NANDHA ENGINEERING COLLEGE

(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE, New Delhi)
Erode-638 052, Tamilnadu, India, Phone: 04294 – 225585

Curriculum and Syllabi
for
B.E – Computer Science and Engineering [R17]

[CHOICE BASED CREDIT SYSTEM]

(This Curriculum and Syllabi are applicable to Students admitted from the academic year 2017-2018 onwards)

SEPTEMBER 2021

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT PEOs, PSOs and POs

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

The following Programme Educational Objectives are designed for B.E. Computer Science and Engineering programme in Computer Science and Engineering based on the Department Vision & Mission to provide higher engineering education and motivate research in the field of Computer Engineering.

- **PEO 1.** Graduates will be employed in IT industries to solve industrial technological issues.
- **PEO 2.** Graduates will take up masters and pursue career paths in teaching and research.
- **PEO 3.** Graduates will be an entrepreneur who develops, deploys and maintains Real-time software.
- **PEO 4.** Graduates will continuously learn and adopt new technologies to solve communal issues.
- **PEO 5.** Graduates will enhance leadership skills and contribute towards societal growth.

PROGRAM SPECIFIC OUTCOMES (PSOs):

- **PSO1.** Ability to understand the principles and working of hardware and software aspects in a computer system
- **PSO2.** Ability to demonstrate knowledge in mathematical models, algorithms and software development methodologies
- **PSO3.** Ability to develop practical competency in programming languages and open source platforms
- **PSO4.** Ability to provide a foundation for higher studies, research and entrepreneurship

PROGRAM OUTCOMES (POs)

a-l	GRADUATE ATTRIBUTES	PO No.	PROGRAMME OUTCOMES
a	Engineering Knowledge	**PO1**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
b	Problem Analysis	**PO2**	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
c	Design and Development of Solutions	**PO3**	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.
d	Investigation of Complex Problems	**PO4**	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.
e	Modern Tool Usage	**PO5**	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.
f	The Engineer and Society	**PO6**	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.
g	Environment and Sustainability	**PO7**	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
h	Ethics	**PO8**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
i	Individual and Team Work.	**PO9**	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
j	Communication	**PO10**	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.
k	Project Management and Finance	**PO11**	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.
l	Lifelong Learning	**PO12**	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.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the Programme educational objectives and the Program Outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	a	b	c	d	e	f	g	h	i	j	k	l
1	3	3	3	3	3	2	2	2	3	3	3	3
2	3	3	3	3	3	2	2	1	3	3	2	3
3	3	3	3	3	3	2	2	2	3	3	3	3
4	3	3	3	3	3	2	2	1	3	3	2	3
5	3	3	3	3	3	3	2	2	2	3	3	3

MAPPING OF PROGRAM SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Outcomes and the Programme Outcomes is given in the following table

PROGRAM SPECIFIC OUTCOMES	PROGRAMME OUTCOMES											
	a	b	c	d	e	f	g	h	i	j	k	l
1	3	3	2	2	2	1	1	1	1	1	1	2
2	3	3	3	3	2	2	1	3	1	2	3	3
3	3	3	3	3	3	3	1	2	1	1	2	3
4	3	3	2	3	3	2	2	3	1	2	2	3

*** Contribution** **1: Reasonable** **2: Significant** **3: Strong**

NANDHA ENGINEERING COLLEGE (AUTONOMOUS), ERODE – 638 052

REGULATIONS – 2017 **CHOICE BASED CREDIT SYSTEM**

B.E. COMPUTER SCIENCE AND ENGINEERING

CURRICULA: I – VIII SEMESTERS **SYLLABI I - VIII SEMESTER**

SEMESTER: I									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1.	17EYA01	Professional English- I	HS	-	4	2	0	2	3
2.	17MYB01	Calculus and Solid Geometry	BS	-	5	3	2	0	4
3.	17PYB02	Physics for Computer Engineers	BS	-	5	3	0	2	4
4.	17CYB03	Environmental Science	BS	-	3	3	0	0	3
5.	17CSC02	Python Programming	ES	-	3	3	0	0	3
PRACTICAL									
6.	17MEP01	Engineering Graphics Laboratory	ES	-	4	0	0	4	2
7.	17CSP02	Python Programming Laboratory	ES	-	4	0	0	4	2
8.	17GEP01	Personal Values	HS	-	2	0	0	2	0
				TOTAL	**30**	**14**	**2**	**14**	**21**

SEMESTER: II									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1.	17EYA02	Professional English- II	HS	17EYA01	4	2	0	2	3
2.	17MYB02	Complex Analysis and Laplace Transforms	BS	17MYB01	5	3	2	0	4
3.	17PYB04	Applied Physics	BS	17PYB02	3	3	0	0	3
4.	17CYB04	Chemistry for Computer Engineers	BS	-	5	3	0	2	4
5.	17CSC03	Structured Programming	ES	-	3	3	0	0	3
6.	17ECC04	Basics of Electronics Engineering	ES	-	4	3	0	0	3
PRACTICAL									
7.	17CSP03	Structured Programming Laboratory	ES	-	4	0	0	4	2
8.	17ECP02	Electronics Laboratory	ES	-	4	0	0	4	2
9.	17GEP02	Interpersonal Values	HS	17GEP01	2	0	0	2	0
				TOTAL	**34**	**17**	**2**	**14**	**24**

SEMESTER: III									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1.	17MYB04	Probability and Statistics	BS	-	4	2	2	0	3
2.	17CSC04	Data Structures using Python	PC	17CSC02	5	3	0	2	4
3.	17ITC01	OOPS using JAVA	PC	-	3	3	0	0	3
4.	17CSC05	Operating Systems	PC	-	3	3	0	0	3
5.	17ECC09	Digital Principles and System Design	ES	17ECC04	3	3	0	0	3
6.	17CSC06	Microprocessor and Computer Architecture	PC	-	3	3	0	0	3
PRACTICAL									
7.	17ITP01	OOPS using JAVA Laboratory	PC	-	4	0	0	4	2
8.	17CSP04	Operating Systems Laboratory	PC	-	2	0	0	2	1
9.	17GED01	Soft Skills – Listening & Speaking	EEC	-	2	0	0	2	0
				TOTAL	**29**	**17**	**2**	**10**	**22**

SEMESTER: IV									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1.	17MYB08	Discrete Mathematics	BS	-	4	2	2	0	3
2.	17ITC04	Design and Analysis of Algorithms	PC	17CSC04	5	3	2	0	4
3.	17CSC07	Database Management System	PC	-	3	3	0	0	3
4.	17CSC08	Computer Networks	PC	-	3	3	0	0	3
5.	17CSC09	Artificial Intelligence	PC	-	3	3	0	0	3
6.	17GEA01	Engineering Economics and Financial Accounting	HS	-	3	3	0	0	3
PRACTICAL									
7.	17CSP05	Database Management System Laboratory	PC	-	4	0	0	4	2
8.	17CSP06	Computer Networks Laboratory	PC	-	2	0	0	2	1
9.	17GED02	Soft Skills – Reading and Writing	EEC	-	2	0	0	2	0
10.	17GED03	Personality and Character Development	EEC	-	1	0	0	1	0
				TOTAL	**30**	**17**	**4**	**9**	**22**

SEMESTER: V									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1.	17CSC10	Theory of Computation	PC	17MYB08	3	3	0	0	3
2.	17ITC09	Internet and Web Programming	PC	17ITC01	4	2	0	2	3
3.	17CSC11	Object Oriented Software Engineering	PC	17CSC07	3	3	0	0	3
4.	17CSC12	Graphics and Multimedia	PC	-	3	3	0	0	3
5.	E1	Elective (PSE)	PSE	-	3	3	0	0	3
6.	E2	Elective (PSE/OE)	PSE/OE	-	3	3	0	0	3
PRACTICAL									
7.	17CSP07	Case Tools Laboratory	PC	-	4	0	0	4	2
8.	17CSP08	Graphics and Multimedia Laboratory	PC	-	4	0	0	4	2
9.	17GED08	Essence of Indian Traditional Knowledge	MC	-	2	2	0	0	0
				TOTAL	**29**	**19**	**0**	**10**	**22**

SEMESTER:VI									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1.	17CSC14	Cloud Computing	PC	-	3	3	0	0	3
2.	17CSC15	Security in Computing	PC	17CSC07, 17CSC08	3	3	0	0	3
3.	17CSC16	Principles of Compiler Design	PC	17CSC10	3	3	0	0	3
4.	E3	Elective (PSE)	PSE	-	3	3	0	0	3
5.	E4	Elective (PSE)	PSE	-	3	3	0	0	3
6.	E5	Elective (PSE/OE)	PSE/OE	-	3	3	0	0	3
PRACTICAL									
7.	17CSP09	Internet of Things Laboratory	ES	-	4	0	0	4	2
8.	17GED06	Comprehension	PC	-	2	0	0	2	0
9.	17GED07	Constitution of India	MC	-	2	2	0	0	0
				TOTAL	**27**	**19**	**0**	**8**	**20**

SEMESTER: VII									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1.	17CSC17	Mobile Computing	PC	17CSC08	3	3	0	0	3
2.	17ITC15	Machine Learning Techniques	PC	17MYB01	3	3	0	0	3
3.	17CSC18	Full Stack Development	PC	-	3	3	0	0	3
4.	E6	Elective (PSE/ OE)	PSE/OE	-	3	3	0	0	3
5.	E7	Elective (OE)	OE	-	3	3	0	0	3
PRACTICAL									
6.	17CSP10	Mobile Computing Laboratory	PC	-	2	0	0	2	1
7.	17CSD01	Project Work I	EEC	-	8	0	0	8	4
				TOTAL	**25**	**15**	**0**	**10**	**20**

SEMESTER: VIII									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1.	E8	Elective (PSE)	PSE	-	3	3	0	0	3
2.	E9	Elective (OE)	OE	-	3	3	0	0	3
PRACTICAL									
3.	17CSD02	Project Work II	EEC	-	16	0	0	16	8
				TOTAL	**22**	**6**	**0**	**16**	**14**

LIST OF PROGRAMME SPECIFIC ELECTIVES

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRERQUISITE	CONTACT PERIODS	L	T	P	C
1	17CSX04	TCP/IP Design and Implementation	PSE	17CSC08	3	3	0	0	3
2	17CSX05	Network Analysis and Management	PSE	17CSC08	3	3	0	0	3
3	17CSX06	Wireless Communication and Networks	PSE	17CSC08	3	3	0	0	3
4	17CSX07	Embedded systems	PSE	-	3	3	0	0	3
5	17CSX08	Graph Theory	PSE	17CSC04	3	3	0	0	3
6	17CSX10	Mobile Application Development	PSE	-	3	3	0	0	3
7	17CSX11	Human Computer Interaction	PSE	17CSC08	3	3	0	0	3
8	17CSX12	Green Computing	PSE	17CSC08	3	3	0	0	3
9	17CSX13	Nano Computing	PSE	17CSC08	3	3	0	0	3
10	17CSX15	Knowledge Management	PSE	-	3	3	0	0	3
11	17ITX05	PHP programming	PSE	17ITC09	3	3	0	0	3
12	17ITX06	Programming with Java2 Enterprise Edition	PSE	17ITC01	3	3	0	0	3
13	17ITX08	C# and .Net	PSE	17ITC01	3	3	0	0	3
14	17ITX09	Ruby programming	PSE	-	3	3	0	0	3
15	17CSX23	Text Mining	PSE	17CSX22	3	3	0	0	3
16	17CSX24	Distributed Systems	PSE	-	3	3	0	0	3
17	17CSX25	Game Programming	PSE	-	3	3	0	0	3
18	17CSX27	Quantum Computing	PSE	17MYB04	3	3	0	0	3
19	17CSX28	Container OrchestrationUsing Kubernetes	PSE	17CSC14	3	3	0	0	3
20	17CSX29	Internet of Things	PSE	17CSC08	3	3	0	0	3
21	17MYB12	Basic Statistics andNumerical Analysis	PSE	-	3	3	0	0	3
22	17CSX31	Problem Solving and Programming	PSE	-	3	3	0	0	3
23	17CSX32	Social network Analysis	PSE	-	3	3	0	0	3
24	17ITX26	Problem Solving and Algorithmic Skills	PSE	-	3	3	0	0	3
25	17ECX16	Internet of Things and its applications	PSE	-	3	3	0	0	3
26	17CSX33	Google Cloud Platform	PSE		3	3	0	0	3

27	17CSX34	Tableau	PSE	-	3	3	0	0	3
28	17CSX35	Node JS	PSE	17ITC09, 17ITX05	3	3	0	0	3
29	17CSX36	React JS	PSE	17ITC09, 17ITX05	3	3	0	0	3
30	17ITX29	IT operations	PSE	-	3	3	0	0	3
31	17ITX30	IT operations Advanced	PSE	17ITX29	3	3	0	0	3
32	17CSX37	Professional Readiness for Innovation, Employability and Entrepreneurship	PSE	-	3	3	0	0	3
33	17ITX32	Test Driven Programming	PSE	-	3	3	0	0	3
34	17ITX33	Java - Full Stack Implementation	PSE	-	3	3	0	0	3
35	17ITX17	Building Enterprise Applications	PSE	-	3	3	0	0	3
36	17ITX37	Problem Solving Using Java	PSE	-	3	3	0	0	3

HUMANITIES AND SOCIAL SCIENCES (HS)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRERQUISITE	CONTACT PERIODS	L	T	P	C
1.	17EYA01	Professional English- I	HS	-	4	2	0	2	3
2.	17GEP01	Personal Values	HS	-	2	0	0	2	0
3.	17EYA02	Professional English- II	HS	17EYA01	4	2	0	2	3
4.	17GEP02	Interpersonal Values	HS	17GEP01	2	0	0	2	0
5.	17GEA01	Engineering Economics andFinancial Accounting	HS	-	3	3	0	0	3

BASIC SCIENCES (BS)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRERQUISITE	CONTACT PERIODS	L	T	P	C
1.	17MYB01	Calculus and Solid Geometry	BS	-	5	3	2	0	4
2.	17PYB02	Physics for Computer Engineers	BS	-	5	3	0	2	4
3.	17CYB03	Environmental Science	BS	-	3	3	0	0	3
4.	17MYB02	Complex Analysis andLaplace Transforms	BS	17MYB01	5	3	2	0	4
5.	17PYB04	Applied Physics	BS	17PYB02	3	3	0	0	3
6.	17CYB04	Chemistry for Computer Engineers	BS	-	5	3	0	2	4
7.	17MYB04	Probability and Statistics	BS	-	4	2	2	0	3
8.	17MYB08	Discrete Mathematics	BS	-	4	2	2	0	3

ENGINEERING SCIENCES (ES)									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	17CSC02	Python Programming	ES	-	3	3	0	0	3
2.	17MEP01	Engineering Graphics Laboratory	ES	-	4	0	0	4	2
3.	17CSP02	Python Programming Laboratory	ES	-	4	0	0	4	2
4.	17CSC03	Structured Programming	ES	-	3	3	0	0	3
5.	17ECC04	Basics of Electronics Engineering	ES	-	4	3	0	0	3
6.	17CSP03	Structured Programming Laboratory	ES	-	4	0	0	4	2
7.	17ECP02	Electronics Laboratory	ES	-	4	0	0	4	2
8.	17ECC09	Digital Principles and System Design	ES	17ECC04	3	3	0	0	3
9.	17CSC13	Internet of Things	ES	-	3	3	0	0	3
10.	17CSP09	Internet of Things Laboratory	ES	-	4	0	0	4	2
EMPLOYABILITY ENHANCEMENT COURSES									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	17GED01	Soft Skills – Listening & Speaking	EEC	-	2	0	0	2	0
2.	17GED02	Soft Skills – Reading & Writing	EEC	-	2	0	0	2	0
3.	17GED03	Personality and Character Development	EEC	-	1	0	0	1	0
4.	17GED08	Essence of Indian Traditional Knowledge	MC	-	2	2	0	0	0
5.	17GED07	Constitution of India	MC	-	2	2	0	0	0
6.	17CSD01	Project Work I	EEC	-	8	0	0	8	4
7.	17CSD02	Project Work II	EEC	-	16	0	0	16	8
PROFESSIONAL CORE (PC)									
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	17CSC04	Data Structures using Python	PC	17CSC02	4	2	0	2	3
2.	17ITC01	OOPS using JAVA	PC	-	3	3	0	0	3
3.	17CSC05	Operating Systems	PC	-	3	3	0	0	3

4.	17CSC06	Microprocessor and Computer Architecture	PC	-	3	3	0	0	3
5.	17ITP01	OOPS using JAVA Laboratory	PC	-	4	0	0	4	2
6.	17CSP04	Operating Systems Laboratory	PC	-	2	0	0	2	1
7.	17CSC07	Database Management System	PC	-	3	3	0	0	3
8.	17CSC08	Computer Networks	PC	-	3	3	0	0	3
9.	17ITC04	Design and Analysis of Algorithms	PC	17CSC04	4	3	2	0	4
10.	17CSC09	Artificial Intelligence	PC	-	3	3	0	0	3
11.	17CSP05	Database Management System Laboratory	PC	-	4	0	0	4	2
12.	17CSP06	Computer Networks Laboratory	PC	-	2	0	0	2	1
13.	17CSC10	Theory of Computation	PC	17MYB08	3	3	0	0	3
14.	17CSC11	Object Oriented Software Engineering	PC	17CSC07	3	3	0	0	3
15.	17ITC09	Internet and Web Programming	PC	-	4	2	0	2	3
16.	17CSC12	Graphics and Multimedia	PC	-	3	3	0	0	3
17.	17CSP07	Case Tools Laboratory	PC	-	4	0	0	4	2
18.	17CSP08	Graphics and Multimedia Laboratory	PC	-	4	0	0	4	2
19.	17CSC14	Cloud Computing	PC	-	3	3	0	0	3
20.	17CSC15	Security in Computing	PC	17CSC07, 17CSC08	3	3	0	0	3
21.	17CSC16	Principles of Compiler Design	PC	17CSC10	3	3	0	0	3
22.	17GED06	Comprehension	PC	-	2	0	0	2	0
23.	17ITC15	Machine Learning Techniques	PC	17MYB01	3	3	0	0	3
24.	17CSC17	Mobile Computing	PC	17CSC08	3	3	0	0	3
25.	17CSP10	Mobile Computing Laboratory	PC	-	2	0	0	2	1
26.	17CSC18	Full Stack Development	PC	-	3	3	0	0	3

(b)Open Electives			AICTE Credit Distribution Norm:18							
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRERQUISITE	CONTACT PERIODS	L	T	P	C	P.S
1.	17AGZ01	Baking and Confectionery Technology	OE	-	3	3	0	0	3	VII
2.	17AGZ02	Food safety and quality control system	OE	-	3	3	0	0	3	VII
3.	17AGZ03	Farm Mechanization	OE	-	3	3	0	0	3	VIII
4.	17AGZ04	Processing of Fruits and Vegetables	OE	-	3	3	0	0	3	VIII
5.	17CHZ01	Waste Water Treatment	OE	-	3	3	0	0	3	VII
6.	17CHZ02	Piping Engineering	OE	-	3	3	0	0	3	VII
7.	17CHZ03	Process Automation	OE	-	3	3	0	0	3	VII
8.	17CHZ04	Process Instrumentation	OE	-	3	3	0	0	3	VII
9.	17CEZ01	Energy conservation in buildings	OE	-	3	3	0	0	3	VII
10.	17CEZ02	Air Pollution Management	OE	-	3	3	0	0	3	VIII
11.	17CEZ03	Building Services	OE	-	3	3	0	0	3	VIII
12.	17CEZ04	Road Safety Management	OE	-	3	3	0	0	3	VII
13	17CEZ05	Waste Management	OE	-	3	3	0	0	3	VII/VII I
14.	17CSZ01	Design Thinking	OE	-	3	3	0	0	3	VII
15.	17CSZ02	Digital Marketing	OE	-	3	3	0	0	3	VII
16.	17CSZ03	Software Engineering	OE	-	3	3	0	0	3	VIII
17.	17CSZ04	Unified Functional Testing	OE	-	3	3	0	0	3	VIII
18	17CSZ05	C Programming	OE	-	3	3	0	0	3	VI
19.	17CSZ06	Data Structures	OE	-	3	3	0	0	3	VI
20.	17CSZ07	Web Services Using Java	OE	-	3	3	0	0	3	VI
21.	17ECZ01	Modern wireless communication system	OE	-	3	3	0	0	3	VII
22.	17ECZ02	Consumer Electronics	OE	-	3	3	0	0	3	VII
23.	17ECZ03	Automotive Electronics	OE	-	3	3	0	0	3	VIII
24.	17ECZ04	Electronic Testing	OE	-	3	3	0	0	3	VIII
25.	17EEZ01	Renewable Energy Technology	OE	-	3	3	0	0	3	VII
26.	17EEZ02	Smart Grid	OE	-	3	3	0	0	3	VII

27.	17EEZ03	Energy Auditing, Conservation and Management	OE	-	3	3	0	0	3	VIII
28.	17EEZ04	Electrical Machines	OE	-	3	3	0	0	3	VIII
29	17EIZ01	Autotronix	OE	-	3	3	0	0	3	VII
30	17EIZ02	Industrial Automation	OE	-	3	3	0	0	3	VII
31.	17EIZ03	Fiber Optic Sensors	OE	-	3	3	0	0	3	VIII
32.	17EIZ04	Ultrasonic Instrumentation	OE	-	3	3	0	0	3	VIII
33.	17ITZ01	Software Testing Tool	OE	-	3	3	0	0	3	VII
34.	17ITZ02	User Experience	OE	-	3	3	0	0	3	VII
35.	17ITZ03	Developing Mobile Apps	OE	-	3	3	0	0	3	VIII
36.	17ITZ04	Software Project Management	OE	-	3	3	0	0	3	VIII
37.	17ITZ05	Java Programming	OE	-	3	3	0	0	3	VI
38.	17MEZ01	Engineering Ergonomics	OE	-	3	3	0	0	3	VII / VIII
39.	17MEZ02	Energy Audit and Resource Management	OE	-	3	3	0	0	3	VII / VIII
40.	17MEZ03	Electric Vehicle Technology	OE	-	3	3	0	0	3	VII / VIII
41.	17MEZ04	Value Engineering	OE	-	3	3	0	0	3	VII / VIII
42.	17MEZ05	Smart Mobility	OE	-	3	3	0	0	3	VII / VIII
43.	17MEZ06	Smart Sensor Systems	OE	-	3	3	0	0	3	VII / VIII
44.	17MYZ01	Mathematical Structures	OE	-	3	3	0	0	3	VII
45.	17MYZ02	Optimization Techniques	OE	-	3	3	0	0	3	VII
46.	17MYZ03	Statics for Engineers	OE	-	3	3	0	0	3	VII
47.	17MYZ04	Statistics for Engineers	OE	-	3	3	0	0	3	VII
48.	17PYZ01	Nanomaterials	OE	-	3	3	0	0	3	VII
49.	17PYZ02	Nuclear physics and Reactors	OE	-	3	3	0	0	3	VII
50.	17PYZ03	Space science and technology	OE	-	3	3	0	0	3	VII
51.	17CYZ01	Chemistry for Every DayLife	OE	-	3	3	0	0	3	VII

52.	17CYZ02	E - Waste Management	OE	-	3	3	0	0	3	VII
53.	17CYZ03	Industrial Chemistry	OE	-	3	3	0	0	3	VII
54.	17EYZ01	Communicative Hindi	OE	-	3	3	0	0	3	VII
55.	17EYZ02	Fundamentals of German	OE	-	3	3	0	0	3	VII
56.	17EYZ03	Basics of Japanese	OE	-	3	3	0	0	3	VII
57.	17EYZ04	Employability Enhancement and Analytical Skills	OE	-	3	3	0	0	3	VII
58.	17EYX01	Effective Communication	OE	-	3	3	0	0	3	VII
59.	17EYZ05	Workplace Communication	OE	-	3	3	0	0	3	VII
60.	17GYZ01	Biology for Engineers	OE	-	3	3	0	0	3	VII
61.	17BMZ01	Health care technology	OE	-	3	3	0	0	3	VII
62.	17BMZ02	Telemedicine	OE	-	3	3	0	0	3	VII
63.	17BMZ03	Epidemiology and Pandemic Management	OE	-	3	3	0	0	3	VII
64.	17BMZ04	Medical Ethics	OE	-	3	3	0	0	3	VII
65.	17AIZ01	Fundamentals of Artificial Intelligence and Machine Learning	OE	-	3	3	0	0	3	VII
66.	17AIZ02	Data Science Fundamentals	OE	-	3	3	0	0	3	VII
67.	17AIZ03	Introduction to Business Analytics	OE	-	3	3	0	0	3	VII
68.	17AIZ04	Augmented Reality/Virtual Reality Technologies	OE	-	3	3	0	0	3	VII
69	17ITZ06	Data Structures using C	OE	-	3	3	0	0	3	VII
70	17ITZ07	Product Lifecycle Management for Engineers	OE		3	3	0	0	3	VII

Honor Degree Courses								
Vertical I - Software Engineering								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	17ITX07	Advanced Web Programming	17ITC09	3	3	0	0	3
2.	17CSX17	Software Design and Architecture	-	3	3	0	0	3
3.	17CSX18	Software Testing Methodologies	-	3	3	0	0	3
4.	17CSX19	Software Agents	-	3	3	0	0	3
5.	17CSX20	Software Quality Assurance	-	3	3	0	0	3
6.	17CSX21	Software Project Management	-	3	3	0	0	3
7.	17CSX30	Agile methodologies	-	3	3	0	0	3
8.	17CSX38	Devops	-i	3	3	0	0	3
Vertical II - Data Science								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**PRERQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	17CSX01	Data Science	17MYB04, 17CSC07	3	3	0	0	3
2.	17CSX02	Data Warehousing and Data Mining	17CSC07	3	3	0	0	3
3.	17CSX03	Data Analytics	17CSC07	3	3	0	0	3
4.	17CSX09	Information Retrieval Techniques	17CSC07	3	3	0	0	3
5.	17CSX14	Deep Learning	17MYB02, 17MYB04	3	3	0	0	3
6.	17CSX16	Image Processing Techniques	-	3	3	0	0	3
7.	17CSX22	Natural Language Processing	-	3	3	0	0	3
8.	17CSX26	Block chain Technologies	17ITC09	3	3	0	0	3

Minor Degree Courses								
Full Stack Development								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**PRE-RQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	17CSM01	User Interface design	-	3	3	0	0	3
2.	17CSM02	Programming using Java	-	3	3	0	0	3
3.	17CSM03	Database System Concepts	-	3	3	0	0	3
4.	17CSM04	XML and Web Services	-	3	3	0	0	3
5.	17CSM05	Web Technologies	-	3	3	0	0	3
6.	17CSM06	Open source systems	-	3	3	0	0	3
7.	17CSM07	UI and UX Design	-	3	3	0	0	3
8.	17CSM08	C# and .Net frame work	17CSM02	3	3	0	0	3

CREDIT DISTRIBUTION

SEM	HS	BS	PC	ES	EEC	PSE	OE	TOTAL
I	3	11	-	7	-	-	-	**21**
II	3	11	-	10	-	-	-	**24**
III	-	3	16	3	-	-	-	**22**
IV	3	3	16	-	-	-	-	**22**
V	-	-	16	-	-	6	-	**22**
VI	-	-	9	2	0	9	-	**20**
VII	-	-	10	-	4	3	3	**20**
VIII	-	-	-	-	8	3	3	**14**
TOTAL	**9**	**28**	**64**	**22**	**12**	**24**	**6**	**165**
%	**5.5**	**17.0**	**38.8**	**13.3**	**7.3**	**14.5**	**3.6**	
AICTE %	**5-10**	**15-20**	**30-40**	**15-20**	**-**	**10-15**	**5-10**	

TOTAL CREDITS (21+24+22+22+22+20+20+14) = 165 CREDITS

17EYA01 - PROFESSIONAL ENGLISH - I (*Common to All Branches*)				
L	**T**	**P**	**C**
2	**0**	**2**	**3**
PREREQUISITE : NIL	**QUESTION PATTERN: TYPE - 1**		

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program Outcomes
1.0	To articulate and enunciate words and sentences clearly and efficiently using grammatical structures.	**1.1**	The students will be able to construct clear, grammatically correct sentences using a variety of sentence structures and appropriate vocabulary.	**f, i, j, l**
2.0	To acquire information through listening and apply it to persuade or articulate one's own point of view.	**2.1**	The students will be able to utilize listening skills to articulate one's own point of view in different circumstances.	**f, i, j, l**
3.0	To enable students to express themselves fluently and appropriately in social and professional contexts.	**3.1**	The students will be able to apply appropriate communication skills across settings, purposes, and audiences.	**f, i, j, l**
4.0	To summarize and paraphrase information in a text through reading skills.	**4.1**	The students will be able to distinguish main ideas and supporting details and employ active reading strategies to understand texts at the maximum level.	**f, i, j, l**
5.0	To understand different techniques and contents based on the written communication.	**5.1**	The students will be able to equip themselves with writing skills needed for academic as well as workplace contexts.	**f, i, j, l**

UNIT I - FOCUS ON LANGUAGE	**(6+6)**
Parts of Speech – Articles - Primary Auxiliaries – Modal Auxiliaries - Questions (_Yes/No' & _Wh' Type) – Negatives - Prepositions – Conjunctions - Tenses (Simple, Continuous, Perfect, Perfect Continuous) - Vocabulary (Synonyms & Antonyms) - Homophones – Homonyms - One Word Substitution	
UNIT II – LISTENING FOR EFFECTIVENESS	**(6+6)**
Listening to Short Conversations or Monologues - Listening to Verbal and Non-Verbal Communication – Listening to Announcements - Listening and Note-taking – Listening to Telephonic Conversations – Listening to TED/ Ink talks- Intensive listening to fill in the gapped text	
UNIT III – COMMUNICATION BOOSTERS	**(6+6)**
Introducing Oneself – Exchanging Personal information (Likes & Dislikes) – Talking about Family & Friends - Asking about Routine Actions and Expressing Opinions - Participating in Short Conversations - Situational Talk	

UNIT IV – PROFESSIONAL READING	(6+6)
Skimming – Scanning (Short Texts and Longer Passages) – Inferring Technical Texts – Reading for Interrogation – Reading Newspaper, Advertisements and Interpreting – Practicing Speed Reading - Reading Comprehension (Multiple choice / Short / Open ended Questions) - Gap Filling	
UNIT V – TECHNICAL CORRESPONDENCE	**(6+6)**
Seeking Permission for Industrial Visit & In-plant Training – Checklist – Instruction - E-mail Writing - Report Writing (Accident & Survey)	

LIST OF SKILLS ASSESSED IN THE LABORATORY

1. Language Skills.
2. Listening Skills.
3. Speaking Skills.
4. Reading Skills
5. Writing Skills

TOTAL (L:30, P:30) = 60 PERIODS

TEXT BOOKS:

1. Sudharshana, N.P and Saveetha.C, “English for Technical Communication”, Cambridge University Press, New Delhi, 2016.
2. Jackman, Vanessa and Russell, Whitehead, “Cambridge English Business Preliminary Practice Tests”, Oxford University Press, New Delhi, 2016.

REFERENCES:

1. Rizvi, Ashraf M. “Effective Technical Communication”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2006.
2. Hewings M, “Advanced English Grammar”, Cambridge University Press, Chennai, 2000.

17MYB01 - CALCULUS AND SOLID GEOMETRY *(Common to All Branches)*				
	L	**T**	**P**	**C**
	3	**2**	**0**	**4**

PREREQUISITE : NIL	**QUESTION PATTERN: TYPE - 4**

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		**Course Outcomes**	**Related Program outcomes**
1.0	To develop the use of matrix algebra techniques those are needed by engineers for practical applications.	**1.1**	The students will be able to apply the concept of orthogonal reduction to diagonalise the given matrix.	**a,b,c,e,i,k,l**
2.0	Use the techniques, Skills and Engineering tools necessary for engineering practice, with Geometric concepts.	**2.1**	The students will be able to gain knowledge about the geometrical aspects of sphere.	**a,b,c,e,f,i,l**
3.0	To improve their ability in solving geometrical applications of differential calculus problems.	**3.1**	The students will be able to find the radius of curvature, circle of curvature and centre of curvature for a given curve.	**a,b,c,l**
4.0	To learn the important role of Mathematical concepts in engineering applications with the functions of several variables.	**4.1**	The students will be able to classify the maxima and minima for a given function with several variables, through by finding stationary points.	**a,b,c,d,i,l**
5.0	To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.	**5.1**	The students will be able to demonstrate the use of double and triple integrals to compute area and volume.	**a,b,c,d,f,i,l**

UNIT I - MATRICES	**(9+6)**
Characteristic Equation-Eigen values and Eigen vectors of a matrix –Properties (statement only)- Cayley Hamilton Theorem and its applications- Orthogonal transformation of a symmetric matrix to a diagonal form - Quadratic form- Reduction of a Quadratic form to canonical form by orthogonal transformation.	
UNIT II - ANALYTICAL GEOMETRY OF THREE DIMENSIONS	**(9+6)**
Equation of a Plane – Angle between two planes - Equation of straight lines-Coplanar lines- skew lines- Equation of a sphere – Orthogonal spheres.	
UNIT III - GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS	**(9+6)**
Curvature – Curvature in Cartesian co-ordinates-Centre and Radius of curvature-Circle of curvature-Evolutes and Involutes-Envelopes.	
UNIT IV - FUNCTIONS OF SEVERAL VARIABLES	**(9+6)**
Partial derivatives - Euler's theorem on homogeneous function -Jacobian-Maxima and Minima of functions of two variables-Constrained Maxima and Minima by Lagrange's multiplier method.	
UNIT V - MULTIPLE INTEGRALS	**(9+6)**
Double integration in Cartesian Co-ordinates-Change of order of integration-Area as double integral- Triple integration in Cartesian Co-ordinates-Volume as triple integrals.	
TOTAL (L: 45 +T:30) = 75 PERIODS	

Note : Simulation of Engineering Problems (Qualitative Analysis) using open source software

TEXT BOOKS:

1. Dr. B.S.Grewal, "Higher Engineering Mathematics", 42nd ed., Khanna publications, 2012.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th ed., John Wiley & sons, 2013.
3. Veerarajan.T, "Engineering Mathematics for Semester I & II", 3rd ed., Tata McGraw Hill, 2014.

REFERENCES:

1. N.P.Bali, Manish Goyal, "A text book of Engineering Mathematics Sem-II", 5th ed., Laxmi Publications.2011.
2. Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first Year", 9th ed., R. V. Chand & Co Ltd, 2013.
3. Glyn James, "Advanced Engineering Mathematics", 7th ed., Wiley India, (2007).

17PYB02 - PHYSICS FOR COMPUTER ENGINEERS *(Common to CSE and IT Branches)*				
L	**T**	**P**	**C**
3	**0**	**2**	**4**
PREREQUISITE : NIL	**QUESTION PATTERN: TYPE - 1**		

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To provide the basic ideas in all the kinds of engineering branches	**1.1**	The students will be able to acquire knowledge regarding Acoustics and ultrasonic	**a,c,d,e,f,l**
2.0	To develop the skills of the students in physics under various applications	**2.1**	The students will be able to applying knowledge in the fields of optics & laser technology	**a,c,d,e,f,l**
3.0	To cultivate the censor designing ability of the students	**3.1**	The students will be able to design the sensors using the knowledge of fiber optics	**a,c,d,e,f,l**
4.0	To provide knowledge in wave and particle physics	**4.1**	The students will be able to gain the knowledge of wave, particle nature and matter waves	**a,b,l**
5.0	To provide the fundamental knowledge in basics of crystals	**5.1**	The students will be able to analyze the different kind of crystal structures and crystal growth	**a,c.e.f,l**

UNIT I - ULTRASONICS	**(9)**
Ultrasonic: Introduction - Properties of Ultrasonics- Magnetostriction and piezo electric methods. Cavitation- Velocity of ultrasonic waves using acoustic grating- SONAR- NDT- Ultasonic Flaw detector- Ultrasonic A, B & C scan methods- Sonogram – Comparison between ECG and PCG- Ultasonic Imaging system(Scanner).	
UNIT II - OPTICS & LASER TECHNOLOGY	**(9)**
Interference: Air wedge – theory – uses – testing of flat surfaces – determination of thickness of a thin wire. Types of lasers – Nd – YAG laser – CO2 laser – semiconductor laser (homojunction & hetrojuction). Applications: Holography – construction – reconstruction – Lasers in industry (Material Processing) and Medical field (Surgery)	
UNIT III - FIBER OPTICS AND SENSORS	**(9)**
Principle of light transmission through fiber – expression for acceptance angle and numerical aperture – Fabrication of optical fibers- Double crucible method – types of optical fibers (material, refractive Index profile and mode) fiber optic communication system. Splicing – Applications of optical fiber – Sensors- temperature- pressure sensor and displacement sensor Medical Endoscope.	
UNIT IV - QUANTUM PHYSICS	**(9)**
Development of quantum theory – de Broglie wavelength – properties of matter waves – G.P Thomson experiment Schrödinger‘s wave equation – time dependent – time independent wave equations – physical significance – applications – particle in a one dimensional potential box - Compton Effect – theory and experimental verification.	
UNIT V - CRYSTALOGRAPHY	**(9)**
Lattice – unit cell – Bravais lattices – 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 – Crystal growth techniques- Bridgemann and Czochralski Methods.	

LIST OF EXPERIMENTS:

1. Determination of Velocity of sound and compressibility of liquid using Ultrasonic Interferometer
2. Determination of Wavelength of Mercury spectrum- Spectrometer-Grating
3. Determination of Thickness of a thin wire- Air wedge Method
4. Determination of Wavelength of given laser, Particle size and Angle of Divergence of laser beam.
5. Determination of Acceptance angle and Numerical of an optical Fiber using a semiconductor laser.

TOTAL (L:45+P:30) = 75 PERIODS

TEXT BOOKS:

1. V. Rajendran, 'Engineering Physics", Tata McGraw-Hill, New Delhi, 2011.
2. K. Tamilarasan, K. Prabu, "Engineering Physics I", 2nd ed., Tata McGraw-Hill. New Delhi. 2011.

REFERENCES:

1. P. K. Palanisami, "Physics for Engineers", Vol. 1, SciTech Pub. (India) Pvt. Ltd., Chennai, 2002.
2. M. N. Avadhanulu and P. G. Kshirsagar, "A Textbook of Engineering Physics", S. Chand & Company Ltd., New Delhi, 2005.
3. V. Rajendran and A. Marikani, "Physics I", TMH, New Delhi, 2004.
4. R. K. Gaur and S. L. Gupta, "Engineering Physics", Dhanpat Rai Publishers, New Delhi, 2006.
5. Dr. Y. Aparna & Dr. K. Venkateswara Rao, "Laboratory Manual of Engineering Physics.", V.G.S Publishers.
6. G.L. Squires, "Practical Physics", Cambridge University Press, Cambridge, 1985. 11. 12.
7. M.H. Shamos, Holt, "Great Experiments in Physics", Rinehart and Winston Inc., 1959.

17CYB03 - ENVIRONMENTAL SCIENCE *(Common to All Branches)*					
			L	**T**	**P**	**C**
			3	**0**	**0**	**3**
PREREQUISITE : NIL		**QUESTION PATTERN: TYPE - 3**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**			**Related Program outcomes**
1.0	To understand the constitutes of the environment	**1.1**	The students will be able to design a system, component, or process to meet desired needs.		**a,b,c,f,g**
2.0	The students should be conversant with valuable resources	**2.1**	The students will be able to identify, formulate, and solve environmental engineering problems		**a,b,c,f,g**
3.0	To know about the role of a human being in maintaining a clean environment.	**3.1**	The students will be able to understand the professional and ethical responsibility as related to the practice of environmental engineering and the impact of engineering solutions in a global context.		**a,b,c,f,g**
4.0	To maintain ecological balance and preserve bio-diversity.	**4.1**	The students will be able to use the techniques, skills, and modern engineering tools necessary for environmental engineering practice.		**a,b,c,f,g**
5.0	To get knowledge about the conservation of environment for the future generation.	**5.1**	The students will be able to acquire the knowledge of information technology in environmental science.		**a,b,c,f,g**

UNIT I - INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES	**(9)**
Environment: Scope – importance - need for public awareness - Forest resources - Use-over exploitation-deforestation - Water resources - use-over utilization of surface and ground water - conflicts over water - Mineral resources - use-exploitation-environmental effects of extracting and using mineral resources - Food resources - world food problems changes caused by agriculture - Effects of modern agriculture - fertilizer- pesticide problems - Energy resources - Renewable energy sources - solar energy - wind energy. Land resources - land degradation - soil erosion - Role of an individual in conservation of natural resources.	
UNIT II - ECOSYSTEMS AND BIODIVERSITY	**(9)**
Concepts of an ecosystem - Structure and function of an ecosystem - Producers, consumers and decomposers - Food chains- food webs - types of ecosystem - structure and functions of forest ecosystem and river ecosystem – Biodiversity - value of biodiversity - consumptive use-productive use - social values - ethical values - aesthetic values - Hotspots of biodiversity -Threats to biodiversity - Habitat loss - poaching of wildlife and man wildlife conflicts- Conservation of biodiversity - In-situ and Ex-situ conservation of biodiversity.	
UNIT III - ENVIRONMENTAL POLLUTION	**(9)**
Pollution: Causes - effects and control measures of Air pollution - Water pollution - Soil pollution and Noise pollution - Solid waste management - Causes - effects -control measures of urban and industrial wastes - Role of an individual in prevention of pollution - Disaster managements - Floods - cyclone- landslides.	

UNIT IV - SOCIAL ISSUES AND THE ENVIRONMENT	(9)
Water conservation - rain water harvesting - global warming - acid rain - ozone layer depletion - Environment protection act - Air (Prevention and control of pollution) Act - Water (prevention and control of pollution) Act - Green Chemistry – Principle of Green chemistry – Application of Green chemistry.	
UNIT V - HUMAN POPULATION AND THE ENVIRONMENT	**(9)**
Population growth - variation among nations - Population explosion - Family welfare programme - Human rights - HIV/AIDS – Human health and environment - women and child welfare - Role of information technology in environment and human health.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Anubha Kaushik and C.P. Kaushik, "Environmental Science and Engineering", New Age International Publishers, New Delhi, 2015
2. Dr. A.Ravikrishan, "Envrionmental Science and Engineering", Sri Krishna Hitech Publishing co. Pvt. Ltd.,Chennai, 12th ed, 2016.

REFERENCES:

1. Masters, Gilbert M, "Introduction to Environmental Engineering and Science", 2nd ed., Pearson Education, New Delhi ,2012.
2. Santosh Kumar Garg, Rajeshwari Garg, Smf Ranjni Garg "Ecological and Environmental Studies", Khanna Publishers, Nai Sarak, Delhi, 2014.
3. Miller T.G. Jr., "Environmental Science", 10th ed., Wadsworth Publishing Co., 2015.

17CSC02 - PYTHON PROGRAMMING *(Common to CSE, ECE, EEE, EIE ,IT & BME Branches)*				
L	**T**	**P**	**C**
3	**0**	**0**	**3**
PREREQUISITE : NIL	**QUESTION PATTERN: TYPE - 1**		

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To gain knowledge about the basics of computer to solve problems	**1.1**	The students will be able to understand the working of computers.	**a,b,c,d,e,h,j,k,l**
2.0	To impart the fundamental concepts of Python Programming	**2.1**	The students will be able to understand the basics of Python Programming constructs.	**a,b,c,d,e,h,i,j,k,l**
3.0	To gain exposure about string manipulation, list, and tuples	**3.1**	The students will be able to realize the need of strings, list, and tuples.	**a,b,c,d,e,h,i,j,k,l**
4.0	To get knowledge about dictionaries, function and modules	**4.1**	The students will be able to design programs involving dictionaries and function.	**a,b,c,d,e,h,i,j,k,l**
5.0	To learn about exception handling.	**5.1**	The students will be able to develop simple programs using file concept and modules.	**a,b,c,d,e,h,i,j,k,l**

UNIT I - BASICS OF COMPUTERS & PROBLEM SOLVING	**(9)**
Computer Basics - Computer organization - Computer Software- Types of software - Software Development steps - Algorithms - Flowchart.	
UNIT II - INTRODUCTION TO PYTHON	**(9)**
History – Features – Execution of python program – Flavors of Python – Comments - Data Types - Built-in data types– Sequences - Literals– Operators – Input and Output Statements - Conditional Statements : if – if-else – Nested if-else – For – While – Nested loops – Break – Continue - pass - assert - return	
UNIT III - STRINGS, LISTS AND TUPLES	**(9)**
Strings and Characters: Creating – Length – Indexing – Slicing – Repeating – Concatenation – Comparing - Removing Spaces - Finding Sub Strings - Counting Substrings in a String - Strings are Immutable - Replacing a String with another String - Splitting and Joining Strings - Changing Case of a String - Checking Starting and Ending of a String - Formatting the Strings - Working with Characters - Sorting Strings - Searching - Finding Number. Lists: Creating Lists – Updating - Concatenation - Repetition - Methods – Sorting. Tuples: Creating - Accessing – Operations – Functions - Nested Tuples - Inserting Elements, Modifying Elements, Deleting Elements from a Tuple.	

UNIT IV - DICTIONARIES AND FUNCTIONS	(9)
Dictionaries: Operations – Methods - Using for Loop with Dictionaries – Sorting the Elements of a Dictionary using Lambdas - Converting Lists and Strings into Dictionary - Passing Dictionaries to Functions - Ordered Dictionaries. Functions: Defining – Calling – Returning - Pass by Object Reference – Formal, Actual, Positional, Keyword, Default & Variable Length Arguments - Local and Global Variables - Recursive Functions - Lambdas - Function Decorators.	
UNIT V - FILES AND MODULES	**(9)**
Files - Types of Files - Opening & Closing a File - Working with Text Files Containing Strings - Working with Binary Files - The with Statement - The seek() and tell() Methods - Random Accessing of Binary Files - Random Accessing of Binary Files using mmap - Zipping and Unzipping Files - Working with Directories. - Modules: Importing module – Features – Built in functions.	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. Dr. R. Nageswara Rao, "Core Python Programming", Dreamtech Press, 2017 Edition.

REFERENCES:

1. Kenneth A. Lambert, 'Fundamentals of Python: First Programs", Cengage Learning, 2012.
2. Wesley J. Chun, "Core Python Programming", Pearson Education, 2nd ed., 2010.

17MEP01 - ENGINEERING GRAPHICS LABORATORY
(Common to CSE and IT Branches)

L	T	P	C
0	0	4	2

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To equip the ability of data extraction and transform it into graphic drawings	**1.1**	The students will be able to construct conic sections and special curves of required specifications	**a,b,c,d,e,f,g,h,i,j,l**
2.0	To learn basic engineering drawing and standards related to technical drawing	**2.1**	The students will be able to apply the concept of first angle projection to create project of straight lines, planes, solids and section of solids	**a,b,c,d,e,f,h,i,k,l**
3.0	To understand and practice the engineering drawings	**3.1**	The students will be able to develop a surface drawing of a solid model with given dimensions	**a,b,c,d,e,g,h,j,k,l**
4.0	To learn the steps involved in construction of orthographic and isometric projections	**4.1**	The students will be able to build orthographic, isometric projections of a three dimensional object	**a,b,c,d,e,g,h,i,j,l**
5.0	To understand the practice of creating physical models	**5.1**	The students will be able to make use of the knowledge of engineering drawing to create physical models	**a,b,d,e,g,h,i,l**

LIST OF EXPERIMENTS:

1. Study of basic tools, commands and coordinate system (absolute, relative, polar, etc.) used in 2D software.
2. Draw the conic curves and special curves by using drafting software.
3. Draw the front view, top view, side view of objects from the given pictorial view.
4. Draw the projections of straight lines.
5. Draw the projections of polygonal surface.
6. Draw the projections of simple solid objects.
7. Draw the sectional view and the true shape of the given section.
8. Draw the development of surfaces like prism, pyramid, cylinder and cone.
9. Draw the isometric projections of simple solids. (Prism and Pyramid).
10. Draw the isometric projections of cylinder and cone.

TOTAL (P:60) = 60 PERIODS

REFERENCE:

1. K.Venugopal, V.Prabhu Raja, "Engineering Graphics II", New Age International (P) Limited, 2013.

17CSP02 - PYTHON PROGRAMMING LABORATORY
(Common to CSE, ECE, EEE, EIE , IT & BME Branches)

L	T	P	C
0	0	4	2

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To impart the fundamental concepts of Python Programming	**1.1**	The students will be able to understand the basics of Python Programming constructs	**a,b,c,d,j**
2.0	To learn the operator concepts of Python Programming	**2.1**	The students will be able to understand the various operators of Python Programming.	**a,b,d**
3.0	To gain exposure about string manipulation, list, and tuples	**3.1**	The students will be able to realize the need of string manipulation, list, and tuples	**a,b,c,d,i,l**
4.0	To get knowledge about dictionaries, function and modules	**4.1**	The students will be able to design programs involving dictionaries, function and modules	**a,b,c,d,i,k,l**
5.0	To learn about exception handling	**5.1**	The students will be able to develop simple programs with exception handling	**a,b,c,d,f,l,k,l**

PYTHON-PROGRAMMING:

1. Program using Operators
2. Program using Conditional Statements
3. Program using Looping
4. Program using Strings
5. Program using Lists
6. Program using Dictionaries
7. Program using Tuples
8. Program using Functions
9. Program using File handling
10. Program using Modules

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos,Printers – 3 Nos.

Software:

- OS – Windows / UNIX Clone
- Open Source Software – Python

TOTAL (P:60) = 60 PERIODS

17GEP01 - PERSONAL VALUES *(Common to All Branches)*					
			L	**T**	**P**	**C**
			0	**0**	**2**	**0**
PREREQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**			**Related Program outcomes**
1.0	To make students to learn individual in knowing them self	**1.1**	The students will be able to become an individual in knowing the self		**a, f**
2.0	To enable the student to understand Gratitude, Truthfulness, Punctuality, Cleanliness & fitness.	**2.1**	The students will be able to acquire and express Gratitude, Truthfulness, Punctuality, Cleanliness & fitness.		**a, g**
3.0	To enable the student to understand physical exercise and breathing techniques	**3.1**	The students will be able to practice simple physical exercise and breathing techniques		**a, c**
4.0	To make the students to do Yoga asana to enhance the quality of life.	**4.1**	The students will be able to practice Yoga asana which will enhance the quality of life.		**a, c, f**
5.0	To motivate the students to Practice Meditation and get benefited	**5.1**	The students will be able to practice meditation and get benefited.		**a, f**

VALUES THROUGH PRACTICAL ACTIVITIES:

1.KNOWING THE SELF

Introduction to value education - Need & importance of Value education – Knowing the self – realization of human life – animal instinct vs sixth sense.

2. MENTAL HEALTH

Evolution of senses – functioning steps of human mind – Body and Mind coordination - Analysis of thoughts – moralization of desires– autosuggestions – power of positive affirmations. – Meditation and its benefits.

3.PHYSICAL HEALTH

Physical body constitution– Types of food - effects of food on body and mind – healthy eating habits – food as medicine– self healing techniques.

4.CORE VALUE SELF LOVE& SELF CARE

Gratitude - Happiness - Optimistic –Enthusiasm – Simplicity – Punctual - Self Control - Cleanliness & personal hygiene - Freedom from belief systems.

5.FITNESS

Simplified physical exercises – Sun salutation - Lung strengthening practices: Naadi suddhi pranayama – Silent sitting and listening to nature – Meditation.

TOTAL(P:30) = 30 PERIODS

REFERENCES:

1. Know Yourself — Socrates – pdf format at www.au.af.mil/au/awc/awcgate/army/rotc_self-aware.pdf.
2. Steps to Knowledge: the book of Inner Knowing – pdf format at www.newmessage.org/wp content/uploads/pdfs/books/stk_nkl_v1.5.pdf.
3. Promoting Mental Health - World Health Organization – pdf.
4. www.who.int/mental_health/evidence/mh_promotion_book.pdf
5. Learning to be: A Holistic and Integrated Approach to Values – UNESCO pdf format at www.unesdoc.unesco.org/ images/ 0012/001279/127914e.pdf
6. Personality Development by Swami Vivekananda -www.estudantedavedanta.net/personality- development.pdf

17EYA02 PROFESSIONAL ENGLISH – II
(Common to All Branches)

L	T	P	C
2	0	2	3

PREREQUISITE : 17EYA01 | **QUESTION PATTERN : TYPE - 1**

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To enable students to get familiar with words, phrases and sentences relevant to the immediate communication tasks.	**1.1**	The students will be able to communicate using a variety of sentence structures and appropriate vocabulary.	**f,i,j,l**
2.0	To help students to develop their listening skills and comprehend them by asking questions.	**2.1**	The students will be able to comprehend conversations and short talks delivered in English and respond accordingly.	**f,i,j,l**
3.0	To enhance students' speaking skills by making them to participate in Technical Presentation, Group Discussion, etc.	**3.1**	The students will be able to speak appropriately and effectively in various situations.	**f,i,j,l**
4.0	To inculcate reading habit and to develop effective reading skills.	**4.1**	The students will be able to employ active reading strategies to understand texts at the maximum level.	**f,i,j,l**
5.0	To foster the ability to write convincing Job Application and effective Formal Letters.	**5.1**	The students will be able to equip themselves with writing formal letters and winning Job Application.	**f,i,j,l**

UNIT I - LANGUAGE DEVELOPMENT **(6+6)**

Vocabulary (Prefixes & Suffixes) - Active Voice and Passive Voice - Impersonal Passive Voice – Conditional Clauses – Subject - Verb Agreement - Direct and Indirect Speech - Idioms and Phrases - Discourse Markers - Error Spotting

UNIT II - LISTENING COMPREHENSION **(6+6)**

Listening for Specific Information and Match / Choose / Fill in the texts - Short Films, News, Biographies, Roles and Responsibilities in Corporate, Funny Shows – Listening to Iconic Speeches and making notes – Listening to Interviews

UNIT III - ACQUISITION OF ORAL SKILLS **(6+6)**

Describing a Person - Making Plans – Asking for and Giving Directions - Talking about Places - Talking over Phone – Narrating Incidents – Introduction to Technical Presentation - Story Telling – Group Discussion

UNIT IV - READING NUANCES **(6+6)**

Intensive Reading – Extensive Reading – Finding key information in a given text - Reading and Understanding Technical Articles - Reading and Interpreting Visual Materials

UNIT V - EXTENDED WRITING **(6+6)**

Job Application with Resume – Recommendation – Inviting Dignitaries - Accepting & Declining Invitation - Paragraph Writing (Topics and Images)

LIST OF SKILLS ASSESSED IN THE LABORATORY

1. Language Skills.
2. Listening Skills.
3. Speaking Skills.
4. Reading Skills
5. Writing Skills

TOTAL (L:30 + P:30) = 60 PERIODS

TEXT BOOKS:

1. Kumar, Suresh. E. “Engineering English”, Orient Blackswan: Hyderabad, 2015.
2. Raman, Meenakshi and Sangeetha Sharma, “Technical Communication Principles and Practice”, Oxford University Press: New Delhi, 2014.

REFERENCES:

1. Board of Editors, “Fluency in English – A Course Book for Engineering and Technology”, Orient Blackswan: Hyderabad, 2016.
2. Comfort, Jeremy, et al., “Speaking Effectively: Developing Speaking Skills for Business English”, Cambridge University Press: Cambridge, 2011.

17MYB02 COMPLEX ANALYSIS AND LAPLACE TRANSFORMS *(Common to All Branches)*				
L	**T**	**P**	**C**
3	**2**	**0**	**4**
PREREQUISITE : 17MYB01	**QUESTION PATTERN : TYPE - 4**		

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To expose the concepts of differential equations.	**1.1**	The students will be able to predict the suitable method to solve second and higher order differential equations	**a,b,c,d,f,i,k,l**
2.0	To communicate the problem solutions using correct Mathematical terminology of vector calculus.	**2.1**	The students will be able to apply the concepts of Differentiation and Integration to Vectors.	**a,b,c,f,g,l**
3.0	Apply rigorous and analytic approach to analyse the conformal mapping.	**3.1**	The students will be able to compute an analytic function, when its real or imaginary part is known.	**a,b,c,d,e,i,l**
4.0	Acquiring the knowledge of evaluating contour integrals using residue theorem.	**4.1**	The students will be able to identify the Singularities and its corresponding Residues for the given function.	**a,b,c,d,e,h,j,l**
5.0	Apply the concepts of Laplace transforms & its applications to various problems related to Engineering.	**5.1**	The students will be able to predict a suitable method to evaluate the Contour integration.	**a,b,c,d,e,f,i,l**

UNIT I - ORDINARY DIFFERENTIAL EQUATIONS	**(9+6)**
Higher order linear differential equations with constant coefficients - Method of variation of parameters Cauchy's and Legendre's Equations.	
UNIT II - VECTOR CALCULUS	**(9+6)**
Gradient and Directional derivative -Divergence and Curl – Irrotational, solenoidal and scalar potential –Line integral over a plane curve-Surface Integral and Volume Integral-Green's theorem in a plane-Gauss divergence theorem and Stokes Theorem (Excluding Proofs)-Simple Applications Involving Square, Rectangles, Cube and Parallelopiped.	
UNIT III- ANALYTIC FUNCTIONS	**(9+6)**
Functions of a complex variable-Analytic functions– Necessary and sufficient conditions of Cauchy's -Riemann Equations in Cartesian Coordinates (Excluding Proofs) – Properties of Analytic Functions – Harmonic conjugate – Construction of an analytic function by Milne's Thomson Method– Conformal mapping :w = c+z , cz, 1/z and Bilinear Transformation.	
UNIT IV - COMPLEX INTEGRATION	**(9+6)**
Statement and Simple applications of Cauchy's integral theorem and Cauchy's integral formula(Excluding Proofs) – Taylor's and Laurent's Series Expansions - Singularities - Residues – Cauchy's Residue theorem (Statement only) – Evaluation of contour integration over unit circle and semi circle (Excluding poles on Real axis).	
UNIT V- LAPLACE TRANSFORM	**(9+6)**
Condition for existence - Transforms of Elementary functions –Basic Properties- First & Second Shifting Theorems (Statement only) –Transforms of derivatives and integrals- Transform of periodic functions - Initial and Final value Theorems. Inverse Laplace transforms -Convolution theorem (Statement only) –Solution of linear second order Ordinary differential equations with constant coefficients using Laplace transforms.	
TOTAL (L: 45+T:30) = 75 PERIODS	

Note : Simulation of Engineering Problems (Qualitative Analysis) using open source software

TEXT BOOKS:

1. Dr. B. S. Grewal, "Higher Engineering Mathematics", 42nd ed., Khanna publications, 2012.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th ed., John Wiley & sons, 2013.
3. Veerarajan.T, "Engineering Mathematics for Semester I & II", 3rd ed., Tata McGraw Hill,2014.

REFERENCES:

1. N.P.Bali, Manish Goyal, "A text book of Engineering Mathematics: Sem-II", 5th ed., Laxmi Publications.2011.
2. Kandasamy .P, Thilagavathy .K, Gunavathy .K, "Engineering Mathematics for first Year", 9th Rv. ed. S.Chand & Co Ltd, 2013.
3. Glyn James, "Advanced Engineering Mathematics", 7th ed., Wiley India, (2007).

17PYB04 APPLIED PHYSICS *(Common to CSE & IT Branches)*				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**
PREREQUISITE : 17PYB02	**QUESTION PATTERN : TYPE - 1**			

Course Objectives and Outcomes

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To provide the basic ideas in electrical conduction, conductors, semiconductors and nano technology	**1.1**	The students will be able to acquire knowledge about electron theory of metals and conductivity	**a,b,l**
2.0	To understand the fundamental concepts in solid state physics	**2.1**	The students will be able to distinguish between conductors, semiconductors and super conductors	**a,b,d,l**
3.0	To provide the basic knowledge in luminescence and optoelectronic devices	**3.1**	The students will be able to understand the magnetism and its applications	**a,c,d,l**
4.0	To develop logical thinking in designing of sensors compatible with computers	**4.1**	The students will be able to design various optoelectronic devices	**a,b,c,d,l**
5.0	To update the recent development in modern engineering materials	**5.1**	The students will be able to aware of recent trends in nanotechnology	**a,c,d,l**

UNIT I - CONDUCTING MATERIALS	**(9)**
Electron theories of conductivity - postulates of classical free electron theory- derivation of electrical conductivity of metals (Drude- Lorentz theory) - merits and demerits. Derivation of thermal conductivity – Weidman-Franz law- verification. Fermi energy - Importance of Fermi energy - Fermi-Dirac distribution function and its variation with temperature - density of energy states- calculation of density of electron.	
UNIT II - SEMICONDUCTING MATERIALS & SUPERCONDUCTING MATERIALS	**(9)**
SEMICONDUCTORS: Elemental and compound semiconductors - Intrinsic semiconductor – carrier concentration derivation – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors (Qualitative) – variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – Applications. **SUPERCONDUCTIVITY:** Properties - Types of super conductors – BCS theory of superconductivity – Applications of superconductors – SQUID, cryotron, magnetic levitation.	
UNIT III - MAGNETIC MATERIALS	**(9)**
Origin of magnetic moment – Bohr magneton – Types of magnetic materials – Domain theory – Hysteresis – soft and hard magnetic materials. Ferrites – applications – magnetic recording and readout – tapes, floppy and magnetic disc drives.	
UNIT IV - OPTICAL DEVICES	**(9)**
Optical properties of semiconductor- Excitons-traps-colourcentre- Types of colourcentres- luminescence-fluorescence and phosphorescence-liquid crystal displays-dynamic scattering display-twisted nematic crystal display - Light emitting diodes- solar cell.	
UNIT V - MODERN ENGINEERING MATERIALS & NANOTECHNOLOGY	**(9)**
Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA. Nanomaterials: synthesis –plasma arcing – chemical vapour deposition – sol-gels – electrodeposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: fabrication – arc method – pulsed laser deposition –structure – properties and application.	
TOTAL (L:45) = 45 PERIODS	

TEXT BOOKS:

1. V.Rajendran, “Engineering Physics”, Tata McGraw- Hill, New Delhi.2011.
2. P.K.Palanisami, “Physics for Engineers-Volume I”, Scitech publications (India) Pvt. Ltd, Chennai, 2002.

REFERENCES:

1. Jacob Millman, Charistos C Halkilas, SatyabrataJit, “Electronic Devices & Circuits”, Tata McGraw Hill Education Private Limited, 3rd ed., 2010.
2. Ben G.Streetman, Sanjay Banerjee, “Solid State Electronic Devices”, Pearson Education, 5th ed., 2006.
3. G.Senthil Kumar, N.Iyandurai, “Physics-II”, VRB Publishers, Revised Edition, 2005-2006.
4. S.O. Pillai, “Solid State Physics”, New Age International Publications, New Delhi, 2010.
5. Dr. Y. Aparna & Dr. K. Venkateswara Rao , “Laboratory Manual of Engineering Physics”, V.G.S Publishers.

17CYB04 – CHEMISTRY FOR COMPUTER ENGINEERS *(Common to CSE & IT Branches)*					
			L	**T**	**P**	**C**
			3	**0**	**2**	**4**
PREREQUISITE : NIL		**QUESTION PATTERN : TYPE - 3**				
Course Objectives and Outcomes					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To understand the principles of water characterization and treatment methods	**1.1**	The students will be able to apply knowledge of fundamental principles of chemistry	**a,b,c,f,g,i,j,k,l**	
2.0	To introduce the basic concepts of electrode potential and batteries	**2.1**	The students will be able to define and solve engineering problems, including the utilization of creative and innovative skills	**a,b,c,d,f,g**	
3.0	To understand the principles and applications of corrosion	**3.1**	The students will be able to gain practical experience with chemical process equipment as well as to analyze and interpret data	**a,b,d,i**	
4.0	To provide the knowledge of surface chemistry.	**4.1**	The students will be able to understand the impact of engineering solutions in a global, economic, environmental and societal content	**a,b,c,g**	
5.0	To study about the e-waste and its management.	**5.1**	The students will be able to understand the management of electronic waste	**a,b,c,k**	

UNIT I - WATER TECHNOLOGY	**(9)**
Hardness - types - estimation by EDTA method - Domestic water treatment - disinfection methods (chlorination, ozonation and UV treatment) - Boiler troubles (scale, sludge, priming, foaming and caustic embrittlement) -Internal conditioning(carbonate, phosphate and calgon) - External conditioning - demineralization process - desalination - reverse osmosis method.	
UNIT II - ELECTROCHEMISTRY	**(9)**
Electrochemistry - electrode potential - Nernst equation and problems - Reference electrode - standard hydrogen electrode - calomel electrode - potentiometric titration (redox) - conductometric titration (strong acid – strong base) - Batteries - types - lead acid battery – fuel cell – hydrogen and oxygen fuel cell.	
UNIT III - CORROSION SCIENCE	**(9)**
Corrosion - definition – types - chemical and electrochemical corrosion (mechanism) – Galvanic corrosion – Differential aeration corrosion - Pitting corrosion – Factors influencing corrosion- Corrosion control - sacrificial anode method.	
UNIT IV - CHEMICAL KINETICS AND SURFACE CHEMISTRY	**(9)**
Order of a reaction (definition) - kinetics of first order reaction – acid catalyzed hydrolysis of ester, - kinetics of second order reaction – base catalysed hydrolysis of ester - Arrhenius equation - effect of temperature on reaction rate - Surface chemistry: Adsorption - types of adsorption - Langmuir adsorption isotherm – role of adsorption in catalytic reactions.	
UNIT V - E – WASTE AND ITS MANAGEMENT	**(9)**
E- Waste – Definition – sources of e-waste – hazardous substances in e-waste – chlorinated compounds – heavy metals - Need for e-waste management - Management of e-waste – Inventory management – production process modification - Disposal treatment of e-waste - incineration - acid baths – landfills.	

LIST OF EXPERIMENTS

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of chloride content of water sample by argentometric method.
4. Conductometric titration of strong acid vs strong base.
5. Estimation of iron content of the given solution using potentiometer.

TOTAL (L:45+P:30) = 75 PERIODS

TEXT BOOKS:

1. J. Glynn Henry and Gary W. Heinke, "Environmental Science and Engineering", Pretice Hall of India, 2014.
2. P.C. Jain and Monica Jain, "Engineering Chemistry",Vol I & II, Dhanpat Rai Pub, Co., New Delhi,15th ed., 2015.

REFERENCES:

1. S.S. Dara, "A Text book of Engineering Chemistry", S.Chand & Co. Ltd., New Delhi, 2014.
2. J. Glynn Henry and Gary W.Heinke ,"Environmental Science and Engineering", Pretice Hall of India, 2014
3. "Electroplating, Anodizing and Metal treatment", Hand book, NIIR board, Delhi, 2004.
4. Ramachandra, T. V. (2013) "Management of Municipal Solid Waste", TERI Press, New Delhi.

17CSC03 STRUCTURED PROGRAMMING *(Common to CSE & IT Branches)*					
			L	**T**	**P**	**C**
			3	**0**	**0**	**3**
PRE REQUISITE : NIL		**QUESTION PATTERN : TYPE - 1**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**			**Related Program outcomes**
1.0	To know the correct and efficient ways of solving problems.	**1.1**	The student will be able to understand the basic terminology used in computer programming.		**a,b,c,d,e,h,j,k,l**
2.0	To learn the basics of C declarations, operators and expressions.	**2.1**	The student can use different data types and operators in a computer program.		**a,b,c,d,e,h,i,j,k,l**
3.0	To work on all the elementary statements (Loop, Branch).	**3.1**	The student will be able to design programs involving decision structures and loops.		**a,b,c,d,e,h,i,j,k,l**
4.0	To learn the manipulation of arrays and strings	**4.1**	The student will be able to write programs using arrays and strings.		**a,b,c,d,e,h,i,j,k,l**
5.0	To learn the manipulation of functions	**5.1**	The student will be able to develop programs using functions by different parameter passing techniques.		**a,b,c,d,e,h,i,j,k,l**

UNIT I -OVERVIEW OF C	**(9)**
Introduction to C - Structure of C program - Programming Rules - C Declarations: Tokens - keywords - identifiers - constants - data types - variable declaration and initialization - type conversion - constant and volatile variables - operators and expressions	
UNIT II -CONTROL STRUCTURES	**(9)**
Managing Input and Output operations - Decision Statements: if Statements - if-else Statement - Nested if-else - if-else-if ladder -goto statement – switch statement - nested switch case - Loop Control: for loop - while loop - do while loop - Nested Loop Statements - break and continue statement	
UNIT III - ARRAYS AND STRINGS	**(9)**
Introduction to Array - Definition - Array initialization - Characteristics - One Dimensional Array - Array operations -Two dimensional arrays -Strings and String handling functions.	
UNIT IV - FUNCTIONS	**(9)**
Functions: Basics - definition - Elements of User defined Functions - return statement, Function types, Parameter Passing Techniques, Function returning more values - Passing Array to Functions - Recursion - Storage classes.	
UNIT V -POINTERS AND FILE MANAGEMENT	**(9)**
Pointer concepts - Pointers & Arrays, Structure concepts - Defining, Declaring, Accessing Member Variables, Structure within Structure - Union - File Management in C- Dynamic Memory Allocation	
	TOTAL (L:45) : 45 PERIODS

TEXT BOOK:
1. Ashok N. Kamthane, “Programming in C”, 2nd ed., Pearson Education, 2013.
REFERENCES:
1. YashavantKanetkar, “Let us C”, BPB publications, New Delhi, 3rd ed., 2011. 2. PradipDey, ManasGhosh, “Fundamentals of Computing and Programming in C”, 1st ed., Oxford University Press, 2009. 3. Byron S Gottfried, “Programming with C”, Schaum’s Outlines, 2nd ed., Tata McGraw-Hill, 2006. 4. R.G. Dromey, “How to Solve it by Computer”, Pearson Education, 4th Reprint, 2007.

17ECC04 - BASICS OF ELECTRONICS ENGINEERING *(Common to CSE & IT Branches)*					
			L	**T**	**P**	**C**
			3	**0**	**0**	**3**
PRE REQUISITE : NIL		**QUESTION PATTERN : TYPE - III**				
COURSE OBJECTIVES AND OUTCOMES:						
Course Objectives		**Course Outcomes**		**Related Program outcomes**		
1.0	To make students to learn and understand the basics of Electrical circuits.	**1.1**	The Students can apply the Ohm's law and Kirchhoff's law and investigates the behavior of electric circuits by analytical techniques.	**a,b,c,d**	
2.0	To enable the student to understand the analysis of DC and AC circuits using Network theorems.	**2.1**	The Students will be able to analyze and forecast the Network theorems in DC and AC circuits.	**a,b,c,d**	
3.0	To enable the student to understand the working of semiconductor devices.	**3.1**	The Students will be able to understand the characteristics of semiconductor devices	**a,c,e**	
4.0	To make the students to understand the working of rectifiers, filters and amplifiers.	**4.1**	The students will be able to understand the concept of rectifiers, filters and amplifiers	**a,c,e,f,g**	
5.0	To make the students to understand the functions of transducer and measuring instruments.	**5.1**	The students will be able to design transducers, measuring instruments and logic circuits.	**a,c,f,g**	

UNIT I - BASIC CIRCUITS ANALYSIS	**(9)**
AC & DC : Current, Voltage, Power - Nodes, Paths, Loops and Branches; Ohm's Law – Kirchhoff's laws-Single loop circuit –Single Node Pair- circuit – Series and parallel connected independent sources- Resistors in series and Parallel-Current and voltage division.	
UNIT II - NETWORK THEOREMS FOR DC AND AC CIRCUITS	**(9)**
Source transformation – Mesh analysis-Node Analysis - Thevenins and Norton Theorem – Superposition Theorem – Maximum power transfer theorem.	
UNIT III - SEMICONDUCTOR DEVICES	**(9)**
Passive Components, PN junction diode - Diffusion and Drift Current – Zener diode - Zener Regulator - BJT: PNP and NPN, CE Configuration of BJT, JFET, MOSFET, UJT.	
UNIT IV - RECTIFIERS, FILTERS AND AMPLIFIERS	**(9)**
Transformers: Construction & Types, Rectifiers: Half Wave, Full Wave and Bridge, Filters: Induction, Capacitor, LC and π (CLC), Introduction to amplifiers, Applications of Amplifier, UPS	
UNIT V - TRANSDUCERS, MEASURING INSTRUMENTS AND DIGITAL CIRCUITS	**(9)**
LED, Piezo electric Transducers, LCD, Moving Coil and Moving Iron Instrument, Digital Voltmeter, CRO, Logic Gates: AND, OR, NOT and Universal Gates-NAND, NOR, Flip Flop: SR, JK.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis," 8th ed., Tata McGraw

Hill publishers, New Delhi, 2013.
2. S. Salivahanan, N. Suresh kumar and A. Vallavanraj, “Electronic Devices and Circuits”, Tata McGraw Hill 3rd ed. 2013.

REFERENCES:

1. Gupta.J.B, “Electronic Devices and Circuits,” S. K. Kataria & Sons, 2009.
2. Chakrabati A, “Circuits Theory (Analysis and synthesis), Dhanpath Rai & Sons, New Delhi, 1999.
3. Nageswara Rao.T, “Circuit Theory”, A.R. Publications, Chennai, 2014.

17CSP03 STRUCTURED PROGRAMMING LABORATORY *(Common to CSE & IT Branches)*					
			L	**T**	**P**	**C**
			0	**0**	**4**	**2**
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language.	**1.1**	The student will be able to implement programs using decision making statements and looping	**a,b,c,d,j**	
2.0	To study, analyze and understand concepts of arrays and functions in 'C'.	**2.1**	The student will be able to write simple programs on arrays of different dimensions.	**a,b,d**	
3.0	To learn the importance of recursive function and pointers.	**3.1**	The student will be able to develop function programs using recursion and pointers.	**a,b,c,d,i,l**	
4.0	To get knowledge of structures and unions in C	**4.1**	The student will be able to design structure and union programs	**a,b,c,d,i,k,l**	
5.0	To gain experience in handling files and allocate memory to a program dynamically.	**5.1**	The student will be able to handle memory locations manually using dynamic memory allocation functions	**a,b,c,d,f,i,k,l**	

C-Programming:

1. Program Using Operators, Expressions and IO formatting
2. Program Using Decision Making
3. Program Using Looping
4. Program Using Arrays
5. Program Using Strings
6. Program Using Functions
7. Program Using Recursion
8. Program Using Pointers
9. Program Using Structure and Union
10. Program Using files
11. Program Using Dynamic memory allocation functions

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software:

- Compiler – C

TOTAL (P:60) = 60 PERIODS

17ECP02 – ELECTRONICS LABORATORY *(Common to CSE & IT Branches)*					
			L	**T**	**P**	**C**
			0	**0**	**4**	**2**
PREREQUISITE :NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To make students to learn and practice the basics of Semiconductor Diodes.	**1.1**	The Students can be able to analyze the characteristics of diodes and transistors.	**a,b,e,k**	
2.0	To enable the student to analyze the characteristics of BJT,FET and UJT	**2.1**	The Students will be able to evaluate the characteristics of electronic devices such as BJT,FET and UJT	**a,b,f,k**	
3.0	To provide the student with practice in the experimental setup of basic electronic circuits.	**3.1**	The Students will be able to verify the Half wave and Full wave Rectifier.	**a,b,j,l**	
4.0	To make the students to learn and practice with measurement of electrical networks.	**4.1**	The students will be able to verify the theorems such as Thevenin's theorem, Norton theorems, KVL and KCL	**a,b,d**	
5.0	To motivate the students to implement the project using electronic digital devices.	**5.1**	The Students will be able to verify the Logic Gates.	**a,b,c,g**	

LIST OF EXPERIMENTS:

1. Characteristics of PN junction diode.
2. Characteristics of Zener diode.
3. Input-Output characteristics of common emitter configuration.
4. FET characteristics.
5. UJT characteristics.
6. Verification of Half Wave Rectifier (HWR) and Full Wave Rectifier (FWR)
7. Verification of Thevenin's theorem.
8. Verification of Norton's theorem.
9. Verification of KVL, KCL.
10. Verification of Logic Gates

TOTAL (P: 60) = 60 PERIODS

17GEP02 INTERPERSONAL VALUES *(Common to All Branches)*					
			L	**T**	**P**	**C**
			0	**0**	**2**	**0**
PRE REQUISITE : 17GEP01					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To know interpersonal values	**1.1**	The students will be able to develop a healthy relationship & harmony with others	**a, f**	
2.0	To train the students to maneuver their temperaments.	**2.1**	The students will be able to practice respecting every human being	**a, g**	
3.0	To achieve the mentality of appreciating core values of a person.	**3.1**	The students will be able to practice to eradicate negative temperaments	**a, c**	
4.0	To analyze the roots of problems and develop a positive attitude about the life.	**4.1**	The students will be able to acquire Respect, Honesty, Empathy, Forgiveness and Equality	**a, c, f**	
5.0	To understand the effects of physical activities on mental health.	**5.1**	The students will be able to practice Exercises and Meditation to lead a healthy life and Manage the cognitive abilities of an Individual	**a, f**	

UNIT I - INTRODUCTION	**(9)**
Introduction to interpersonal values – Developing harmony with others –Healthy relationship – Need & importance of interpersonal values for dealing with others and team - Effective communication with others.	
UNIT II - MANEUVERING THE TEMPERAMENTS	**(9)**
From Greed to Contentment - Anger to Tolerance -Miserliness To Charity – Ego to Equality - Vengeance to Forgiveness.	
UNIT III - CORE VALUE	**(9)**
Truthfulness - Honesty –Helping–Friendship – Brotherhood – Tolerance –Caring & Sharing – Forgiveness – Charity – Sympathy — Generosity – Brotherhood -Adaptability.	
UNIT IV - PATHWAY TO BLISSFUL LIFE	**(9)**
Signs of anger – Root cause – Chain reaction – Evil effects on Body and Mind – Analyzing roots of worries – Techniques to eradicate worries.	
UNIT V - THERAPEUTIC MEASURES	**(9)**
Spine strengthening exercises - Nero muscular breathing exercises - Laughing therapy - Mindfulness meditation.	
TOTAL (L: 30) = 30 PERIODS	

TEXT BOOKS:

1. Interpersonal Skills Tutorial (Pdf Version) – Tutorials Point
2. www.tutorialspoint.com/interpersonal_skills/interpersonal_skills_tutorial.pdf
3. Interpersonal Relationships At Work - Ki Open Archive – Karolinska.
4. www.publications.ki.se/xmlui/bitstream/handle/10616/39545/thesis.pdf?sequence=1
5. Values Education for Peace, Human Rights, Democracy – UNESCO. www.unesdoc.unesco.org/images/0011/001143/114357eo.pdf
6. Maneuvering Of Six Temperaments - Vethathiri Maharishi. www.ijhssi.org/papers/v5(5)/F0505034036.pdf
7. The Bliss of Inner Fire: Heart Practice of the Six. – Wisdom Publications - www.wisdompubs.org/sites/.../Bliss%20of%20Inner%20Fire%20Book%20Preview.pdf

17MYB04 PROBABILITY AND STASTISTICS *(Common to CSE and IT Branches)*					
		L	T	P	C
		2	2	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: TYPE - IV**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**			**Related Program outcomes**
1.0	Acquire knowledge of the random variable and moments & moments generating functions.	**1.1**	The students will be able to infer expectation, variance, standard deviation moments and moment generating function for discrete and continuous random variables.		**a,b,l**
2.0	Aware the knowledge of applications of discrete & continuous distributions.	**2.1**	The students will be able to apply the concept of expectation and moment generating functions to discrete and Continuous distributions and find the probability values for the defined distributions.		**a,b,e,l**
3.0	Provide the knowledge of transformation of random variables.	**3.1**	The students will be able to Acquire skills in handling situations involving more than one random variable and functions of random variables		**a,b,l**
4.0	To get knowledge on types of hypothesis tests.	**4.1**	The students will be able to select a hypothesis testing method for the given numerical set of data to analyze the significance		**a,b,d,e,l**
5.0	To understand the knowledge of design of experiments.	**5.1**	The students will be able to apply analysis of Variance for the data set of selected number factors for analyzing the significance.		**a,b,d,e,l**

UNIT I - PROBABILITY AND RANDOM VARIABLES	**(6 + 6)**
Random variables-Probability mass function – Probability density function – Properties - Moments –Moment generating functions.	
UNIT II - STANDARD DISTRIBUTIONS	**(6 + 6)**
Discrete distributions: Binomial, Poisson and Geometric- Continuous distribution: Uniform, Exponential and normal distributions.	
UNIT III - TWO DIMENSIONAL RANDOM VARIABLES	**(6 + 6)**
Joint distributions-Marginal and conditional distributions-Covariance-Correlation and Regression.	
UNIT IV - TESTING OF HYPOTHESIS	**(6 + 6)**
Sampling Distributions-Testing of hypothesis for mean, variance. t -distribution, F – distribution- Chi-square - Test for independence of attributes and Goodness of fit.	
UNIT V - DESIGN OF EXPERIMENTS	**(6 + 6)**
Analysis of variance- Completely randomized design - Randomized block design - Latin square design.	
TOTAL (L:30+T:30) = 60 PERIODS	

TEXT BOOKS:

1. Veerarajan.T, "Probability, Statistics and Random Processes with Queuing Theory and Queuing Networks", 4th ed. ,Tata McGraw-Hill, New Delhi 2016.
2. S.C.Gupta and V.K.Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi-2014.

REFERENCES:

1. Allen, O. Arnold, "Probability, Statistics and Queuing Theory with Computer Applications ", 2nd ed., Elsevier, New Delhi, 1990.
2. Taha, H.A., "Operations Research - An Introduction", 8th ed., Pearson Education, New Delhi, 2008.
3. Trivedi, S.K, "Probability and Statistics with Reliability, Queuing and Computer Science applications", 2nd Ed. John Wiley & Sons, New Delhi, 2002.
4. Gross, Donald and Harris, M. Carl," Fundamentals of Queuing Theory", 3rd ed., Wiley Publications, New Delhi, 1998.

17CSC04 DATA STRUCTURES USING PYTHON *(Common to CSE and IT Branches)*					
			L	**T**	**P**	**C**
			3	**0**	**2**	**4**
PRE REQUISITE : 17CSC02		**QUESTION PATTERN: TYPE - I**				

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		**Course Outcomes**		**Related Program outcomes**
1.0	To review the Python programming language and learn Stack ADT.	**1.1**	The students will be able to recall and familiarize python programming and implement Stack ADT.	**a,b,c,h,k,l**
2.0	To be able to implement the abstract data type list as a linked list using the node and reference pattern.	**2.1**	The students will be able to compare the performance of our linked list implementation with Python's list implementation.	**a,b,c,h,k,l**
3.0	To understand the abstract data types queue, deque using Python.	**3.1**	The students will be able to implement the ADTs queue, and deque using Python lists.	**a,b,c,h,k,l**
4.0	To understand what a tree data structure is and how it is used.	**4.1**	The students will be able to implement trees using classes and references.	**a,b,c,d,h,k,l**
5.0	To see how graphs can be used to solve a wide variety of problems	**5.1**	The students will be able to design graph abstract data type using multiple internal representations.	**a,b,c,d,g,h,k,l**

UNIT I – INTRODUCTION TO LINEAR DATA STRUCTURES	**(9+6)**
Abstract Data Types (ADTs) and Data Structures – Non Primitive Data structures: array, list, tuples, dictionaries, set. Classes and Objects in Python. Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression	
UNIT II - LINEAR DATA STRUCTURES - LIST	**(9+6)**
Array Vs List. Concept of linked list –Single linked list –Representation –Methods and functions on list –Operations: Traversing –Insertion – Deletion – Double linked list –Representation –Operations, traversing –Insertion–Deletion– Circular link list.	
UNIT III - LINEAR DATA STRUCTURES – QUEUE AND HASHING	**(9+6)**
Queue: Representation and Implementation –Programs on Queue – Insert & Delete operations –Circular queue – Representation –Deque –Applications of queue. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.	
UNIT IV - NON LINEAR DATA STRUCTURES – TREE	**(9+6)**
Definitions - Binary Trees - The Search tree ADT – Binary Search Trees – AVL Tree – Tree Traversals – B-Tree – B+ Tree - Priority Queues (Heap) – Model – simple implementations of Binary Heap.	
UNIT V - NON LINEAR DATA STRUCTURES – GRAPH	**(9+6)**
Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.	
TOTAL (L:45+P:30) = 75 PERIODS	

LIST OF EXPERIMENTS:

1. Implementing Stack ADT in Python.
2. Implementing unordered list using Linked list (ADT).
3. Implementing Queue ADT in Python.
4. Implement Binary Search Tree using Python.
5. Implementation of BFS and DFS Graph Traversal using Python.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

Hardware:

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos, Printers – 3 Nos.

Software:

- OS – Windows / UNIX Clone Open Source Software Python

TEXT BOOKS:

1. Dr. R. Nageswara Rao, "Core Python Programming", Dreamtech Press, ed., 2017.
2. Bradley N. Miller, David L. Ranum," Problem Solving with Algorithms and Data Structures Using Python", Franklin, Beedle & Associates, 2011.

REFERENCES:

1. Michael T. Goodrich, Irvine Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", 2013 edition.
2. Kenneth A. Lambert, "Fundamentals of Python: Data Structures", 1st ed., Data Structures, Cengage Learning, 06-Nov-2013.

17ITC01 - OOPS USING JAVA *(Common to CSE and IT Branches)*				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**
PRE REQUISITE : NIL	**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To impart fundamental concepts of OOP using java	**1.1**	The students will be able to understand the basics of object oriented concepts in java.	**a,b,e,g,h,i,j,k,l**
2.0	To gain exposure about inheritance, packages and Interfaces	**2.1**	The students will be able to develop applications using inheritance, packages and interfaces.	**a,b,c,d,e,f,g ,h,i,j,k,l**
3.0	To explore about the exception handling mechanism	**3.1**	The students will be able to construct applications with exception handling.	**a,b,c,d,e,f,g,h, i,j,k,l**
4.0	To understand threads and collection concepts	**4.1**	The students will be able to build applications using threads and collection framework	**a,b,c,d,e,f,g,h, i,j,k,l e**
5.0	To know about GUI components and database connectivity	**5.1**	The students will be able to build simple java application with neat GUI and database connectivity	**a,b,c,d,e,f,g,h, i,j,k,l**

UNIT I - INTRODUCTION TO OOP USING JAVA	**(9)**
Elements of Object Oriented Programming – Overview of JAVA – Data Types, Variables and Arrays –Operators– Control Statements – Introduction to classes and methods– Keywords: Static, final, this– String –Wrapper Class.	
UNIT II - INHERITANCE, PACKAGES AND INTERFACES	**(9)**
Inheritance Basics – Using Super – Constructor Call – Method Overriding – Dynamic Method Dispatch – Using Abstract Classes – Using Final with Inheritance – Packages – Access Protection – Interfaces–Exploring java.io Package –File –Byte Streams –Character Streams.	
UNIT III - EXCEPTION HANDLING AND COLLECTIONS	**(9)**
Exception-Handling Fundamentals – Exception Types – Using try and catch – Multiple catch Clauses – Nested try Statements – throw, throws, finally -Collections Overview – Collection Interfaces – Collection Classes.	
UNIT IV-THREADS	**(9)**
Java Thread Model – Main Thread – Creating a Thread – Creating Multiple Threads – Using isAlive( ) and join( ) – Thread Priorities – Synchronization – Interthread Communication – Suspending, Resuming, and Stopping Threads – Using Multithreading	
UNIT V - GUI WITH DATABASE CONNECTIVITY	**(9)**
Applet Basics –AWT classes –Frames –Graphics –AWT controls –Layout managers –Swing – Swing Components: JApplet – Icons and Labels – Text Fields – Buttons – Combo Boxes – Tabbed Panes – Scroll Panes – Trees – Tables.JDBC: Connecting to, querying and Manipulating the database(Create, Insert, Update, Delete).	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Herbert Schildt, "Java: The Complete Reference", McGraw Hill Education, 9th ed.,2017.
2. R.M. Menon, "Expert Oracle JDBC Programming", Apress 1st ed., 2005.

REFERENCE:

1. Cay. S. Horstmann, Gary Cornell, "Core Java-JAVA Fundamentals", Prentice Hall, 10th ed., 2016.

17CSC05 OPERATING SYSTEMS				
L	T	P	C
3	0	0	3

PRE REQUISITE : NIL | **QUESTION PATTERN: TYPE - I**

COURSE OBJECTIVES AND OUTCOMES:

	Course objectives		Course outcomes	Related program outcomes
1.0	To learn about the basics of operating system hardware, peripherals and troubleshooting.	**1.1**	The students will be able to identify the systematic approach of the system.	**a,b,k**
2.0	To transfer knowledge about how the process scheduling work together to perform computing tasks.	**2.1**	The students will be able to develop real-time operating systems for task scheduling.	**a,b,c,f,g,k,l**
3.0	To learn the importance of memory in the operating system.	**3.1**	The students will be able to analyze the working of memory related hardware	**a,c,h,k,l**
4.0	To explore and demonstrate managing the disk and fills of operating systems	**4.1**	The students will be able to work on design and development of disk and file related hardware.	**a,b,c,j,k,l**
5.0	To study advanced security, authentication and production techniques of operating system	**5.1**	The students will be able to know the real time meaning of security and production in the field of operating system.	**a,c,d,f,j,k,l**

UNIT I - FUNDAMENTALS	**(9)**
Introduction, system architecture - operating system structure - operations - process management, memory management - storage management - system structure - user operating system interface, system calls - types, system programs, operating system design and implementation, operating system structure, virtual machines, operating system generation, system boot.	
UNIT II - PROCESS MANAGEMENT	**(9)**
Process concept - process scheduling, operations on processes, inter process communication, examples of ipc systems, communication in client server systems; process scheduling - basic concepts, scheduling criteria, scheduling algorithms, thread scheduling, multiple-processor scheduling, operating-system examples, synchronization - the critical-section problem, semaphores, deadlock prevention, deadlock avoidance, deadlock detection.	
UNIT III - MEMORY MANAGEMENT	**(9)**
Memory management hardware - swapping, paging, segmentation, page replacement, allocation of frames, thrashing, memory mapped files, kernel memory.	
UNIT IV - SECONDARY STORAGE MANAGEMENT	**(9)**
Secondary storage structure - disk structure, disk attachment, disk scheduling, disk management, swap space management, raid structure, stable storage implementation; file system - file concept, access methods, directory and disk structure, file system mounting; file system implementation – structure, implementation, directory implementation, free space management; i/o systems – i/o hardware, application i/o interface, kernel i/o subsystem, transforming i/o requests to hardware operations.	
UNIT V - PROTECTION AND SECURITY	**(9)**
System protection - goals, principles, domain, access matrix, access control; system security – problem, threads, cryptography, user authentication, implementing security, firewall, computer security classification; case study: LINUX, Windows and Android.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK: 1. Silberschatz, P.B. Galvin and G. Gagne, “Operating System Concepts”, 9th ed., 2012.
REFERENCE: 1. W. Stallings, “Operating Systems”, 8th ed., Prentice-Hall, 2014.

17ECC09 DIGITAL PRINCIPLES AND SYSTEM DESIGN			
L	T	P	C
3	0	0	3

PREREQUISITE : NIL	QUESTION PATTERN : TYPE - III

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To learn how to design digital circuits, by simplifying the Boolean functions.	**1.1**	The Students will be able to design digital circuits, by simplifying the Boolean functions.	**a,b,c,d**
2.0	To give an idea about Combinational Circuit and HDL basics	**2.1**	The Students will be able to get idea about Combinational Circuit and HDL basics	**a,b,c,e,l**
3.0	To design the Synchronous Sequential Circuits	**3.1**	The Students will be able to design synchronous clocked circuits	**a,b,e,l**
4.0	To design the Asynchronous Sequential Circuits	**4.1**	The students will be able to design asynchronous sequential circuits.	**a,b,c,d,e**
5.0	To Give an idea about designs using PLDs, and write codes for designing larger digital systems.	**5.1**	The Students can formulate Programmable Logical Device Models.	**a,b,c,d,e**

UNIT I - BOOLEAN ALGEBRA AND LOGIC GATES	**(9)**
Review of Number Systems – Arithmetic Operations – Binary Codes – Boolean Algebra Theorems – Boolean Functions – Simplification of Boolean Functions using Karnaugh Map Method – Logic Gates – NAND and NOR Implementations.	
UNIT II - COMBINATIONAL LOGIC	**(9)**
Combinational Circuits – Circuits for Arithmetic Operations – Application circuits for Multiplexer, De-multiplexer, Decoder and Encoder – Introduction to HDL – HDL Models of Combinational circuits (simple examples).	
UNIT III - SYNCHRONOUS SEQUENTIAL LOGIC	**(9)**
Sequential Circuits –Flip Flops – Design examples – State Reduction and State Assignment – Shift Registers – Counters – HDL for Sequential Logic Circuits (simple examples).	
UNIT IV - ASYNCHRONOUS SEQUENTIAL LOGIC	**(9)**
Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race- free State Assignment – Hazards.	
UNIT V- PROGRAMMABLE LOGIC DEVICES	**(9)**
Error Detection and Correction Circuits– Programmable Logic Array –Programmable Array Logic – Sequential Programmable Devices – Application Specific Integrated Circuits.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Morris Mano M. and Michael D. Ciletti, “Digital Design”, 5th ed., Pearson Education, 2013.

REFERENCES:

1. John F. Wakerly, “Digital Design Principles and Practices”, 4th ed., Pearson Education, 2007.
2. Charles H. Roth Jr, “Fundamentals of Logic Design”, 5th ed., – Jaico Publishing House, Mumbai, 2003.
3. Donald D. Givone, “Digital Principles and Design”, Tata McGraw Hill, 2003.
4. D. P. Leach, A. P. Malvino, "Digital Principles and Applications", Tata McGraw Hill, 2010.

17CSC06 MICROPROCESSOR AND COMPUTER ARCHITECTURE					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN : TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To introduce fundamentals of 8086 architecture.	**1.1**	The students will be able to explain the basic architecture of 8086.	**a,c,l**
2.0	To understand different peripheral devices.	**2.1**	The students will be able to employ the peripheral interfacing.	**a,b,c,h,l**
3.0	To study the design of arithmetic and logic unit and implementation of fixed point and Floating-point arithmetic operations.	**3.1**	The students will be able to solve basic binary math operation.	**a,c,e,k,l**
4.0	To perceive knowledge about internal and external memory technologies.	**4.1**	The students will be able to understand the variety of memory technologies.	**a,b,c,h,l**
5.0	To learn about Processing and pipelining.	**5.1**	The students will be able to describe the instruction execution and pipelining concepts.	**a,c,k,l**

UNIT I - 8086 ARCHITECTURE	**(9)**
Introduction to Microprocessor – Architecture – Minimum and Maximum mode operations of 8086 – Addressing modes – Instruction set **–** Assembly Language Programming.	
UNIT II - INTERRUPTS & PERIPHERALS INTERFACING	**(9)**
Interrupts: Introduction – interrupt vector table – interrupt service routines - Peripherals & Interfacing With 8086: Serial & parallel I/O (8251A and 8255) – Programmable interval timer (8253) – Programmable DMA controller (8257) – programmable interrupt controller (8259A) – Keyboard and display controller (8279).	
UNIT III - COMPUTER ARITHMETIC	**(9)**
Data Representation – Hardware and Software Implementation of Arithmetic Unit for Common Arithmetic Operations: Addition, Subtraction, Multiplication, Division (Fixed point and floating point) – Design of Fast Address.	
UNIT IV - MEMORY SYSTEM	**(9)**
Basic Concepts – Semiconductor RAM – ROM – Speed – Size and Cost – Cache Memories – Improving Cache Performance – Virtual Memory – Memory Management Requirements –Secondary Storage Devices.	
UNIT V - PROCESSING UNIT AND PIPELINING	**(9)**
Fundamental Concepts – Execution of Complete Instruction – Hardware Control – Micro Programmed Control – Pipelining Basic Concepts – Data Hazards – Instruction Hazards – Data Path and Control Considerations – Superscalar Operations – Performance Considerations.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. A.K. Ray and K.M. Bhurchandi “Advanced Microprocessors and Peripherals”, 2nd ed., Tata McGraw Hill, 2013.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, 5th ed., Tata McGraw Hill, 2011.

REFERENCES:

1. Douglas V. Hall,"Microprocessors and Interfacing Programming and Hardware". Tata McGraw Hill, 2007.
2. K Uday Kumar, B S Umashankar, "Advanced Micro processors & IBM-PC Assembly Language Programming", Tata McGraw Hill, 2003
3. Peter Abel, "IBM PC Assembly language & Programming", PHI, 5th ed., 2001.
4. William Stallings, "Computer Organization and Architecture – Designing for Performance", International Edition, Pearson Education, 2013.
5. John P. Hayes, "Computer Architecture and Organization", 3rd ed., Tata McGraw Hill, 1998.

17ITP01 – OOPS USING JAVA LABORATORY
(Common to CSE and IT Branches)

L	T	P	C
0	0	4	2

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To impart basic programming elements of Java	**1.1**	The students will be able to create simple java programs using basic programming elements in java.	**a,b,e,g,h,i,j,k,l**
2.0	To gain exposure about inheritance, packages and Interfaces	**2.1**	The students will be able to develop applications using inheritance, packages and interfaces.	**a,b,c,d,e,f,g ,h,i,j,k,l**
3.0	To explore about the exception handling mechanism	**3.1**	The students will be able to construct applications with exception handling.	**a,b,c,d,e,f,g,h, i,j,k,l**
4.0	To understand threads and collection concepts	**4.1**	The students will be able to build applications using threads and collection framework	**a,b,c,d,e,f,g,h, i,j,k,l e**
5.0	To know about Swing components and database connectivity	**5.1**	The students will be able to build simple java application with neat GUI and database connectivity	**a,b,c,d,e,f,g,h, i,j,k,l**

LIST OF EXPERIMENTS

1. Basic programming elements of Java (Arrays, String).
2. Programs using Static, final and this keywords.
3. Programs illustrating the implementation of various forms of inheritance
4. Programs illustrating overloading and overriding methods in Java.
5. Programs to use packages and Interfaces in Java.
6. Develop a Java application using Exception handling.
7. Programs to create and synchronize multiple threads in Java.
8. Programs for collection framework.
9. Programs to use Swing Components.
10. Simple Java application with neat GUI and database connectivity.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

SOFTWARE :

1. Java / Equivalent Compiler

HARDWARE:

1. Standalone desktops 30 Nos

TOTAL (L: 60) = 60 PERIODS

17CSP04 OPERATING SYSTEMS LABORATORY					
		L	T	P	C
		0	0	2	1
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course objectives		**Course outcomes**			**Related program outcomes**
1.0	To learn the files which support operating systems, basic computing fundamentals, and appropriate behavior while using technology.	**1.1**	The students will be able to display basic commands and CPU utilization.		**a,b,c,d,e,f, g,l**
2.0	To understand the various scheduling methods with its real time application.	**2.1**	The students will be able to explore the knowledge to solve basic scheduling problems.		**a,b,c,d,e,f, g,l**
3.0	To learn the complex operating system problem with simulation tools.	**3.1**	The students will be able to simulate the operating system processing.		**a,b,c,d,e,f, g,l**
4.0	To replicate the concept of deadlock.	**4.1**	The students will be able to identify components and peripherals of operating systems including input-output devices.		**a,b,c,d,e,f, g,l**
5.0	To know the process concept and inside operation of operating system.	**5.1**	The students will be able to able to create new process for operating systems		**a,b,c,d,e,f, g,l**

LIST OF EXPERIMENTS:

1. Study the basic shell commands in Linux.
2. Program to get the amount of memory configured into the computer, amount of memory currently available.
3. Implement program for system calls.
4. Implement the various process scheduling mechanisms.
5. Implement the solution for reader –writer's problem.
6. Implement the solution for dining philosopher's problem.
7. Implement banker's algorithm.
8. Implement the program to simulate deadlock detection
9. Write a program to create processes and threads.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE :

Compiler - C

HARDWARE:

Standalone desktops 30 Nos

TOTAL (P:60) = 60 PERIODS

17GED01 – SOFT SKILLS – LISTENING AND SPEAKING					
			L	T	P	C
			0	0	2	0
PREREQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To recollect the functional understanding of basic grammar and its structure	**1.1**	The students will be able to apply the knowledge of basic grammar to classify the types of verbs and questions and to construct the sentences	**i,j,l**	
2.0	To acquire the listening skills through note completion, matching and multiple choice modes	**2.1**	The students will be able to develop the listening skills through note completion, matching and multiple choice modes	**i,j,l**	
3.0	To develop speaking skills through self introduction, short talk and topic discussion	**3.1**	The students will be able to organize a presentation on the given topic	**i,j,l**	

UNIT I - GRAMMAR	**(10)**
Tenses - Verb (Auxiliary and Modal) - 'Yes/No' Type Questions - Reported Speech - Gerund - Phrasal Verbs	
UNIT II – LISTENING	**(10)**
Part I : Note completion Part II: Matching Part III: Multiple Choice	
UNIT III -SPEAKING	**(10)**
Part I : Self Introduction Part II: Short talk on business topics Part III: Discussion in pairs	
TOTAL (P:30) : 30 PERIODS	

REFERENCES:

1. Murphy, Raymond, "Essential Grammar in Use", Cambridge University Press, UK, 2007
2. Whitby, Norman,"Business Benchmark Pre- Intermediate to Intermediate Preliminary, 2nd ed., Cambridge University Press, 2013.

17MYB08 DISCRETE MATHEMATICS (Common to CSE and IT Branches)					
		L	T	P	C
		2	2	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: TYPE - IV**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**			**Related Program outcomes**
1.0	To understand the basic concepts of logic and their applications.	**1.1**	The students will be able to rephrase real world statements as logical propositions and demonstrate whether the proposition is satisfy, tautology or a contradiction.		**a,b,d,l**
2.0	To gain knowledge about these discrete structures include logic, predicate calculus	**2.1**	The students will be able to infer whether a logical argument is valid from the given set of premises by applying the inference rules of predicate calculus.		**a,b,d,l**
3.0	To get exposed to concepts and properties of set theory and functions.	**3.1**	The students will be able to show mathematical reasoning and arrive at conclusions about sets and relations.		**a,b,d,l**
4.0	To acquire ideas about the general counting methods involving permutations and combinations. These methods are very useful in constructing computer programs and in mastering many theoretical topics of computer science.	**4.1**	The students will be able to construct the number of arrangements and selections using the principles of counting.		**a,b,d,l**
5.0	To understand the concepts of Lattices and its properties.	**5.1**	The students will be able to avail the concept of Lattices and its properties.		**a,b,d,l**

UNIT I - PROPOSITIONAL CALCULUS	**(6 + 6)**
Propositions-Logical connectives - Compound propositions - Conditional and biconditional propositions -Truth tables-Tautologies and Contradictions - Logical and Equivalences and implications – De Morgan's Laws - Normal forms - Rules of inference – Arguments - Validity of arguments.	
UNIT II - PREDICATE CALCULUS	**(6 + 6)**
Predicates-Statement Function – Variables - free and bound variables – Quantifiers - Universe of discourse - Logical equivalences and implications for quantified statements -Theory of inference -The rules of universal specification and generalization - Validity of arguments.	
UNIT III - SET THEORY AND FUNCTIONS	**(6 + 6)**
Set Operations - Properties-Power set - Relations-Graph and matrix of a relation - Partial Ordering - Equivalence relation - Partitions – Functions - Types of functions - Composition of relation and functions-inverse functions.	
UNIT IV COMBINATORIC	**(6 + 6)**
Basics of counting - Counting arguments - Pigeonhole Principle - Permutations and Combinations - Recursion and recurrence relations - Generating Functions - Mathematical Induction – Inclusion - Exclusion	
UNIT V - LATTICES	**(6 + 6)**
Posets - Lattices as posets - Properties of lattices-Lattices as Algebraic systems – Sub lattices - Direct product and Homomorphism.	
TOTAL (L: 30+T:30) = 60 PERIODS	

TEXT BOOKS:

1. Tremblay J.P and Manohar R,"Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill, New Delhi, Reprint 2010.
2. Veerarajan.T, "Discrete Mathematics with Graph Theory and Combinatorics", 4th ed., Tata McGraw Hill, New Delhi, 2008.

REFERENCES:

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 5th ed., Tata McGraw- Hill publications, New Delhi 2007.
2. Venkatraman M.K.,"Discrete Mathematics", the National Publishing Company, Chennai, 2007.
3. S.Santha, "Discrete Mathematics with Combinatorics and Graph Theory", 2010 Cengag Learning India Pvt. Ltd.
4. Swapan Kumar Sarkar,"A Text Book of Discrete Mathematics", S. Chand & Company Ltd., New Delhi.

17ITC04 DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE and IT Branches)					
		L	T	P	C
		3	2	0	4
PRE REQUISITE : 17CSC04		**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To know the fundamental concepts and techniques for problem solving and algorithm design.	1.1	The students will be able to analyze worst, best and average case running times of algorithms using asymptotic notations.	**a,b,l**
2.0	To learn the different sorting algorithms and the strategy followed.	2.1	The students will be able to use different sorting techniques such as heap sort, merge sort, and quick sort.	**a,b,c,d,l**
3.0	To be familiar with dynamic and greedy algorithm design techniques	**3.1**	The students will be able to design dynamic-programming algorithms and apply them to test for optimality.	**a,b,c,d,f,i,k,l**
4.0	To understand backtracking, Branch bound techniques.	**4.1**	The students will be able to analyze the complexity of searching and hashing.	**a,b,c,d,f,i,k,l**
5.0	To learn the different range of behaviors of algorithms, the notion of tractable and intractable problems.	**5.1**	The students will be able analyze the complexities of various problems in different domain.	**b,c,d,e,i,k,l**

UNIT I - INTRODUCTION	**(9+6)**
Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms – Visualization.	
UNIT II - BRUTE FORCE AND DIVIDE-AND-CONQUER	**(9+6)**
Brute Force – Computing a^n – String Matching - Selection Sort and Bubble Sort – Sequential Search - Closest-Pair and Convex-Hull Problems - Exhaustive Search: Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort –Closest-Pair and Convex - Hull Problems.	
UNIT III - DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	**(9+6)**
Dynamic Programming : Computing a Binomial coefficient – Warshall's and Floyd's Algorithm – Optimal Binary Search trees - 0/1 Knapsack Problem. Greedy Technique: Prim's algorithm and Kruskal's Algorithm - Huffman Trees.	
UNIT IV – ITERATIVE IMPROVEMENT AND LIMITATIONS OF ALGORITHM POWER	**(9+6)**
Iterative Improvement - The Simplex Method - The Maximum-Flow Problem- Maximum Matching in Bipartite Graphs. Limitations of Algorithm Power : Lower bound arguments – Decision trees – P, NP and NP complete Problems.	
UNIT V - COPING WITH THE LIMITATIONS OF ALGORITHM POWER	**(9+6)**
Backtracking: N Queen's problem – Hamiltonian Circuit problem – Subset problem. Branch and Bound: Assignment problem – Knapsack Problem – Travelling Salesman Problem – Approximation algorithms for NP hard problems.	
TOTAL (L:45+T:30) =75 PERIODS	

TEXT BOOK:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, 2nd ed.., 2013.

REFERENCES:

1. Harsh Bhasin, "Algorithms Design and Analysis ", Oxford university press, 2016.
2. S. Sridhar, "Design and Analysis of Algorithms ", Oxford university press, 2014.

17CSC07 DATABASE MANAGEMENT SYSTEM
(Common to CSE and IT Branches)

L	T	P	C
3	0	0	3

PRE REQUISITE : NIL | **QUESTION PATTERN: TYPE - I**

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To know the fundamentals of data models.	1.1	The students will be able to identify suitable data models for real time application and conceptualize a database system using ER Diagram	**a,b,c,d,e,f ,h,i,k,l**
2.0	To learn about Relational database architecture and querying through SQL.	2.1	The students will be able to write queries in relational algebra and SQL.	**a,b,c,d,e, i,k,l**
3.0	To know about normalization	3.1	The students will be able to normalize the database design.	**a,b,c,d,e, h,i,k,l**
4.0	To understand the storage structures and the queries processing/optimization.	4.1	The students will be able to choose storage structure and process/optimize Queries.	**a,b,c,d,e, h,i,k,l**
5.0	To gain knowledge about transaction processing, concurrency control and recovery.	5.1	The students will be able to apply concepts of query processing, transaction processing, and concurrency control.	**a,b,c,d,e,f ,h,k,l**

UNIT I - DATA BASE SYSTEM CONCEPT **(9)**

Purpose of Database systems – Views of data – Database Languages - Database design – Database system architecture – Data models – Data Dictionary – Database Administration – Entity-Relationship model – EER Model.

UNIT II - RELATIONAL DATABASE **(9)**

Structure of Relational Database – Integrity Constraints – Relational Algebra – Relational Calculus – SQL – Views – Joins – Functions and Procedures – Triggers.

UNIT III - DATABASE DESIGN **(9)**

Functional Dependencies – Decomposition: Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT IV - PHYSICAL DATABASE DESIGN AND QUERY PROCESSING **(9)**

Storage and file structure – Indexing and Hashing – Query Processing

UNIT V -TRANSACTION PROCESSING **(9)**

Transactions: Desirable properties of Transactions – Serializability – Concurrency Control: Lock-Based Protocols – Timestamp-Based Protocols – Validation-Based Protocols – Recovery systems.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", 6th ed., McGraw Hill, 2011.

REFERENCES:

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", 5th ed., Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", 3rd ed., Pearson Education, 2007.

17CSC08 COMPUTER NETWORKS					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand the concepts of data communications	**1.1**	The students will be able to familiarize with the Data Communication Concepts	**a,c,f,h,i,j,l**
2.0	To impart the fundamental concepts of Data Link Layer	**2.1**	The students will be able to implement the Data Link Layer Concepts	**a,b,c,e,i,l**
3.0	To gain exposure about Addressing and Routing Protocols	**3.1**	The students will be able to realize the need of Addressing and Routing	**a,b,c,d,e,i,j,l**
4.0	To get knowledge about services in Transport Layer	**4.1**	The students will be able to build a clear concern on Transport Layer Services	**a,b,c,d,e,i,j,l**
5.0	To learn about Application Layer functionalities	**5.1**	The students will be able to work with Application layer protocols	**a,b,c,d,e,i,j,l**

UNIT I - DATA COMMUNICATIONS	**(9)**
Data communication Components – Data representation and Data flow –Networks – Protocols and Standards – OSI model – TCP/IP protocol suite – Multiplexing – Transmission Media.	
UNIT II - DATA LINK LAYER	**(9)**
Error Detection and Error Correction – Introduction–Block coding – Linear block codes – cyclic codes – Checksum – Flow Control and Error control Protocols: Stop and Wait – Go back – N ARQ – Selective Repeat ARQ – Piggybacking – Random Access – CSMA/CD,CDMA/CA.	
UNIT III - NETWORK LAYER	**(9)**
Logical addressing – IPV4 – IPV6–Address mapping–ARP, RARP, BOOTP and DHCP–ICMP – Delivery, Forwarding and Unicast Routing protocols – Multicast Routing protocols.	
UNIT IV - TRANSPORT LAYER	**(9)**
Process to Process Delivery – User Datagram Protocol – Transmission Control Protocol – SCTP – Congestion Control – Quality of Service – Techniques to improve QoS.	
UNIT V - APPLICATION LAYER	**(9)**
Domain Name System – DDNS – TELNET – EMAIL – File transfer– HTTP – Network Management System – SNMP.	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw–Hill, 4th ed., 2012.

REFERENCES:

1. William Stallings, “Data and Computer Communication”, 8th ed., Pearson Educationf, 2017.
2. James F. Kurose, Keith W. Ross, “Computer Networking - A Top-Down Approach Featuring the Internet”, 5th ed., Pearson Education, 2010.

17CSC09 ARTIFICIAL INTELLIGENCE (Common to CSE and IT Branches)					
			L	T	P	C
			3	0	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: TYPE - I**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**			**Related Program outcomes**
1.0	To illustrate the basic concepts of logic and knowledge-based agents.	**1.1**	The students will be able to understand the fundamentals of knowledge representation of agents.		**a,b,j,k**
2.0	To build the most basic concepts, representations and algorithms for planning, to explain the method of achieving goals.	**2.1**	The students will be able to an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.		**a,b,j,k**
3.0	To introduce the most basic concepts, representations and algorithms for planning, to explain the method of achieving goals.	**3.1**	The students will be able to understand the representation of states, algorithm for planning and real world problems.		**a,b,d,i,j**
4.0	To understand the concept of uncertainty and to learn the syntax and semantics of probability theory.	**4.1**	The students will be able to analysis and compare the different learning process and apply to the probability theory.		**a,c,i,j**
5.0	To understand the basic concepts of several learning techniques.	**5.1**	The students will be able to understand the different limitations of current Artificial Intelligence techniques.		**a,b,j,k**

UNIT I - INTRODUCTION	**(9)**
Introduction–Definition - Future of Artificial Intelligence – Intelligent Agents – Structure of Agents - Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.	
UNIT II - KNOWLEDGE AND LOGICAL REASONING	**(9)**
Knowledge Based Agents – Logical Agents – Propositional Logic – Inferences – First-order Logic – Inferences in First order Logic – Forward Chaining – Backward Chaining – Unification and Lifting – Resolution.	
UNIT III - PLANNING STRATAGIES	**(9)**
Introduction – Planning problem – Planning with State Space Search – Partial order Planning – Planning Graphs – Plan graph for Heuristic Estimation – Plan Graph Algorithm – Planning with proportional logic – Planning and Acting in the real world – Time, Schedules, and Resources.	
UNIT IV - UNCERTAIN KNOWLEDGE AND REASONING	**(9)**
Uncertainty – Review of Probability - Probabilistic Reasoning – Bayesian Networks – Inferences in Bayesian Networks – Inference by Enumeration – Variable Elimination Algorithm – Temporal Models – Hidden Markov Models.	
UNIT V - LEARNING TECHNIQUES	**(9)**
Learning from Observation – Forms of Learning – Ensemble Learning – Computational Learning Theory – Inductive Learning – Decision Trees – Decision Trees as Performance Elements – Expressiveness of Decision Tree – Explanation Based Learning – Statistical learning Methods –Reinforcement Learning.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, 3rd ed., Pearson Education, 2009.

REFERENCES:

1. David Poole, Alan Mackworth, Randy Goebel, ”Computational Intelligence: a logical approach”, Oxford University Press, 2004.
2. G. Luger, “Artificial Intelligence: Structures and Strategies for complex problem solving”, 4th ed., Pearson Education, 2002.
3. J. Nilsson, “Artificial Intelligence: A new Synthesis”, Elsevier Publishers, 1998.

17GEA01 ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING				
L	T	P	C	
3	0	0	3	
PRE REQUISITE : NIL	**QUESTION PATTERN: TYPE - IV**			

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To manage an Organization; to describe principles of macroeconomics to have the understanding of economic environment of Business.	**1.1**	The students will be able to know the importance of Engineering Economics and Principles of Micro and Macro Economics.	**a,b,c,e,l**
2.0	To understand the Market demand and supply analysis and the ways in which changes in these determinants affect equilibrium price and output	**2.1**	The students will be able to estimate the market position with the knowledge in demand forecasting and supply.	**a,b,c,e,l**
3.0	To know the production and cost function in various market condition.	**3.1**	The students will be able to develop and estimate cost for any project.	**a,b,c,e,l**
4.0	To determine the changes in price of the product, the effect of a price control in different market structure, taxation and services.	**4.1**	The students will be able to fix the price of the product with the knowledge in different market structure and taxation design.	**a,b,c,d,e,f,g,h, l,k,l**
5.0	To acquire a reasonable knowledge in Accounts; to analyze and evaluate Financial Statements.	**5.1**	The students will be able to analyze the financial statement to determine the optimal managerial decisions.	**a,b,c,d,e,f,g,h, l,k,l**

UNIT I - INTRODUCTION **(9)**

Managerial Economics – Relationship with other disciplines, Firms – Types, Objectives and Goals, Managerial Decisions, Decision Analysis.

UNIT II - DEMAND AND SUPPLY ANALYSIS **(9)**

Demand – Types of Demand, Determinants of Demand, Demand Function, Demand Elasticity, Demand Forecasting. Supply – Determinants of Supply, Supply Function, Supply Elasticity.

UNIT III - PRODUCTION AND COST ANALYSIS **(8)**

Production Function – Returns to scale, Production Optimization, Isoquants, and Managerial uses of Production Function. Cost Concepts – Cost Function, Determinants of Cost, Estimation of Cost.

UNIT IV – PRICING AND TAXATION **(9)**

Determinants of Price, Pricing under different Objectives and different Market Structures, Price Discrimination, Pricing methods in practice. Tax Design: The Structure of Taxation – Taxation of goods and services.

UNIT V - FINANCIAL ACCOUNTING, CAPITAL BUDGETING AND ACCOUNTING STANDARDS **(10)**

Introduction to Financial, Cost and Management Accounting, Accounting Concepts and Conventions, Final Accounts, Investments – Evaluation of Investment Decision – Average Rate of Return, Payback Period, Net Present Value. Accounting Standard: History – International Financial Reporting Standards – Indian Accounting Standards.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Anjali Bagad, "Engineering Economics and Financial Accounting", Technical Publications 2nd Revised ed., 2011.
2. B. Senthil Arasu, J. Praveen Paul, "Engineering Economics and Financial Accounting", SchiTech Publication (India) Pvt. Ltd.

REFERENCES:

1. McGuigan, Moyer and Harris, "Managerial Economics; Applications, Strategy and Tactics", Thomson South Western, 10th ed., 2005.
2. Paresh Shah, "Basic Financial Accounting for Management", Oxford University Press, New Delhi, 2007.

17CSP05 DATABASE MANAGEMENT SYSTEM LABORATORY					
		L	T	P	C
		0	0	4	2
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**			**Related Program outcomes**
1.0	To design a database system.	**1.1**	The students will be able to define database with various integrity constraints.		**b,c,j**
2.0	To study the usage of DDL and DML commands.	**2.1**	The students will be able to working with various DDL, DML queries.		**b,c,d,g**
3.0	To learn about joins, views, various built in functions and procedures and functions	**3.1**	The students will be able to create various views and make use of various types of joins and procedures and functions		**a,b,d,e**
4.0	To know about normalization	**4.1**	The students will be able to do conceptual design using E-R model and normalize the design.		**a,b,c,k**
5.0	To work with database connectivity.	**5.1**	The students will be able to work with real time data base connectivity		**a,c,j,k**

LIST OF EXPERIMENTS

1. Structured Query Language : Creating Database
   - Creating a Table
   - Specifying Relational Data Types
   - Specifying Constraints
   - Creating Indexes

2. Table and Record Handling
   - INSERT statement
   - Using SELECT and INSERT together
   - DELETE, UPDATE, TRUNCATE statements
   - DROP, ALTER statements

3. Retrieving Data from a Database
   - The SELECT statement
   - Using the WHERE clause
   - Using Logical Operators in the WHERE clause
   - Using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING Clause
   - Using Aggregate Functions Combining Tables
   - Using JOINS Sub queries

4. Database Management
   - Creating Views
   - Creating Column Aliases
   - Creating Database Users
   - Using GRANT and REVOKE

5. High level language extension with Triggers

6.Database design using E-R model and Normalization

7. Design and implementation of Payroll processing system

8. Design and implementation of Banking system

9. Design and implementation of Library Information System

10. Design and implementation of Student Evaluation System

TOTAL (P: 60) = 60 PERIODS

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:
HARDWARE: 1. 33 nodes with LAN connection or Standalone PCs **SOFTWARE:** 1. MYSQL 8.0 2. Visual Basic 6.0

17CSP06 COMPUTER NETWORKS LABORATORY				
L	T	P	C	
0	0	2	1	

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To know the services provided by Data Link Layer	**1.1**	The students will be able to implement services provided by Data Link Layer	**a,b,c,d,l**
2.0	To work with addressing protocols	**2.1**	The students will be able to realize addressing protocols	**a,b,c,d,l**
3.0	To gain knowledge about the working of routing algorithms	**3.1**	The students will be able to implement various routing algorithms	**a,b,c,d,j,l**
4.0	To learn socket programming	**4.1**	The students will be able to program using Sockets	**a,b,c,d,j,l**
5.0	To use analyzing tools to analyze the performance of protocols in different layers in computer networks	**5.1**	The students will be able to use Analyzer tools	**a,b,c,d,e,j,l**

LIST OF EXPERIMENTS:

1. Implementation of Error Detection / Error Correction using CRC
2. Implementation of Stop and Wait Protocol and sliding window
3. Implementation and study of Go-back-N and selective repeat protocols
4. Implementation of ARP /RARP protocols
5. Implementation of distance vector and Link state routing algorithms
6. Chat Program using TCP and UDP Sockets
7. Simulation of DNS using TCP and UDP Sockets
8. Create a socket (TCP & UDP) between two computers and enable file transfer between them.
9. Protocol analyzer using ethereal for analyzing ICMP, Trace route and Ping
10. Protocol analyzer using ethereal for analyzing HTTP GET/response interaction
11. Using Simulator, Create a scenario as described below.

    No of students – 2
    SN -1 Nodes – 15
    SN -2 Nodes - 10
    Generate FTP Traffic & HTTP traffic between
    Nodes 1 to 11 (FTP)
    14 to 7 (HTTP / Gen FTP)
    Trace the packet within the Simulation time and display the Trace file.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS SOFTWARE :

HARDWARE:

Standalone desktops 30 Nos.

SOFTWARE:

C / C++ / Java / Equivalent Compiler

Network simulator like Ethereal / NS2 / NS3 / Glomosim /OPNET/ 30 Equivalent.

TOTAL (L: 30) = 30 PERIODS

17GED02 SOFT SKILLS – READING AND WRITING					
			L	T	P	C
			0	0	2	0
PREREQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To recollect the functional understanding of parts of speech and basic grammar	**1.1**	The students will be able to apply the knowledge to identify the parts of speech and construct the sentences	**i,j,l**	
2.0	To acquire the reading skills through cloze texts, matching and multiple choice modes	**2.1**	The students will be able to develop the reading skills through cloze texts, matching and multiple choice modes	**i,j,l**	
3.0	To enhance the writing skills for a variety of purposes	**3.1**	The students will be able to interpret effectively through writing for a variety of purposes	**i,j,l**	

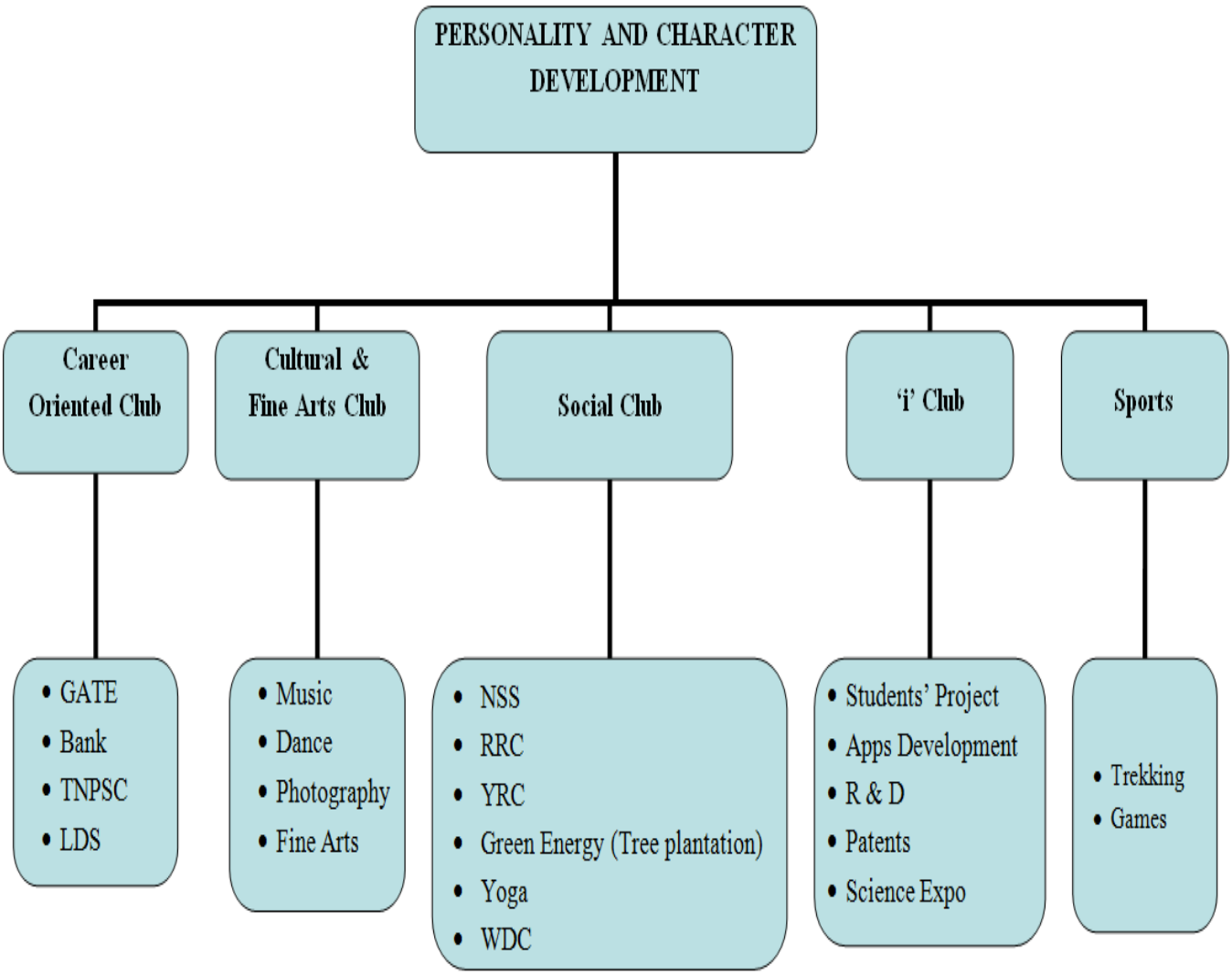
UNIT I - GRAMMAR	**(10)**
Articles - Adjectives - Conjunctions - Prepositions - Idioms & Phrases	
UNIT II – READING	**(10)**
Part I : Matching 7 sentences to four short texts Part II: Text with sentences missing Part III: Text with multiple choice questions Part IV: Text with multiple choice gaps Part V: Identification of additional unnecessary words in text	
UNIT III -WRITING	**(10)**
Part I : E-mail writing, Writing short notes, Memo, Agenda & Minutes Part II: Report Writing, Complaint Letter, Writing Proposals	
TOTAL (P:30) : 30 PERIODS	

REFERENCES:

1. Murphy, Raymond, "Essential Grammar in Use", Cambridge University Press, UK, 2007.
2. Whitby, Norman, "Business Benchmark Pre - Intermediate to Intermediate Preliminary", 2nd ed., Cambridge University Press, 2013

17GED03 - PERSONALITY AND CHARACTER DEVELOPMENT

L	T	P	C
0	0	1	0



***LDS - Leadership Development Skills**

OBJECTIVES :				
Career Oriented Club	**Cultural & Fine Arts Club**	**Social Club**	**'i' club**	**Sports**
• To provide support for identifying specific career field of interests and career path • To provide support for preparing for competitive exams	• To bring out the hidden talent of students in music, dance and other fine arts. • To promote photography skill among the students • To develop and enhance the performance of students by participating in various events • To inculcate managerial capabilities such as event management and stage organization	• To create social awareness and develop a sense of social and civic responsibility • To inculcate socially and environmentally sound practices and be aware of the benefits • To encourage the students to work along with the people in rural areas, thereby developing their character, social consciousness, commitment, discipline and being helpful towards the community.	• To inculcate the basic concepts of innovation • To foster the networking between students, build teams, exchange ideas, do projects and discuss entrepreneurial opportunities • To enrich the academic experience, build competencies and relationships beyond the classroom	• To provide opportunities to excel at sports • To promote an understanding of physical and mental well-being through an appreciation of stress, rest and relaxation. • To develop an ability to observe, analyze and judge the performance of self and peers in sporting activities. • To develop leadership skills and nurture the team building qualities. **Trekking:** • To provide opportunities to explore nature and educating about the purity of nature • To improve physical and mental health.

OUTCOMES : At the end of this course, the students will be able to				
• Find a better career of their interest. • Make use of their knowledge during competitive exams and interviews.	• Take part in various events • Develop team spirit, leadership and managerial qualities	• Develop socially responsive qualities by applying acquired knowledge • Build character, social consciousness, commitment and discipline	• Apply the acquired knowledge in creating better solutions that meet new requirements and market needs • Develop skills on transforming new knowledge or new technology into viable products and services on commercial markets as a team	• Demonstrate positive leadership skills that contribute to the organizational effectiveness • Take part an active role in their personal wellness (emotional, physical, and spiritual) that supports a healthy lifestyle • Create inclination towards outdoor activity like nature study and Adventure.

TOTAL [2 x (P: 15)]: 30 PERIODS
(Cumulatively for Two Semesters)

17CSC10 THEORY OF COMPUTATION					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17MYB08		**QUESTION PATTERN: TYPE - III**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To learn the basic concepts in theoretical computer science.	**1.1**	The students will be able to explain the key properties of formal languages and finite automata	**a,c,j,k,l**
2.0	To comprehend complex concepts and formal proofs in theoretical computer science in order to improve reasoning and problem solving skills.	**2.1**	The students will be able to design and describe the strings recognized by regular languages.	**a,c,j,k,,**
3.0	To learn about context free grammar and how to develop context free grammar based on different normal forms.	**3.1**	The students will be able to construct the context-free grammars and explain the languages accepted by CFG	**a,b,c,j,k,l**
4.0	To study about the turing machine and push down automata.	**4.1**	The students will be able to design a turing machine and push down automata that accomplish a specific task.	**a,b,c,k,l**
5.0	To learn about the different classes of problem.	**5.1**	The students will be able to explain the undecidable and intractable classes of problems	**a,b,c,k,l**

UNIT I - AUTOMATA	**(9)**
Introduction to finite automata(FA) – Central concepts of automata theory – Deterministic finite automata – Non deterministic finite automata – Finite automata with epsilon transitions – Equivalence between epsilon NFA and DFA - Minimization of automata.	
UNIT II - REGULAR EXPRESSIONS	**(9)**
Regular expressions(RE) - Manipulation of regular expressions - Equivalence between RE and FA - Inter conversion - Pumping lemma - Closure properties of regular sets – Decision properties of Regular Languages.	
UNIT III - CONTEXT FREE GRAMMAR	**(9)**
Context free Grammars (CFG) - Derivation trees - Ambiguity in Context-Free Grammars - Applications of Context Free Grammars - Normal Forms - Chomsky Normal Form (CNF) - Greibach Normal Form (GNF).	
UNIT IV - PUSH DOWN AUTOMATA AND TURING MACHINE	**(9)**
Push Down Automata (PDA) – Languages of PDA – Equivalence of PDA's and CFG's - Turing Machine, Programming techniques of Turing Machine – Types of Turing Machine.	
UNIT V -CLASSES OF PROBLEMS	**(9)**
A language that is not Recursively Enumerable – Universal Turing Machine – Rice's Theorem and properties of the Recursively Enumerable Languages – Post's Correspondence Problem (PCP) – The Classes P and NP – An NP Complete Problem.	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. John E Hopcroft, Rajeev Motwani, Jeffrey D Ullman," Introduction to Automata Theory, Languages, and Computation", 3rd ed., Pearson, 2013.
2. John C Martin, "Introduction to Languages and the Theory of Computation", 4th ed., Tata McGraw Hill Publishing Company, New Delhi, 2010

REFERENCES:

1. Kamala Krithivasan and Rama. R, “Introduction to Formal Languages, Automata Theory and Computation”, Pearson Education 2009.
2. Lewis H.P. & Papadimitriou C.H.,” Elements of Theory of Computation”, Prentice Hall of India, 4th ed., 2007.
3. Mishra K L P and Chandrasekaran N, “Theory of Computer Science - Automata, Languages and Computation”, Prentice Hall of India, New Delhi, 3rd ed., 2004.
4. Harry R Lewis, Christos H Papadimitriou, “Elements of the Theory of Computation”, Prentice Hall of India/ Pearson Education, New Delhi, 2nd ed., 2003.

17ITC09 INTERNET AND WEB PROGRAMMING (Common to CSE and IT Branches)				
L	T	P	C	
2	0	2	3	
PRE REQUISITE : 17ITC01	**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To discuss the concepts of HTML 5 and CSS.	**1.1**	The students will be able to design a web page using HTML 5 and CSS	**a,c,d,e,f,g,i,k,l**
2.0	To infer the basics of JavaScript	**2.1**	The students will be able to make use of JavaScript client side coding	**a,b,c,d,e,f,g,i, k,l**
3.0	To know about basics Java Servlets	**3.1**	The students will be able to apply servlets for their web development	**a,b,c,d,e,f,g,i, k,l**
4.0	To know about basic concepts of JSP	**4.1**	The students will be able to make use of JSP	**a,b,c,d,e,f,g,i, k,l**
5.0	To know about XML and Web services	**5.1**	The students will be able to make use of XML and Web Services	**a,b,c,d,e,f,g,i, k,l**

UNIT I - HTML 5 and CSS	**(6+6)**
HTML Elements –HTML Forms – Introduction to HTML5 new elements – Semantic elements- CSS-Features–Syntax–Box Model- Selectors – Display Positioning – CSS Floats – CSS Colors – CSS text fonts	
UNIT II -JAVASCRIPT	**(6+6)**
JavaScript Introduction - Basic Elements - Variable - Data Types - Operators and Literals – Functions -Objects-Arrays–Built-in- Object – Event Handling – Validation	
UNIT III - SERVLETS	**(6+6)**
Java Servlets: Architecture–Overview – Servlet Generating Dynamic Content-Life Cycle-Parameter Data-Sessions-Cookies	
UNIT IV - JSP	**(6+6)**
JSP: Overview –Basic JSP: Architecture- Lifecycle– Directives – Actions- Implicit Objects– Java Beans Classes and JSP – MVC Paradigm	
UNIT V - XML and WEB SERVICES	**(6+6)**
XML: Namespaces- XML Processing- -XML Documents- XSL – XSLT; Web Services: WSDL-XML Schema–Introduction to SOAP	

1. Programs with HTML and CSS.
2. Programs with Java script.
3. Programs on basic JSP tags
4. Programs for creating web applications using JSP.
5. Programs on HTTP Servlet.
6. Programs for creating web application using Servlets.
7. Creation of 3 tier Application.
8. Programs on XML

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:

HARDWARE:

1. System with 1 GB RAM minimum.

SOFTWARE:

1. OS – Windows 7 or higher
2. Notepad++
3. Net beans

TOTAL (L: 30+P:30) = 60 PERIODS

TEXT BOOKS:

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
2. Deitel Deitel Nieto, “Internet &World Wide Web How To Program”, Prentice Hall, 5th ed., 2012.

REFERENCES:

1. Thomas A. Powell, “The Complete Reference HTML &CSS”, New Riders, 5th ed., 2010.
2. Steve Suehring, “JavaScript– Step by Step”, PHI, 2nd ed., 2010.
3. https://www.w3schools.com
4. https://www.tutorialspoint.com/jsp

17CSC11 OBJECT ORIENTED SOFTWARE ENGINEERING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC07	**QUESTION PATTERN: TYPE - I**				

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To learn about software engineering concepts and object modeling.	**1.1**	The student will be able to explain software development activites.	**a,c,d,g,j,k,l**
2.0	To perceive knowledge on requirement analysis	**2.1**	The student will be able to gather and analyze user's requirements for the given product.	**a,b,c,d,e,h,i,j, k,l**
3.0	To acquire knowledge on system design.	**3.1**	The students will be able to identify and apply appropriate system design.	**a,b,c,d,e,f,g,i,j ,k,l**
4.0	To study and learn how to reuse Design Patterns and specify interfaces.	**4.1**	The students will be able to apply Design Patterns and Interfaces.	**a,b,c,d,e,f,g,h, i,j,k,l**
5.0	To learn various levels of testing	**5.1**	The students will be able to formulate and employ different testing strategies.	**a,b,c,d,e,f,g,h, i,j,k,l**

UNIT I - INTRODUCTION	**(9)**
Introduction – Software Engineering Concepts – Development Activities – Managing Software Development – Modelling with UML.	
UNIT II - ANALYSIS	**(9)**
Requirements Elicitation – Concepts – Activities – Management – Analysis concepts – Analysis Activities – managing analysis.	
UNIT III - SYSTEM DESIGN	**(9)**
Decomposing the system – Overview of System Design – System Design Concepts – System Design Activities – Addressing Design Goals – Managing System Design.	
UNIT IV- OBJECT DESIGN	**(9)**
Reusing Pattern Solutions – Overview of object design – reuse concepts – reuse activities – managing Reuse – Specifying Interfaces – Overview – Interface Specification concepts – Interface Specification activities.	
UNIT V- MAPPING MODELS TO CODE AND TESTING	**(9)**
Overview of Mapping - Mapping concepts – mapping activities – Manage implementation – Overview of Testing – Testing concepts – Testing activities – Managing testing.	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. Bernd Bruegge & Allen H. Dutoit, "Object-Oriented Software Engineering", 3nd ed., Pearson Education, 2014.

REFERENCES:

1. Timothy C. Lethbridge, Robert Laganiere, Object Oriented Software Engineering, Tata McGraw-Hill, 6th ed., reprint, 2008.
2. Stephen Schach, "Object Oriented and Classical Software Engineering 6th ed., McGraw-Hill, 2005.

17CSC12 GRAPHICS AND MULTIMEDIA					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL	**QUESTION PATTERN: TYPE - I**				

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To introduce the graphics model with the help of basic algorithms and methodologies.	**1.1**	The students will be able to explain the fundamentals of Graphics	**a,b,c,d,e,f,g,h,i,l**
2.0	To equip students with fundamental knowledge and basic technical competence in the field of computer graphics.	**2.1**	The students will be able to design two dimensional and three dimensional graphic transformations.	**a,b,c,d,e,f,g,h,i,l**
3.0	To provide an understanding of color models and surface detection methods.	**3.1**	The students will be able to detect the hidden surfaces and relate color models with graphics.	**a,b,c,d,e,f,g,h,i,l**
4.0	To enable students to acquire knowledge in Gimp Installation.	**4.1**	The students will be able to explain the techniques of image editing.	**a,b,c,d,e,f,g,h,i,l**
5.0	To learn the Color correction and Restoration.	**5.1**	The students will be able to manipulate an image.	**a,b,c,d,e,f,g,h,i,l**

UNIT I - FUNDAMENTALS	**(9)**
Introduction to Computer Graphics – Raster and vector graphics systems – Output primitives – Points and lines – Line drawing algorithms –Loading the frame buffer – Line function – Circle and ellipse generating algorithms – Pixel addressing and object geometry – Filled area primitives – Anti-aliasing	
UNIT II - 2D-3D REPRESENTATION AND MANIPULATION	**(9)**
2D Transformation: Translation, rotation, scaling, reflection and shearing – Matrix and homogeneous coordinates – Composite 2D transformations – 2D Viewing – Clipping: line, polygon and text clipping. 3D Transformation: Translation, rotation, scaling, reflection, shearing – Composite 3D transformation – 3D Viewing – Projection – 3D clipping	
UNIT III - VISIBLE SURFACE DETECTION AND COLOR MODELS	**(9)**
Back face detection – Depth buffer method – A-Buffer method -Scan line method – Depth sorting method – BSP – Tree method – Area Subdivision method – Octree method – Ray casting – Curved surfaces – Wireframe methods – Visibility Detection Functions – Color Models – RGB, CMY, HSV, HLS, CIE models.	
UNIT IV – INTRODUCTION TO GIMP	**(9)**
Downloading and Installing Gimp – Gimp Interface – Image Menu – Image Navigation Bar –Toolbox and Important tool Functions – Working with Layers – Digitizing Large Images – Scanning Slides and Negatives–Straightening and Cropping your Images–Correcting Tone And Exposure : Common Tonal Problems –The Brightness –Contrast Dialog– Tonal Corrections Using Levels, Curves, Layer Blend Modes.	
UNIT V – COLOR CORRECTION AND RESTORATION	**(9)**
Color essentials – Correcting Color Casts - Correcting And Restoring Color – Converting Color into Black and White – Digital Sepia Toning – Selective Colorizing – Colorizing Black and White Images Case Study : Image Editing	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Donald Hearn and Pauline Baker, “Computer Graphics”, Prentice Hall, New Delhi, 2nd ed., 2012.
2. Phillip Whitt, “Beginning Photo Retouching & Restoration Using GIMP”, Apress Publisher , 2014..

REFERENCES:

1. Ranjan Parekh, “Principles of Multimedia”, Tata McGraw-Hill, 2013.
2. Jan Smith, Roman Joost, “GIMP for Absolute Beginners”, Apress Publisher ,2012

17CSP07 CASE TOOLS LABORATORY

L	T	P	C
0	0	4	2

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To have a knowledge on problem analyzing.	**1.1**	The students will be able to outline the project scope and objectives.	**a,b,c,i,k,l**
2.0	To learn how to identify objects and their relationships.	**2.1**	The students will be able to write the software requirement analysis.	**a,b,e,i,k,l**
3.0	To get familiarized on object oriented design process.	**3.1**	The students will be able to create Data Modeling.	**a,b,c,d,k,l**
4.0	To know the project module development using tools.	**4.1**	The students will be able to develop and debug the projects.	**a,b,c,d,e,g,i,k,l**
5.0	To gain experience on writing test cases.	**5.1**	The students will be able to generate test cases using testing strategies.	**a,b,d,g,i,k,l**

Prepare the following documents for the project and develop the software using software engineering methodology.

1. Problem Analysis and Project Planning - study of the problem, Identify project scope, Objectives, and Infrastructure.
2. Software Requirement Analysis - Phases/ modules of the project, Identify deliverables.
3. Data Modeling - use work products, data dictionary and UML diagrams.
4. Software Development and Debugging.
5. Software Testing - Prepare test plan, perform validation testing, coverage analysis, develop test case hierarchy, Site check and site monitor.

LIST OF PROJECTS:

1. Passport automation system.
2. Book bank.
3. Exam Registration and result system.
4. Stock maintenance system.
5. Online course reservation system
6. E-ticketing.
7. Expert System for Medical Diagnosis System
8. Credit card processing.
9. Payroll System.
10. Student Information System.

SOFTWARE TOOLS:

1. Rational Suite 30 user License
2. Open Source Alternatives: ArgoUML, VisualParadigm
3. Eclipse IDE and JUnit, Selenium
4. PCs 30

TOTAL (P:60) = 60 PERIODS

17CSP08 GRAPHICS AND MULTIMEDIA LABORATORY

L	T	P	C
0	0	4	2

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To learn algorithmic development of graphics primitives like: line, circle, ellipse, polygon etc.	**1.1**	The students will be able to draw basic shapes such as lines, circle and ellipse.	**a,b,c,d,e,f,g,h,i,l**
2.0	To understand the need of developing graphics applications.	**2.1**	The students will be able to execute processing of basic shapes by various algorithms and techniques.	**a,b,c,d,e,f,g,h,i,l**
3.0	To learn the representation and transformation of graphical images and pictures.	**3.1**	The students will be able to apply the transformations to the basic shapes and various clipping algorithms.	**a,b,c,d,e,f,g,h,i,l**
4.0	To illustrate the impact of animations.	**4.1**	The students will be able to design animation sequences using Open source animation Softwares.	**a,b,c,d,e,f,g,h,i,l**
5.0	To know the impact of videos.	**5.1**	The students will be able to create videos using video editing Softwares.	**a,b,c,d,e,f,g,h,i,l**

LIST OF EXPERIMENTS :

1. Implementation of Line Drawing Algorithms
    a) DDA
    b) Bresenham's
2. Implementation of Bresenham's Circle and Ellipse Generation Algorithm
3. Implementation of Two Dimensional Transformations
4. Implementation of Cohen-Sutherland Line Clipping Algorithm
5. Implementation of 3D Transformations
6. Basic Operations on the Image using image manipulation software.
    a) Selection Tool
    b) Color Tool
    c) Brush Tool
    d) Clone Tool
    e) Blur
    f) Scale Tool
7. Animation using 2D Animation Software.
    a) Tweening
8. Video Editing.

SOFTWARE REQUIRED:

1. Turbo C Software
2. Gimp,Paint .Net,etc.
3. Tupi 2d Animation, Synfig,etc.
4. Video editor – Movie maker, Virtual dub,etc.

TOTAL (P: 60) = 60 PERIODS

17GED08 - ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE					
			L	T	P	C
			2	0	0	0
PREREQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**			**Related Program outcomes**
1.0	To Understand the basics of Indian tradition and Indian traditional knowledge systems	**1.1**	The students will be able to Gain Knowledge about of Indian tradition and Indian traditional knowledge systems		**a,f,h**
2.0	To know about basics of technologies and its scientific perspectives.	**2.1**	The students will be able to Understand basics of technologies and its scientific perspectives.		**a, f**
3.0	To study the basics of Indian traditional health care ,	**3.1**	The students will be able to study the basics of Indian traditional health care		**a,f,l**
4.0	To know the basics of Indian artistic tradition knowledge	**4.1**	The students will be able to know the basics of Indian artistic tradition		**a,f,l**
5.0	To develop the basics of linguistic tradition	**5.1**	The students will be able To develop the basics of linguistic tradition		**a,f,h**

UNIT I - INDIAN TRADITION	**(6)**
Fundamental unity of India, India's heroic role in world civilization, The Indian way of life, Introduction to Indian tradition, The Scientific Outlook and Human Values.	
UNIT II - INDIAN KNOWLEDGE SYSTEM AND MODERN SCIENCE	**(6)**
Relevance of Science and Spirituality, Science and Technology in Ancient India, Superior intelligence of Indian sages and scientists	
UNIT III - INDIAN TRADITIONAL HEALTH CARE	**(6)**
Importance and Practice of Yoga, Pranayam and other prevailing health care techniques	
UNIT IV - INDIAN ARTISTIC TRADITION	**(6)**
Introduction and overview of significant art forms in ancient India such as painting, sculpture, Civil Engineering, Architecture, Music, Dance, Literature etc	
UNIT V - INDIAN LINGUISTIC TRADITION	**(6)**
Ancient Indian languages and literary Heritages, Phonology, Morphology, Syntax and Semantics	
TOTAL = 30 PERIODS	

Text Books:

1. Sivaramakrishnan, V., Cultural Heritage of India- Course Material, Bharatiya Vidya Bhavan, Mumbai 5th Edition, 2014.
2. Swami Jitatmananda, Modern Physics and Vedanta, Bharatiya Vidya Bhavan, 2004.
3. Raman V.V., Glimpses of Indian Heritage, Popular Prakashan, 1993.
4. Jha V.N., Language, Thought and Reality.
5. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.

17CSC14 CLOUD COMPUTING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: TYPE - I**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To learn the basic concepts of the cloud.	**1.1**	The students will be able to recall and describe cloud Platform and Technology.	**a,j,l**	
2.0	To be familiar with the architecture and virtualization of cloud.	**2.1**	The students will be able to describe and Implement Virtualization Technologies.	**a,e,j,l**	
3.0	To describe the key elements of Cloud Platform and Thread Programming.	**3.1**	The students will be able to develop and manage cloud applications using Aneka.	**a,b,c,e,j,l**	
4.0	To explore the concepts of Map Reduce Programming.	**4.1**	The students will be able to create a Hadoop Environment and Generate a Map- Reduce Programming.	**a,b,c,e,j,l**	
5.0	To design intelligent Cloud services and Applications.	**5.1**	The students will be able to design Web Based Applications for various Corporate.	**a,b,c,d,e,i,j,k,l**	

UNIT I - INTRODUCTION	**(9)**
Introduction: Cloud computing at a Glance – Historical Development – Building Cloud Computing Environments – Computing Platform and Technologies – Principles of Parallel and Distributed Computing: Elements of parallel Computing – Distributed Computing –Technologies of Distributed Computing.	
UNIT II - VIRTUALIZATION AND CLOUD COMPUTING ARCHITECTURE	**(9)**
Virtualization: Introduction – Characteristics of Virtualized Environments – Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization – Technology Examples – Cloud Computing Architecture: Cloud reference model – Types of the Clouds – Open Challenges.	
UNIT III - HADOOP AND MAP REDUCE	**(9)**
Apache Hadoop – Hadoop Map Reduce – Hadoop Distributed File System- Hadoop I/O - Developing a Map Reduce Application - Map Reduce Types and Formats - Map Reduce Features– Hadoop Cluster Setup – Administering Hadoop.	
UNIT IV – SECURITY IN THE CLOUD	**(9)**
Basic Terms and Concepts – Threat Agents – Cloud Security Threats – Cloud Security Mechanism: Encryption, Hashing, Digital Signature, Public Key Infrastructure, Identity and Access Management, Single Sign-on, Cloud Based Security Groups, Hardened Virtual Server Images.	
UNIT V - CLOUD PLATFORMS AND APPLICATIONS	**(9)**
Cloud Platforms in Industry: Amazon Web Services – Google AppEngine – Microsoft Azure – Cloud Application: Scientific Applications – Business and consumer Applications – Case Study – Cloud Deployment Tools: Eucalyptus, Open Nebula.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Rajkumar Buyya, Christian Vecchiola and Thamari Selvi S, “Mastering in Cloud Computing”, McGraw Hill Education (India) Private Limited, 2013.
2. Thomas Erl, ZaighamMahood, Ricardo Puttini, “Cloud Computing, Concept, Technology and Architecture”, Prentice Hall, 2013.

REFERENCES:

1. Anthony T Velte, “Cloud Computing: A Practical Approach”, Tata McGraw Hill, 2009.
2. Halper Fern, Kaufman Marcia, Bloor Robin, Hurwit Judith, “Cloud Computing for Dummies”, Wiley India, 2009.
3. RajkumarBuyya, James Broberg, Andrzej M. Goscinski, “Cloud Computing Principles Books and Paradigms”, Wiley, 2014.
4. Michael Miller , “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing ,2009
5. Dr. Kumar Saurabh, “Cloud Computing – Unleashing Next Gen Infrastructure to Application”, Willey, 2014.

17CSC15 SECURITY IN COMPUTING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC07, 17CSC08		**QUESTION PATTERN: TYPE - I**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To understand the basics of cryptography	**1.1**	The students will be able to summarize various cryptographic algorithms	**a,d,e,f,i,l**	
2.0	To learn to find the vulnerabilities in programs and how to overcome them	**2.1**	The students will be able to secure the programs from unauthorized access	**a,b,c,f,l**	
3.0	To know the different kinds of security threats in networks and solutions to solve them	**3.1**	The students will be able to employ security mechanism in networks	**a,f,i,j,l**	
4.0	To learn the different kinds of security issues in databases and recovery system also	**4.1**	The students will be able to apply security mechanisms to Secure databases	**a,c,f,i,j,l**	
5.0	To study about legal and ethical issues in computer security	**5.1**	The students will be able to differentiate various security models and standards	**f,g,h**	
UNIT I - ELEMENTARY CRYPTOGRAPHY					**(9)**
Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions – Key Exchange – Digital Signatures – Certificates.					
UNIT II - SECURITY IN PROGRAMS AND OPERATING SYSTEMS					**(9)**
Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls Against Program Threat – Control of Access to General Objects – User Authentication – Designing Trusted Operating System – Security Policies – Models of Security – Trusted Operating System Design – Assurance in Trusted Operating System.					
UNIT III - SECURITY IN NETWORKS					**(9)**
Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL – IPSec – Content Integrity – Access Controls – Wireless Security – Honeypots – Traffic Flow Security – Firewalls – Intrusion Detection Systems – Secure e-mail.					
UNIT IV - SECURITY IN DATABASES					**(9)**
Security requirements of database systems – Reliability and Integrity in databases – Two Phase Update – Redundancy/Internal Consistency – Recovery – Concurrency/Consistency – Monitors – Sensitive Data – Types of disclosures – Inference.					
UNIT V - LEGAL AND ETHICAL ISSUES IN COMPUTER SECURITY					**(9)**
Protecting Programs and Data – Information and the Law – Rights of Employees and Employers – Redress for Software Failures – Computer Crime – Ethical Issues in Computer Security – Case study in Ethics.					
					TOTAL (L:45) = 45 PERIODS
TEXT BOOK: 1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 5th ed., Prentice Hall, 2015. 2. Matt Bishop, "Introduction to Computer Security", Addison-Wesley, 2004.					
REFERENCES: 1. William Stallings, "Cryptography and Network Security: Principles and Practices", 5th ed., Prentice Hall, 2010. 2. https://www.owasp.org/index.php/Top_10_2010.					

17CSC16 PRINCIPLES OF COMPILER DESIGN			
L	T	P	C
3	0	0	3

PRE REQUISITE : 17CSC10 | **QUESTION PATTERN: TYPE - III**

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To learn the design principles of a Compiler	**1.1**	The students will be able to describe different phases of a Compiler and its applications	**a,b,c,d,l**
2.0	To understand, design and implement the different parsing techniques.	**2.1**	The students will be able to build parsers for syntax analysis using context free grammars.	**a,b,c,d,l**
3.0	To learn and design intermediate code generation schemes	**3.1**	The students will be able to create intermediate code for programming constructs.	**a,b,c,d,l**
4.0	To learn about the code generation techniques.	**4.1**	The students will be able to develop the code.	**a,b,c,d,l**
5.0	To learn how to optimize and effectively generate machine codes.	**5.1**	The students will be able to analyze and optimize the code to design a compiler.	**a,b,c,d,l**

UNIT I – INTRODUCTION AND LEXICAL ANALYSIS **(9)**

Introduction to Compiling- Compilers - Analysis of the source program - The phases - Cousins - The grouping of phases - Compiler construction tools. The role of the lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens - A language for specifying lexical analyzer.

UNIT II - SYNTAX ANALYSIS **(9)**

Syntax Analysis - The role of a parser - Context free grammar - Top down parsing– Recursive descent parsing, Predictive parsing - Bottom up parsing - Shift Reduce Parsing - Operator Precedence Parsing - LR parsers - SLR Parser, CLR Parser and LALR Parser.

UNIT III - INTERMEDIATE CODE GENERATION **(9)**

Intermediate languages - Declarations - Assignment statements - Boolean expressions - Case statements – Back patching - Procedure calls

UNIT IV - CODE GENERATION **(9)**

Issues in the design of a code generator- The target machine-Run-time storage management-Basic blocks and flow graphs- Next-use information-A simple code generator-Register allocation and assignment-The dag representation of basic blocks - Generating code from dags

UNIT V - CODE OPTIMIZATION **(9)**

Introduction-The principle sources of optimization-Peephole optimization- Optimization of basic blocks-Loops in flow graphs- Introduction to global data - flow analysis - Code improving transformations.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, “Compilers – Principles, Techniques, and Tools”, Pearson Education Asia, 2013.

REFERENCES:

1. Steven S. Muchnick, “Advanced Compiler Design & Implementation”, Morgan Kaufmann Publishers, 2003.
2. C. N. Fisher and R. J. LeBlanc “Crafting a Compiler with C”, Pearson Education, 2011.

17CSP09 INTERNET OF THINGS LABORATORY
(Common to CSE and IT Branches)

L	T	P	C
0	0	4	2

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To understand the fundamentals of LED and light intensity control.	**1.1**	Studentswill be able to acquire knowledge about Arduino, LED and control intensity of light.	**a,k,l**
2.0	To understand about the components such as Buzzer and LCD.	**2.1**	Students will be able to implement buzzer and LCD in applications.	**a,k,l**
3.0	To understand how to work with sensors such as temperature and LDR.	**3.1**	Students will be able to implement LM35sensor, LDR in applications.	**a,b,c,e,k,l**
4.0	To understand about key input and servo motor.	**4.1**	Students will be able to implement the way to blink LED through key input and working with servo motor.	**a,b,c,k,l**
5.0	To understand the concept NODEMCU with app and sensor value to upload in Cloud.	**5.1**	Students will be able to implement applications with NODEMCU with Blynk app and upload sensor value in Cloud.	**a,b,c,d,e,g,j,k,l**

LIST OF EXPERIMENTS

1. Implement a program to Blink LED using Arduino.
2. Implement a program to control intensity light using Arduino.
3. Implement a program for LCD Display using Arduino.
4. Implement a program for Buzzer Indication using Arduino.
5. Implement a program for LDR using Arduino.
6. Implement a program for LM35 Sensor using Arduino.
7. Implement a program for Key Input with LED using Arduino.
8. Implement a program for Servo Motor Control using Arduino.
9. Implement a program for blinking LED using NODEMCU with Blynk.
10. Implement a program for Sensor value logging in Cloud.

HARDWARE OR SOFTWARE REQUIREMENT:

HARDWARE:

1. 36 nodes with WiFi connection or Standalone PCs
2. Temperature sensor, LDR, LCD, Servo motor, Buzzer, LEDs, Arduino Board, IoT Core board, ESP01 ESP8266.

SOFTWARE:

Arduino 1.8.5
Arduino Library

TOTAL (P: 60) = 60 PERIODS

17GED06 COMPREHENSION				
L	T	P	C	
0	0	2	0	

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To encourage the students to comprehend the knowledge acquired from the first Semester to Sixth Semester of B.E Degree Course through periodic exercise	**1.1**	The student will be able to figure out and solve any given problem related to computer science & engineering field.	**a, b, c, e, k, l**

METHOD OF EVALUATION

The student will be assessed for his understanding of the basic principles of the core engineering subjects. The internal assessment for a total of 50 marks will be evaluated by a committee comprising of the faculty members of the department. The committee will conduct three assessments of objective question type from the subjects as follows

- Test 1 - C Programming, Data Structures, Operating systems, Computer Networks.
- Test 2 - Java Programming, Database Systems, Computer Architecture, Software Engineering.
- Test 3 – Internet and web programming, Object Oriented Analysis and Design, Internet of Things.

The end semester examination, which carries a total of 50 marks, will be an objective question type examination conducted by a committee of one internal examiner appointed by the COE of our college.

TOTAL: 30 PERIODS

17GED07- CONSTITUTION OF INDIA					
		L	T	P	C
		2	0	0	0
PREREQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To educate about the Constitutional Law of India	**1.1**	The students will be able to Gain Knowledge about the Constitutional Law of	**f, h, l**	
2.0	To motivate students to Understand the Fundamental Rights and Duties of a citizen	**2.1**	The students will be able to Understand the Fundamental Rights and Duties of a citizen	**f, g, h**	
3.0	To make students to understand about Federal structure of Indian Government	**3.1**	The students will be able to Apply the concept of Federal structure of Indian Government	**f, g, h**	
4.0	To understand about Amendments and Emergency provisions in the Constitution	**4.1**	The students will be able to Analyze the Amendments and Emergency provisions in the Constitution	**f, g, h**	
5.0	To educate a holistic approach in their life as a Citizen of India	**5.1**	The students will be able Develop a holistic approach in their life as a Citizen of India	**f, h, l**	

UNIT I - INTRODUCTION TO INDIAN CONSTITUTION	**(6)**
Meaning of the constitution law and constitutionalism - Historical perspective of the Constitution - Salient features and characteristics of the Constitution of India	
UNIT II - FUNDAMENTAL RIGHTS	**(6)**
Scheme of the fundamental rights - Right to Equality - Fundamental Right under Article 19 - 102 Scope of the Right to Life and Liberty - Fundamental Duties and its legal status - Directive Principles of State Policy – Its importance and implementation	
UNIT III - FEDERAL STRUCTURE	**(6)**
Federal structure and distribution of legislative and financial powers between the Union and the States - Parliamentary Form of Government in India - The constitutional powers and status of the President of India	
UNIT IV - AMENDMENT TO CONSTITUTION	**(6)**
Amendment of the Constitutional Powers and Procedure - The historical perspectives of the constitutional amendments in India	
UNIT V - EMERGENCY PROVISIONS	**(6)**
National Emergency, President Rule, Financial Emergency Local Self Government – Constitutional Scheme in India.	
TOTAL = 30 PERIODS	

REFERENCES:

1. Constitution of India - Ministry of Law & Justice – PDF format awmin.nic.in/coi/coiason29july08.pdf
2. Introduction to the Constitution of India by Durgadas Basu.
3. The Constitution of India – Google free material - www.constitution.org/cons/india/const.html

17CSC17 MOBILE COMPUTING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC08		**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand the basic concepts of mobile computing.	**1.1**	The students will be able to explain the basics of mobile telecommunication system	**a,b,i,j,k**
2.0	To be familiar with the network protocol stack	**2.1**	The students will be able to choose the required functionality at each layer for given application	**a,b,c,i,j,k**
3.0	To learn the basics standards of mobile telecommunication system.	**3.1**	The students will be able to identify different standards of mobile communication systems	**a,b,i,j,k**
4.0	To be expressed to Ad-Hoc networks.	**4.1**	The students will be able to use simulation tools and design Ad hoc networks	**a,b,d,i,j,k**
5.0	To gain knowledge about different mobile platforms and application development.	**5.1**	The students will be able to develop a mobile application.	**a,b,d,i,j,k**

UNIT I - MOBILE COMPUTING AND WIRELESS NETWORKING	**(9)**
Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications –Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols –Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.	
UNIT II - MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER	**(9)**
Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – Route Optimization – Overview of TCP/IP– Architecture of TCP/IP – Adaptation of TCP Window – Improvement in TCP Performance.	
UNIT III - MOBILE TELECOMMUNICATION SYSTEM	**(9)**
Cellular Mobile Communication –Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).	
UNIT IV - MOBILE AD–HOC NETWORKS	**(9)**
Ad- Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing–Essential of Traditional Routing Protocols – Popular Routing Protocols – Vehicular Ad Hoc networks (VANET)–MANET Vs VANET – Security .	
UNIT V - MOBILE PLATFORMS AND APPLICATIONS	**(9)**
Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – Mobile Commerce– Structure – Pros & Cons – Mobile Payment System – Security Issues.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt. Ltd, New Delhi – 2012.

REFERENCES:

1. Jochen H. Schller, “Mobile Communications”, 2nd ed., Pearson Education, New Delhi, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt. Ltd., 2005.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
4. William.C.Y.Lee, “Mobile Cellular Telecommunications– Analog and Digital Systems”, 2nd ed., Tata McGraw Hill Edition, 2006.
5. C.K.Toh, “Ad-Hoc Mobile Wireless Networks”, 1st ed., Pearson Education, 2002.
6. Android Developers : http://developer.android.com/index.html
7. Apple Developer : https://developer.apple.com/
8. Windows Phone Dev Center : http://developer.windowsphone.com

17ITC15 MACHINE LEARNING TECHNIQUES				
L	T	P	C
3	0	0	3

PRE REQUISITE : 17MYB01 | **QUESTION PATTERN: TYPE - III**

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To introduce the basic concepts and techniques of Machine Learning	**1.1**	The students will be able to explain the concepts of supervised, unsupervised and semi-supervised learning	**a,b**
2.0	To have a thorough understanding of the Supervised and Unsupervised learning techniques.	**2.1**	The students will be able to apply the appropriate machine learning strategy for any given problem	**b,c,e,i,j,k,l**
3.0	To study the various probability based learning techniques	**3.1**	The students will be able to suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem	**b,c,e,i,j,k,l**
4.0	To study the evolutionary models and genetic algorithm for machine learning	**4.1**	The students will be able to design systems that uses the appropriate graph models of machine learning	**b,c,d,f,i,j,k,l**
5.0	To understand graphical models of machine learning algorithms	**5.1**	The students will be able to modify existing machine learning algorithms to improve classification efficiency	**b,c,d,f,i,j,k,l**

UNIT I - INTRODUCTION **(9)**

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

UNIT II - LINEAR MODELS **(9)**

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.

UNIT III - TREE AND PROBABILISTIC MODELS **(9)**

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map.

UNIT IV - DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS **(9)**

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process.

UNIT V - GRAPHICAL MODELS **(9)**

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Stephen Marsland, "Machine Learning – An algorithmic perspective", 2nd ed., Chapman and Hall/CRC Machine learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, "Machine Learning", 1st ed., McGraw Hill Education India Ltd, 2013.

REFERENCES:

1. Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", 1st ed., Cambridge University Press, 2012.
2. Jason Bell, "Machine learning –Hands on for Developers and Technical Professionals", 1st ed., Wiley, 2014.
3. Ethem Alpaydin, "Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)", 3rd ed., MIT Press, 2014.

17CSC18 FULL STACK DEVELOPMENT					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL		**QUESTION PATTERN : TYPE III**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program Outcomes**	
1.0	To build strong expertise in developing front end application using HTML5 and CSS3.	**1.1**	The students will be able to understand and develop web page using HTML and CSS	**a,c,j,k**	
2.0	To develop front end application using JavaScript.	**2.1**	The students will be able to design and develop front end application using JavaScript	**a,c,j,k**	
3.0	To become proficient in Bootstrap concepts and to develop web pages based on Bootstrap.	**3.1**	The students will be able to design and develop front end application using Bootstrap.	**a,b,c,k**	
4.0	To build strong expertise in developing front end application with jQuery.	**4.1**	The students will be able to implement MVC and responsive design to scale well across PC, tablet and Mobile Phone using jQuery.	**a,b,c,j,k**	
5.0	To build strong expertise in developing front end application jQuery Mobile.	**5.1**	The students will be able to implement MVC and responsive design to scale well across PC, tablet and Mobile Phone using jQuery Mobile.	**a,b,c,j,k**	

Unit I - HTML5 and CSS3	**(9)**
Introduction to HTML - HTML Basic Tags - HTML Formatting Tags - HTML Color Coding –HTML Grouping Using Div Span – Lists – Tables – Images – Hyperlink – Iframe – Headers – Classes – Responsive – Layout – HTML Javascript – Entities and URI code - Charset and Forms. Introduction to CSS3 – CSS3 Syntax - Selectors - Color Background Cursor -Text Fonts - Lists Tables - Box Model - Display Positioning - CSS Floats – Animations – Buttons – Pagination - User Interface – Filters – Responsive.	
Unit II - CLIENT SIDE PROGRAMMING	**(9)**
Introduction to JavaScript - Language Basics - JavaScript Objects - Scope – Events - Strings – Numbers – Math – Arrays – Boolean – Comparisons – Conditions – Switch - Loops - Type Conversion – RegExp – Errors - Debugging – Hoisting - Strict Mode - Functions – Objects – Forms - JavaScript HTML DOM - JavaScript BOM.	
Unit III - BOOTSTRAP	**(9)**
Introduction to Bootstrap - Bootstrap Basics - Bootstrap Grids - Bootstrap Themes - Bootstrap CSS - Bootstrap JS. Node.js – MySQL - MongoDB	
Unit IV- jQUERY	**(9)**
Introduction to jQuery - jQuery Syntax - jQuery Selectors - jQuery Events - jQuery Effects - jQuery HTML - jQuery Traversing - jQuery AJAX & Misc .	
Unit V- jQUERY MOBILE	**(9)**
Introduction to jQuery Mobile - jQuery Mobile Pages - jQuery Mobile Transitions - jQuery Mobile Buttons - Mobile Icons - Mobile Popups - Mobile Toolbars - Mobile Navbars - Mobile Panels - Mobile Collapsibles - Mobile Tables - Mobile Grids - Mobile Lists - Mobile Forms - jQuery Mobile Themes - jQuery Mobile Events.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Kogent Learning Solutions Inc. “HTML5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQUERY”, Wiley India Pvt. Limited, 2011.
2. Deitel and Deitel and Nieto, “Internet and World Wide Web – How to Program”, Prentice Hall, 5th Edition, 2011.

REFERENCES:

1. Silvio Moreto, Matt Lambert, Benjamin Jakobus, Jason Marah, “Bootstrap 4–Responsive Web Design” Packt Publishing (6 July 2017)
2. Adriaan de Jonge, Phil Dutson, “jQuery jQuery UI and jQuery Mobile - Recipes and Examples”, Pearson Education India.
3. Thomas Powell, “Web Design: The Complete Reference” ,Osborne / McGraw-Hill
4. https://www.w3schools.com/

17CSP10 MOBILE COMPUTING LABORATORY				
L	T	P	C	
0	0	2	1	

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To know the components and structure of mobile application development frameworks.	**1.1**	The students will be able to understand the fundamentals and various computational processing of mobile applications	**a,c,d,i,k**
2.0	To learn how to work with various mobile application development frameworks.	**2.1**	The students will be able to apply specifications and functionalities of various protocols/ standards of mobile applications.	**a,c,i,j,k**
3.0	To learn familiar with the capabilities and limitations of mobile devices.	**3.1**	The students will be able to implement the design using Android SDK and using Objective C and iOS.	**a,c,i,k**
4.0	To know how develop the Android and Windows OS based Mobiles.	**4.1**	The students will be able to design and Implement various mobile applications using emulators.	**a,c,d,i,k**
5.0	To learn how works android in different mobiles.	**5.1**	The students will be able to deploy applications to hand-held devices.	**a,c,i,j,k**

LIST OF EXPERIMENTS

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement Multi-threading application.
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Create a mobile alarm clock application.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

Standalone desktops with Windows or Android or iOS or Equivalent Mobile Application Development Tools with appropriate emulators and debuggers - 30 Nos.

TOTAL (P:30) = 30 PERIODS

17CSD01 PROJECT WORK - I				
	L	T	P	C
	0	0	8	4

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program Outcomes
1.0	To identify the problem in the specific domain or enhance the existing product to the next level.	**1.1**	The students will be able to demonstrate a sound technical knowledge of their selected project topic.	**a, b, l**
2.0	To learn how to formulate solution for the problem.	**2.1**	The students will be able to undertake problem formulation and solution legally for the sustainable development.	**c, d, e, g, h**
3.0	To be trained to function effectively as an individual and a member in diverse teams.	**3.1**	The students will be able to develop an attitude of team work and independent working on real time problems.	**h, i**
4.0	To interpret and justify the experimental results	**4.1**	The students will be able to design engineering solutions to complex problems based on engineering and management principles.	**c, d, e, k**
5.0	To develop an effective communication and be trained to write dissertation report	**5.1**	The students will be able to communicate with engineers and the community at large in written and oral forms.	**f, j**

DESCRIPTION

Project work may be allotted to a single student or to a group of students not exceeding 4 per group. The title of project work is approved by head of the department under the guidance of a faculty member and student(s) shall prepare a comprehensive project report after completing the work to the satisfaction of the guide. The Head of the department shall constitute a review committee for project work. There shall be three reviews during the semester by the committee to review the progress. Student(s) shall make presentation on the progress made by him / her / them before the committee and evaluation is done as per Rules and Regulations.

TOTAL (P:120) = 120 PERIODS

17CSD02 PROJECT WORK II					
			L	T	P	C
			0	0	16	8
PRE REQUISITE : 17CSD01					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program Outcomes**	
1.0	To identify the problem in the specific domain or enhance the existing product to the next level.	**1.1**	The students will be able to demonstrate a sound technical knowledge of their selected project topic.	**a, b, l**	
2.0	To learn how to formulate solution for the problem	**2.1**	The students will be able to undertake problem formulation and solution legally for the sustainable development.	**c, d, e, g, h**	
3.0	To be trained to function effectively as an individual and a member in diverse teams.	**3.1**	The students will be able to develop an attitude of team work and independent working on real time problems.	**h, i**	
4.0	To interpret and justify the experimental results	**4.1**	The students will be able to design engineering solutions to complex problems based on engineering and management principles.	**c, d, e, k**	
5.0	To develop an effective communication and be trained to write dissertation report	**5.1**	The students will be able to communicate with engineers and the community at large in written and oral forms.	**f, j**	

DESCRIPTION

Project work may be allotted to a single student or to a group of students not exceeding 4 per group. The title of project work (same title as in project work-I if the same project is continued in project work-II or the title will be selected based on different project) is approved by head of the department under the guidance of a faculty member and student(s) shall prepare a comprehensive project report after completing the work to the satisfaction of the guide. The Head of the department shall constitute a review committee for project work. There shall be three reviews during the semester by the committee to review the progress. Student(s) shall make presentation on the progress made by him / her / them before the committee and evaluation is done as per Rules and Regulations.

TOTAL (P:240) = 240 PERIODS

17CSX01 DATA SCIENCE					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17MYB04, 17CSC07	**QUESTION PATTERN: TYPE - III**				

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand the Lifecycle of data science projects.	**1.1**	The students will be able to understand the basics of data science and big data field.	**a,b,c,d,e,l**
2.0	To apply various techniques for mining data stream.	**2.1**	The students will be able to design efficient techniques for mining large volumes of data in engineering applications.	**a,b,c,d,e,l**
3.0	To analyze the data using classification techniques.	**3.1**	The students will be able to deploy the technique of classification and prediction in data science	**a,b,c,d,e,l**
4.0	To understand the clustering and analysis methods.	**4.1**	The students will be able to understand about the clusters and analyze the big data for useful business applications.	**a,b,c,d,e,l**
5.0	To apply visualization techniques to clearly communicate analytic insights to business sponsors, analytic audiences and use tools like Hadoop, Giraph	**5.1**	The students will be able to apply tools like Hadoop, Giraph and storm to implement real time applications.	**a,b,c,d,e,l**

UNIT I - INTRODUCTION	**(9)**
Data Science – Related fields – Data Scientist – Roles - Data mining – limits on data mining - Big Data - Computing Environment - NoSQL Stores – Hadoop and Map Reduce Architecture - Life cycle of data science project.	
UNIT II - DATA AND RELATIONS	**(9)**
Data scales - Set and Matrix Representations - Relations - Similarity Measures - Dissimilarity Measures - Sequence Relations - Sampling and Quantization.	
UNIT III - CLASSIFICATION	**(9)**
Criteria, Naive Bayes Classifier, Linear Discriminant Analysis, Regression - Support Vector Machine, Nearest Neighbor Classifier, Decision Trees.	
UNIT IV - CLUSTERING AND ANALYSIS	**(9)**
Cluster analysis - K-means - Hierarchical clustering - Time series analysis - Recommendation Systems - Text analysis.	
UNIT V - DATA VISUALIZATION AND ENGINEERING	**(9)**
Diagrams, Principal Component Analysis- Multidimensional Scaling - Histograms - Spectral Analysis - MapReduce - Bulk Synchronous Parallel Distributed Computation - Event Processing - Case Studies: Hadoop, Giraph, Storm	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Thomas. A. Runkler, "Data Analytics: Models and algorithms for Intelligent Data Analysis", Springer, Germany, 2012.
2. Jared Dean, "Big Data, Data Mining and Machine learning", Wiley publications, 2014.

REFERENCES:

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive data sets", Cambridge University press, 2011.
2. Donald Miner, Map Reduce Design Patterns: "Building Effective Algorithms and Analytics for Hadoop and Other Systems", O'Reilly Media, 2012.

17CSX02 DATA WAREHOUSING AND DATA MINING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC07		**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand the basic principles, concepts and applications of data warehousing and data mining.	**1.1**	The students will be able to identify and use of various data warehousing components functionalities	**a,b,c,i,l**
2.0	To enlighten the data mining concepts and preprocessing techniques.	**2.1**	The students will be able to analyze the techniques of data mining and data warehousing models and do preprocessing techniques.	**a,b,c,i,k,l**
3.0	To understand and create association rules.	**3.1**	The students will be able to design, implement and evaluate a system using association mining.	**a,c,g,h,i,l**
4.0	To learn the importance of supervised learning and relevant algorithms.	**4.1**	The students will be able to apply and work with classification algorithms	**a,b,c,d,e,l**
5.0	To learn the importance of unsupervised learning algorithms and recent trends.	**5.1**	The students will be able to apply and work with clustering algorithms and recent trends	**a,b,d,f,l**

UNIT I - DATA WAREHOUSING	**(9)**
Need for Data Warehousing – Data Warehouse Architecture –Multidimensional Data Model –Schemas for Multidimensional Data Model- OLAP Operations – Data warehouse Implementation- Types of OLAP Server	
UNIT II - DATA MINING CONCEPTS AND PREPROCESSING	**(9)**
Introduction to Data mining – Types of Data –Functionalities of data mining- Statistical Descriptions of Data – Data Visualization – Major Issues in Data Mining – Data Preprocessing: Data Cleaning – Data Integration – Data Reduction – Data Transformation and Discretization.	
UNIT III - FREQUENT PATTERN MINING	**(9)**
Basic Concepts – Market Basket Analysis – Frequent Item Set Mining Methods – Apriori Algorithm – FP Growth Algorithm – Pattern Evaluation Methods–Correlation Analysis –Mining multilevel and multidimensional associations.	
UNIT IV - CLASSIFICATION AND PREDICTION	**(9)**
Classification basic concepts – Decision Tree Induction– Bayesian Classification – Rule–Based Classification — Model Evaluation and Selection - Techniques to Improve Classification Accuracy - Advanced Methods	
UNIT V - CLUSTERING AND TRENDS IN DATA MINING	**(9)**
Cluster Analysis: Basic Concepts – Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid-Based Methods- Outlier Analysis – Detection Methods- Statistical Approaches- Proximity-Based Approaches– Data Mining Trends: Mining Complex Data Types – Applications Of Data Mining.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Han Jiawei and Kamber Micheline, "Data Mining: Concepts and Techniques", Harcourt India India/ Morgan Kauffman Pvt. Ltd., New Delhi, 3rd ed., 2012.

REFERENCES:

1. Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw–Hill Edition, 13th Reprint 2008.
2. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Prentice Hall 2006.

17CSX03 DATA ANALYTICS					
		L	T	P	C
		3	0	0	3

PRE REQUISITE :17CSC07	QUESTION PATTERN: TYPE - III

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To be exposed to big data	1.1	The students will be able to apply the statistical analysis methods.	a,b,c
2.0	To learn the different ways of Data Analysis	2.1	The students will be able to compare and contrast various soft computing frameworks.	a,c,d,k
3.0	To be familiar with data streams	3.1	The students will be able to design distributed file systems.	a,b,c,e,l
4.0	To learn the mining and clustering	4.1	The students will be able to apply Stream data model.	a,c,e,l
5.0	To be familiar with the frameworks and visualization	5.1	The students will be able to use frameworks and Visualization techniques.	a,c,e,l

UNIT I - INTRODUCTION TO BIG DATA	**(9)**
Introduction to Big Data Platform – Challenges of conventional systems – The nature of data – Modern data analytic tools, Statistical concepts: Probability - Sampling distributions, statistical inference, prediction error, resampling, statistical inference, prediction error.	
UNIT II - DATA ANALYSIS	**(9)**
Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics - Rule induction - Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods	
UNIT III - MINING DATA STREAMS AND LINK ANALYSIS	**(9)**
Introduction to Streams Concepts – Stream data model - Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting ones in a window – Decaying window – Link analysis: Page Rank, Efficient computation of page rank, Sensitive page rank,, Link Spam, Hubs and Authorities.	
UNIT IV - FREQUENT ITEMSETS AND CLUSTERING	**(9)**
Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent item sets in a stream – Clustering Techniques – Hierarchical – K- Means – The CURE algorithm – Clustering in non-euclidean space – Clustering for streams and Parallelism.	
UNIT V - FRAMEWORKS AND VISUALIZATION	**(9)**
MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications.	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2013.
2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

REFERENCES:

1. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced Analystics", John Wiley & Sons, 2012.
2. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", 2nd ed., Elsevier, Reprinted 2008
3. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
4. Pete Warden, "Big Data Glossary A Guide to the New Generation of Data Tools", O'Reilly, 2011.

17CSX04 TCP/IP DESIGN AND IMPLEMENTATION					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC08		**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand the concept of internet protocols.	**1.1**	The students will be able to gain knowledge in communication protocols.	**a,b,c,d,e,f,g, h,i,k,l**
2.0	To study about different transmission protocols.	**2.1**	The students will be able to establish TCP connection.	**a,b,c,d,e,f,g, h,i,k,l**
3.0	To absorb the fundamentals of network design and implementation of IP.	**3.1**	The students will be able to acquire knowledge in fundamentals of IP addresses and IP routing	**a,b,c,d,e,f,g, h,i,k,l**
4.0	To learn design and implement of network applications using TCP.	**4.1**	The students will be able to analyze and implement TCP in real time environment.	**a,b,c,d,e,f,g, h,i,k,l**
5.0	To know about congestion avoidance techniques.	**5.1**	The students will be able to outline an insight of congestion avoidance and control.	**a,b,c,d,e,f,g, h,i,k,l**

UNIT I - INTRODUCTION	**(9)**
Internetworking concepts and architecture model – Classful Internet address – CIDR – Sub netting and Super netting – AARP – RARP- IP- IP Routing – ICMP – IPV6.	
UNIT II - DATA TRANSMISSION	**(9)**
User Datagram Protocol (UDP) – Reliable Stream Transport Service (TCP) – Mobile IP – Dynamic Host Configuration Protocol(DHCP) – Domain Name System(DNS).	
UNIT III - IP ROUTING IMPLEMENTATION	**(9)**
IP global software organization – Routing table – Routing algorithms – Fragmentation and reassembly – Error processing (ICMP) – Multicast Processing (IGMP).	
UNIT IV - TCP I/O PROCESSING	**(9)**
Data structure and input processing – Transmission control blocks – Segment format – Comparison – Finite state machine implementation – Output processing – Mutual exclusion – TCP Data length.	
UNIT V - TCP IMPLEMENTATION	**(9)**
Timers – Events and Messages – Timer process – Deleting and inserting timer event – Flow control and adaptive retransmission– Congestion avoidance and control – Urgent data processing and push function.	
TOTAL (L:45) = 45 PERIODS	

TEXT BOOKS:

1. Douglas E. Comer, "Internetworking with TCP/IP: Principles, Protocols and Architecture", Vol. 1, 5th ed., PHI, 2013.
2. Douglas E. Comer, "Internetworking with TCP/IP: Design, Implementation and Internals", Vol. 2, 3rd ed., PHI, 2009.

REFERENCE:

1. W. Richard Stevens, "TCP/IP illustrated-The Protocols", Volume 1, Pearson Education, 2003.

17CSX05 NETWORK ANALYSIS AND MANAGEMENT				
L	T	P	C	
3	0	0	3	

PRE REQUISITE : 17CSC08 | **QUESTION PATTERN: TYPE - I**

COURSE OBJECTIVES AND OUTCOMES:

Course objectives		Course outcomes		Related program outcomes
1.0	To be familiar with basics of network design and requirement analysis.	**1.1**	The students will be able to explain basics of network design and requirement analysis.	**a,b,c,e,g,h,i, j,l**
2.0	To understand the network flow analysis.	**2.1**	The students will be able to apply a range of techniques for characterizing network structure.	**a,b,c,i,j,k,l**
3.0	To be aware of network logical design.	**3.1**	The students will be able to explain the methodologies for developing logical design of networks.	**a,b,c,e,f,g,h, i,j,k,l**
4.0	To understand network management and security concepts.	**4.1**	The students will be able to explore the network management and security concepts.	**a,b,c,d, g,h,i,j,k,l**
5.0	To understand network physical design and routing.	**5.1**	The students will be able to apply network physical design and routing for building networking applications.	**a,b,c,d,e,f, h,j,k,l**

UNIT I - A SYSTEM APPROACH TO NETWORK DESIGN AND REQUIREMENT ANALYSIS **(9)**

Introduction- Overview Of Analysis, Architecture And Design Process –System Methodology - System Description - Service Description - Service Characteristics-Performance Characteristics; User Requirements-Application Requirements-Device Requirements-Network Requirements –Requirement Analysis: Guidelines –Requirements Gathering And Listing-Developing Service Metrics To Measure Performance –Characterizing Behavior-Developing RMA Requirements.

UNIT II - FLOW ANALYSIS: CONCEPTS, GUIDELINES AND PRACTICE **(9)**

Background-flows-identifying and developing flows- data sources and sinks-flow model – flow prioritization – flow specification- examples of applying flow specs-case study.

UNIT III - NETWORK ARCHITECTURE **(9)**

Background- component architectures-reference architecture-architecture models- systems and network architectures; addressing and routing architecture-addressing mechanisms-routing mechanisms-address strategies-routing strategies- architectural considerations.

UNIT IV- MANAGEMENT ARCHITECTURE AND PERFORMANCE ARCHITECTURE **(9)**

Network Management Mechanisms- Architectural Considerations; Performance Architecture-Goals- Performance Mechanisms-Architectural Considerations

UNIT V - SECURITY, PRIVACY AND NETWORK DESIGN **(9)**

Developing a security and privacy plan- security and privacy administration- security and privacy mechanisms-architectural considerations; design concepts- design process- vendor, equipment and service-provider evaluations-network layout- design traceability- design metrics.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. James. D. Mccabe, “Practical Computer Network Analysis and Design”, 3rd ed., Morgan Kaufaman, 2014.

REFERENCES:

1. J. Radz,”Fundamentals of computer network analysis and engineering: basic approaches for solving problems in the networked computing environment”, universe, 2005.
2. Laura Chappell and Gerald Combs, “Wireshark 101: Essential Skills for Network Analysis”, Kindle Edition, 2013.

17CSX06 WIRELESS COMMUNICATION AND NETWORKS					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC08		**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course objectives		Course outcomes		Related program outcomes
1.0	To introduce the concepts of 2G and 3G networks.	**1.1**	The students will be able to explain the fundamentals of wireless communication.	**a,b,c,d,e,f,g,h,i, k,l**
2.0	To know mobile radio propagation	**2.1**	The students will be able to recognize the model about mobile radio propagation.	**a,b,c,d,e,f,g,h,i, k,l**
3.0	To understand the modulation and diversity schemes.	**3.1**	The students will be able to design the modulation and diversity schemes.	**a,b,c,d,e,f,g,h,i, k,l**
4.0	To realize the multiple access systems	**4.1**	The students will be able to apply real time uses of multiple access systems.	**a,b,c,d,e,f,g,h,i, k,l**
5.0	To grasp the requirement for wireless networking.	**5.1**	The students will be able to implement the wireless networking requirement.	**a,b,c,d,e,f,g,h,i, k,l**

UNIT I - INTRODUCTION	**(9)**
Introduction to wireless communication systems-Modern wireless communication systems: 2G cellular networks-3G cellular networks –WLAN-PAN-Cellular concept-system design fundamentals Handoff Strategies-Interference and system capacity , Improving Coverage and Capacity.	
UNIT II - MOBILE RADIO PROPAGATION	**(9)**
Free space propagation model, Three basic propagation mechanisms, Reflection-Two-Raymodel, Diffraction –Knife-edge diffraction model, Scattering, Log-normal shadowing, Okumara model, Hata model, Log-distance path loss model, Small-scale multipath propagation, Parameters of mobile multipath channels, Types of small scale fading, Rayleigh and Ricean distribution.	
UNIT III - MODULATION AND DIVERSITY SCHEMES	**(9)**
Digital Modulation-an overview-Linear modulation techniques -Constant Envelope Modulation –Combined Linear and Constant Envelop Modulation Technique, Spread Spectrum Systems-Modulation Performance in Fading and Multipath Channel.	
UNIT IV- MULTIPLE ACCESS SYSTEMS	**(9)**
Multiple Access Systems: Access methods -FDMA, TDMA -CDMA -SDMA and CSMA, Reservation protocols.	
UNIT V - WIRELESS NETWORKING	**(9)**
Development of wireless network, fixed network hierarchy, traffic routing, wireless data services, protocols for network access, network database.	
	Total (l: 45) = 45 Periods

TEXT BOOK:

1. Theodore S Rappaport, “Wireless Communications”, Pearson Education, Asia, NewDelhi, 2010.

REFERENCES:

1. Kaveh Pahlavan, K. Prasanth Krishnamurthy, “Principles of Wireless Networks”, Pearson Education Asia, 2002.
2. Andrea Goldsmith, “Wireless Communications”, Cambridge University Press, 2009.
3. William Stallings, “Wireless Communications and Networks”, Pearson/ Prentice Hall of India, 2nd ed., 2007.

17CSX07 EMBEDDED SYSTEMS			
L	T	P	C
3	0	0	3

PRE REQUISITE : NIL | **QUESTION PATTERN: TYPE - I**

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To learn the architecture and programming of ARM processor.	**1.1**	The students will be able to write the programming of ARM processor.	**a,b,c,e,l**
2.0	To be familiar with the embedded computing platform design and analysis.	**2.1**	The students will be able to optimize the embedded platform.	**a,b,c,e,l**
3.0	To be exposed to the basic concepts of real time Operating system and distributed embedded systems.	**3.1**	The students will be able to choose the appropriate Operating system design and distributed embedded systems for designing.	**a,b,c,e,l**
4.0	To learn to do embedded program using Arduino.	**4.1**	The students will be able to develop Arduino programs.	**a,b,c,d,e,f,g,h, i,k,l**
5.0	To learn the different real time examples.	**5.1**	The students will be able to model real-time applications using embedded-system concepts.	**a,b,c,d,e,f,g,h, i,k,l**

UNIT I - INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS	**(9)**
Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and output- supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.	
UNIT II - EMBEDDED COMPUTING PLATFORM DESIGN	**(9)**
The CPU Bus-Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform-level performance analysis - Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.	
UNIT III - REAL TIME OPERATING SYSTEMS AND DISTRIBUTED EMBEDDED SYSTEM	**(9)**
Introduction - Multiple tasks and multiple processes - Multirate systems - Preemptive real-time operating systems - Priority based scheduling - Interprocess communication mechanisms -Distributed embedded systems – Network abstractions – CAN bus – Distributed computing in cars and airplanes – I2C bus.	
UNIT IV - ARDUINO PROGRAMMING	**(9)**
Introduction to Arduino-Creating Arduino programming environment –Using the Arduino IDE – Creating the Arduino Program – Working with variables - Structured Commands – Programming loops – Working with strings – Implementing data structures – Creating functions – Storing data – Using Libraries – Working with digital interfaces – Interfacing with analog devices – Communicating with devices.	
UNIT V - CASE STUDY	**(9)**
Data compressor - Alarm Clock - Audio player - Software modem-Digital still camera - Telephone answering machine-Engine control unit – Video accelerator.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Wayne Wolf, "Computers as Components - Principles of Embedded Computing System Design", 2nd ed., "Morgan Kaufmann Publisher (An imprint from Elsevier), 2008.
2. Richard Blum, "Arduino Programming in 24 hours" Pearson Education 2014.

REFERENCES:

1. Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", 3rd ed., Cengage Learning, 2012.
2. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.

17CSX08 GRAPH THEORY					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC04		**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To be familiar with the most fundamental Graph Theory concepts.	**1.1**	The students will be able to write precise and accurate mathematical definitions of objects in graph theory.	**a,l**
2.0	To study about the different mathematical notations.	**2.1**	The students will be able to use mathematical definitions to identify and construct examples.	**a,b,c,l**
3.0	To be exposed to the techniques of proofs and analysis.	**3.1**	The students will be able to validate and critically assess a mathematical proof.	**a,b,d**
4.0	To know how to combine the theoretical and mathematical concepts using graph theory.	**4.1**	The students will be able to use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.	**a,b,d,e,i,l**
5.0	To perceive knowledge about the mathematical proofs.	**5.1**	The students will be able to reason from definitions to construct mathematical proofs.	**a,b,c,d,e**

UNIT I - BASIC CONCEPTS	**(9)**
Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.	
UNIT II - TREES, CONNECTIVITY & PLANARITY	**(9)**
Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets –Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.	
UNIT III - MATRICES, COLOURING AND DIRECTED GRAPH	**(9)**
Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.	
UNIT IV - PERMUTATIONS & COMBINATIONS	**(9)**
Fundamental principles of counting - Permutations and combinations - Binomial theorem - combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion - Derangements - Arrangements with forbidden positions.	
UNIT V - GENERATING FUNCTIONS	**(9)**
Generating functions - Partitions of integers - Exponential generating function – Summation operator - Recurrence relations - First order and second order – Non-homogeneous recurrence relations - Method of generating functions.	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Narsingh Deo, “Graph Theory: With Applications to Engineering and Computer Science”, Prentice Hall of India, 2016.
2. Grimaldi R.P., “Discrete and Combinatorial Mathematics: An Applied Introduction”, Addison Wesley, 5th edition 2004.

REFERENCES:

1. Clark J. & Holton D.A., “A First Look at Graph Theory”, Allied Publishers, 2005.
2. Mott J.L., Kandel A. & Baker T.P., “Discrete Mathematics for Computer Scientists and Mathematicians”, Prentice Hall of India, 1986.
3. Liu C.L., “Elements of Discrete Mathematics a Computer Oriented Approach”, McGraw Hill, 2008.
4. Rosen K.H., “Discrete Mathematics and Its Applications”, McGraw Hill, 7th ed., 20012.

17CSX09 INFORMATION RETRIEVAL TECHNIQUES					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC07	**QUESTION PATTERN: TYPE - I**				

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To learn the basics of information retrieval system.	**1.1**	The students will be able build an information retrieval system using the available tools.	**a,b,c,d,e,l**
2.0	To perceive knowledge on information retrieval components.	**2.1**	The students will be to identify and design the various components of an Information Retrieval system.	**a,b,c,d,e,i,l**
3.0	To gain exposure about text operations and user interface.	**3.1**	The students will be able to apply machine learning techniques to text classification and clustering which is used for efficient information retrieval.	**a,b,c,d,e,i,l**
4.0	To explore different multimedia information retrieval techniques.	**4.1**	The students will be able to analyze the web content structure.	**a,b,c,d,e,i,l**
5.0	To design search engines and interpret its applications.	**5.1**	The students will be able to design an efficient search engine.	**a,b,c,d,e,f,g,h, i,j,k,l**

UNIT I - INTRODUCTION **(9)**

Basic Concepts – Retrieval Process – Modeling – Classic Information Retrieval – Set Theoretic, Algebraic and Probabilistic Models – Structured Text Retrieval Models – Retrieval Evaluation –Word Sense Disambiguation

UNIT II - QUERYING **(9)**

Languages – Key Word based Querying – Pattern Matching – Structural Queries – Query Operations –User Relevance Feedback – Local and Global Analysis – Text and Multimedia languages

UNIT III - TEXT OPERATIONS AND USER INTERFACE **(9)**

Document Pre-processing – Clustering – Text Compression - Indexing and Searching – Inverted files –Boolean Queries – Sequential searching – Pattern matching – User Interface and Visualization – Human Computer Interaction – Access Process – Starting Points –Query Specification - Context – User relevance Judgment – Interface for Search.

UNIT IV - MULTIMEDIA INFORMATION RETRIEVAL **(9)**

Data Models – Query Languages – Spatial Access Models – Generic Approach – One Dimensional Time Series – Two Dimensional Color Images – Feature Extraction

UNIT V - APPLICATIONS **(9)**

Searching the Web – Challenges – Characterizing the Web – Search Engines – Browsing – Meta-searchers– Online IR systems – Online Public Access Catalogs – Digital Libraries – Architectural Issues –Document Models, Representations and Access – Prototypes, Projects, Interfaces and Standards.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. R. Baeza-Yates and B. Ribeiro Neto, “Modern Information Retrieval: The Concepts and Technology behind Search”, 2nd ed., Addison Wesley, 2011.

REFERENCES:

1. Christopher D. Manning, Prabhakar Raghavan and Hinrich Schutze, ”Introduction to Information Retrieval”, Cambridge University Press, 2008.
2. David A.Grossman and Ophir Frieder,”Information Retrieval – Algorithms and Heuristics”, 2nd ed., Springer International Edition, 2009.

17CSX10 MOBILE APPLICATION DEVELOPMENT

L	T	P	C
3	0	0	3

PRE REQUISITE : NIL | **QUESTION PATTERN: TYPE - III**

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To understand system requirements for mobile applications.	**1.1**	The students will be able to describe the requirements for mobile applications.	**a,c,e,l**
2.0	To learn suitable design using specific mobile development frameworks	**2.1**	The students will be able to explain the challenges in mobile application design and development.	**c,d,k**
3.0	To create mobile application design.	**3.1**	The students will be able to develop mobile applications for specific requirements.	**b,c,e,l**
4.0	To understand the design using specific mobile development frameworks	**4.1**	The students will be able to implement the design using Android SDK and using Objective C and iOS.	**a,b,c,e,l**
5.0	To know the latest technologies available in mobile application.	**5.1**	The students will be able to deploy mobile applications in Android and iPhone	**a,d,i,k,l**

UNIT I - INTRODUCTION **(9)**

Introduction to mobile applications – Importance of mobile strategies – Cost of development – Mobile myths – Mobile web presence - Mobile applications – Benefits of a mobile app- Marketing -Mobiles in Future

UNIT II - USER INTERFACE DESIGN **(9)**

Understanding mobile application users – Understanding mobile information design – Understanding mobile platforms – Using the tools of mobile interface design.

UNIT III - MOBILE WEBSITES **(9)**

Choosing a mobile web option – Adaptive mobile websites – Dedicated mobile websites – Mobile web apps with HTML5 – Web services-Examples of web services-Advantages of web services - Web services testing Methodologies

UNIT IV - DEVELOPMENT ENVIRONMENT **(9)**

Android development practices – Android fundamentals – Android SDK – Common interactions – Offline storage – iOS SDK – Debugging iOS apps – Objective -C basics – iOS features.

UNIT V - TECHNOLOGY **(9)**

Using google maps – GPS – WiFi and WiMAX — Wearable devices – Centralized storage – Mobile commerce- Mobile security.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012.

REFERENCES:

1. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech, 2012.
2. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 6 Development: Exploring the iOS SDK”, Apress, 2013.
3. http://developer.android.com/develop/index.html.

17CSX11 HUMAN COMPUTER INTERACTION			
L	T	P	C
3	0	0	3

PRE REQUISITE : 17CSC08	QUESTION PATTERN: TYPE - I

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To explain the fundamentals of human computer interaction.	**1.1**	The students will be able to explain the capabilities of both humans and computers from the viewpoint of human information processing	**a,c,d,e,h,i,j,l**
2.0	To create awareness on various models for interaction.	**2.1**	The students will be able to describe the typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms	**a,b,d,e,i,j,l**
3.0	To learn the design techniques and fundamentals of Human Computer Interaction (HCI).	**3.1**	The students will be able to apply an interactive design process, standards, guidelines and universal design principles to designing HCI systems.	**c,e,h,k,l**
4.0	To know the various types of existing interfaces and evaluation techniques.	**4.1**	The students will be able to analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.	**e,h,j,l**
5.0	To implement the applications of HCI in emerging trends.	**5.1**	The students will be able to analyze and discuss HCI issues in groupware, ubiquitous computing, virtual reality, multimedia, and Word Wide Web-related environments.	**c,d,e,g,k,l**

UNIT I - THE HUMAN AND COMPUTER	**(9)**
The Human: Introduction – Input – output Channels – Human memory – Thinking: reasoning and problem – solving – Individual differences – Psychology and the design of interactive systems – The computer: Introduction – Text entry devices – Positioning – pointing and drawing – Paper: printing and scanning – Memory – Processing and networks.	
UNIT II - INTERACTION AND INTERFACES	**(9)**
The Interaction: Introduction – Models of interaction – Frameworks and HCI – Ergonomics – Interaction styles – Elements of the WIMP interface – Interactivity – The context of the interaction – Experience – Engagement and fun – Paradigms: Introduction – Paradigm for interaction – Expressive interfaces – models of emotions – interface types.	
UNIT III - DESIGNING RULES	**(9)**
Interaction design basics: Introduction – The process of design – User focus – Scenarios – Navigation design – Screen design and layout – Iteration and Prototyping – HCI in the software process: Introduction – The software life cycle – Usability engineering – Iterative design and prototyping – Design rationale – Design rules: Introduction – Principles to support usability – Standards – Guidelines – Golden rules and heuristics – HCI patterns.	
UNIT IV - MODELS AND EVALUATION FRAMEWORK	**(9)**
Cognitive models: Introduction – Goal and task hierarchies – Linguistics models – The challenge of display – based systems – Physical and device models – cognitive architecture – Communication and collaboration model: Introduction – Face-to-face communication – Conversation – Text-based communication – Group working – Models of the system: Introduction – Standard formalisms – Interactive models – Continuous behavior.	
UNIT V - INTERFACING APPLICATIONS	**(9)**
Groupware: Introduction – Groupware systems – Computer-mediated communication – Meeting and decision support systems – Shared applications and artifacts – Frameworks for groupware – Implementing synchronous groupware – Hypertext – multimedia and the World Wide Web: Introduction – Understanding hypertext – Finding things – Web technology and issues – Static web content – Dynamic web content.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Alan Dix, Janet Finlay, Gregory D.Abowd and Russell Beale. Human - Computer Interaction, Prentice Hall, 3rd ed., 2004.

REFERENCES:

1. J. Preece, Y. Rogers, H. Sharp, D. Benyon, S. Holland and T. Carey. "Human - Computer Interaction", Addison Wesley, 1994.
2. Andrew Sears, Julie A. Jacko, "The Human-Computer Interaction Handbook Fundamentals, Evolving Technologies, and Emerging Applications", 2nd ed., Taylor & Francis Group, 2008.
3. Claude Ghaoui, "Encyclopaedia of Human Computer Interaction", Wiley Publications, 2000.

17CSX12 GREEN COMPUTING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC08		**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To acquire knowledge to adopt green computing practices.	**1.1**	The students will be able to explain green computing technology to reduce paper wastage and carbon footprint.	**a,c,d,e,f,h,i,j,l**
2.0	To learn about green environment architecture.	**2.1**	The students will be able to describe behavior and capabilities of green assets and processes.	**a,b,d,e,f,i,j,l**
3.0	To minimize energy consumption.	**3.1**	The students will be able to conserve natural resources.	**c,e,f,h,l**
4.0	To understand how to reduce the requirements for the disposal of equipment.	**4.1**	The students will be able to utilize the resources in a socio economic manner.	**e,f,h,j,l**
5.0	To manage improved environmental sustainability.	**5.1**	The students will be able to Implement the environmental impacts of green activities.	**c,d,e,f,g,k,l**

UNIT I - FUNDAMENTALS	**(9)**
Green IT Fundamentals : Business, IT, and the Environment –Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics – Green computing: Carbon Foot Print, Scoop on Power	
UNIT II - GREEN ASSETS AND MODELING	**(9)**
Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture, Environmental Intelligence and Green Supply Chains – Green Information Systems: Design and Development Models	
UNIT III - RECYCLING AND TELECOMMUTING	**(9)**
Choosing Your Green PC Path: Buying a Green Computer – Recycling Your Computer – Greener Under the Hood: Optimize Your Computer Power Management – Greening Mobile Devices – Telecommuting, Teleconferencing and Teleporting: Making the Case for Telecommuting – Telecomm Central: The Green Home Office – Collaborating and Cloud Computing.	
UNIT IV -GREEN COMPLIANCE	**(9)**
Socio cultural Aspects of Green IT – Green Enterprise Transformation Roadmap Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.	
UNIT V - CASE STUDIES	**(9)**
The Environmentally Responsible Business Strategies Research Survey – Case Study Scenarios for Trial Runs – Case Studies in Applying Green IT Strategies and Applications to a Hospital, Packaging Industry and Telecom Sector	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Bhuvan Unhelkar, “Green IT Strategies and Applications: Using Environmental Intelligence”, CRC Press, 2011.
2. Woody Leonhard, Katherrine Murray, “Green Home Computing for Dummies”, August 2009.

REFERENCES:

1. John Lamb, “The Greening of IT”, Pearson Education, 2009.
2. Jason Harris, “Green Computing and Green IT – Best Practices on Regulations & Industry”, Lulu.com, 2008.
3. Carl Speshocky, “Empowering Green Initiatives with IT”, John Wiley & Sons, 2010.

17CSX13 NANO COMPUTING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC08		QUESTION PATTERN: TYPE - III			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To gain knowledge about nano computing challenges.	1.1	The students will be able to explain nano computing challenges.	a,c,d,e,f,h,i,j,l
2.0	To be familiar with the imperfections.	2.1	The students will be able to handle the imperfections.	a,b,d,e,f,i,j,l
3.0	To gain exposure about reliability evolution strategies.	3.1	The students will be able to apply reliability evolution strategies.	c,e,f,h,l
4.0	To get knowledge about nano scale quantum computing.	4.1	The students will be able to use nano scale quantum computing.	e,f,h,j,l
5.0	To learn about molecular computing and optimal computing.	5.1	The students will be able to utilize molecular computing and optimal computing.	c,d,e,f,g,k,l

UNIT I - NANOCOMPUTING-PROSPECTS AND CHALLENGES	**(9)**
Introduction - History of Computing – Nano computing - Quantum Computers – Nano computing Technologies - Nano Information Processing - Prospects and Challenges - Physics of Nano computing : Digital Signals and Gates - Silicon Nano electronics - Carbon Nano tube Electronics – Carbon Nano tube Field-effect Transistors – Nanolithography.	
UNIT II - NANOCOMPUTING WITH IMPERFECTIONS	**(9)**
Introduction – Nano computing in the Presence of Defects and Faults - Defect Tolerance – Towards Quadrillion Transistor Logic Systems.	
UNIT III - RELIABILITY OF NANOCOMPUTING	**(9)**
Markov Random Fields - Reliability Evaluation Strategies - NANOLAB - NANOPRISM – Reliable Manufacturing and Behavior from Law of Large Numbers.	
UNIT IV - NANOSCALE QUANTUM COMPUTING	**(9)**
Quantum Computers - Hardware Challenges to Large Quantum Computers - Fabrication, Test, and Architectural Challenges – Quantum dot Cellular Automata (QCA) - Computing with QCA – QCA Clocking - QCA Design Rules.	
UNIT V - QCADESIGNER SOFTWARE AND QCA IMPLEMENTATION	**(9)**
Basic QCA Circuits using QCA Designer - QCA Implementation - Molecular and Optical Computing: Molecular Computing - Optimal Computing - Ultrafast Pulse Shaping and Tb/sec Data Speeds.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Sahni V. and Goswami D., Nano computing, Mcgraw Hill Education Asia Ltd 2008 (reprint-2017).

REFERENCES:

1. Sandeep K. Shukla and R. Iris Bahar., Nano , Quantum and Molecular Computing, Kluwer Academic Publishers 2007.
2. Sahni V, Quantum Computing , Mcgraw Hill Education Asia Ltd(2011).
3. Jean- Baptise Waldner, Nanocomputers and Swarm Intelligence, John Wiley & Sons, Inc.2010.

17CSX14 DEEP LEARNING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE: 17MYB02, 17MYB04		QUESTION PATTERN: TYPE - III			
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To gain knowledge about the basics of machine learning techniques.	1.1	The students will be able to use the concepts of machine learning in real world.	a,b,c,d,e,h,j,k, l
2.0	To impart the fundamental concepts of deep networks	2.1	The students will be able develop the basic deep networks constructs	a,b,c,d,e,h,i,j, k,l
3.0	To gain exposure about optimization in training the networks.	3.1	The students will be able to analyze the need of optimization in training networks.	a,b,c,d,e,h,i,j, k,l
4.0	To get knowledge about modeling and convolution networks.	4.1	The students will be able to design programs involving convolution networks problems.	a,b,c,d,e,h,i,j, k,l
5.0	To learn about research fields in deep networks.	5.1	The students will be able to extend simple applications for vision and processing.	a,b,c,d,e,h,i,j, k,l

UNIT I - BASICS OF DEEP & MACHINE LEARNING	(9)
Introduction – Learning algorithms – Capacity, over fitting & under fitting – Hyper parameters and validation sets – Estimators , Bias & Variance – Supervised Learning algorithms - Unsupervised Learning algorithms – Stochastic gradient descent – Building a machine learning algorithm – Challenges motivating deep learning.	
UNIT II - DEEP NETWORKS	**(9)**
Deep feed forward networks: Gradient based learning – Hidden units – Architecture design – Back propagation – Differentiation algorithms – Regularization for deep learning: Parameter norm penalties – Norm penalties as constrained optimization – Dataset augmentation – Semi supervised learning – Multitask learning - Sparse representations – Dropout – Adversarial training.	
UNIT III - OPTIMIZATION FOR TRAINING DEEP MODELS	**(9)**
Learning differs from pure optimization – challenges in neural network optimization – Algorithms – Parameter initialization strategies – Algorithms with adaptive learning rates – Approximate second order methods – Optimization strategies and meta algorithms.	
UNIT IV - CONVOLUTION NETWORKS	**(9)**
Operation – Motivation – Pooling – Variants of basic convolution function – Structured outputs – Data types – Algorithms – Random and supervised features – Neuro scientific basics – Sequence modeling: Recurrent neural networks – Bidirectional RNNs – Encoders – Decoders sequence to sequence architectures – Deep recurrent network.	
UNIT V - I/O DEEP LEARNING RESEARCH AND APPLICATIONS	**(9)**
Linear factor models – Auto encoders – Representation learning –Applications: Large scale deep learning – Computer vision – Speech recognition – Natural language processing.	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville," Deep Learning", The MIT Press, 2016 Edition

REFERENCE:

1. Julius Porter , "Deep Learning: Fundamentals, Methods and Applications", Nova Science Publishers Inc, 2016.

17CSX15 KNOWLEDGE MANAGEMENT					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To perceive knowledge on the quality of management decision.	**1.1**	The students will be able to explain the technical components and use of decision support systems.	**a,b,j,k**
2.0	To learn the major challenges and benefits of each phase of the KM cycle.	**2.1**	The students will be able to link the KM frameworks to key KM concepts and the major phases of the KM cycle.	**a,b,d,e**
3.0	To understand the general taxonomic approaches used in classifying knowledge.	**3.1**	The students will be able to apply general approaches to classify knowledge.	**a,b,c,d,e,j,k**
4.0	To study the knowledge codification tools and procedures.	**4.1**	The students will be able to apply tools, techniques, processes used for knowledge codification.	**a,b,c,d,e,j,k**
5.0	To know the role of internet and data mining in knowledge transfer.	**5.1**	The students will be able to analyze the knowledge transfer process.	**a,e,k,l**

UNIT I - KNOWLEDGE MANAGEMENT	**(9)**
KM Myths – KM Life Cycle – Understanding Knowledge – Knowledge, Intelligence – Experience – Common Sense – Data, Information and Knowledge – Types of Knowledge – Expert Knowledge – Human Thinking and Learning.	
UNIT II - KNOWLEDGE MANAGEMENT SYSTEM LIFE CYCLE	**(9)**
Challenges in Building KM Systems – KM System Life Cycle – Knowledge Creation and Knowledge Architecture – Nonaka's Model of Knowledge Creation and Transformation – Knowledge Architecture.	
UNIT III - CAPTURING KNOWLEDGE	**(9)**
Evaluating the Expert – Developing a Relationship with Experts –The Interview as Tool – Guide to a Successful Interview – Knowledge Capturing Techniques, Brain Storming – Protocol Analysis –Delphi Method – Nominal Group Technique – Concept Mapping – Black Boarding-Communication tools-Conferencing tools-Collaborative management tools	
UNIT IV- KNOWLEDGE CODIFICATION	**(9)**
Modes of Knowledge Conversion – Codification Tools and Procedures – Knowledge Developer's Skill Sets – System Testing and Deployment – Knowledge Testing – Approaches to Logical Testing-User Acceptance Testing – Managing the Testing Phase – User Training – Post Implementation.	
UNIT V - KNOWLEDGE TRANSFER AND SHARING	**(9)**
Transfer Methods – Role of the Internet – Knowledge Transfer in E-World – E-Business – KM System Tools – Neural Network – Data Mining and Business Intelligence – Data Management – Role of Data Mining in Customer Relationship-Future trends -Case studies	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Elias. M. Awad & Hassan M. Ghaziri, "Knowledge Management", Pearson Education 2012.

REFERENCE:

1. C.W. Holsapple, "Handbooks on Knowledge Management", International Handbooks on Information Systems, Vol. 1 and 2, 2003.

17CSX16 IMAGE PROCESSING TECHNIQUES				
	L	T	P	C
	3	0	0	3
PRE REQUISITE : NIL	**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To learn digital image fundamentals	**1.1**	The students will be aware of the concepts of digital image fundamentals.	**a,b**
2.0	To get exposed to simple image processing techniques.	**2.1**	The students will be able to apply image enhancement techniques.	**a,d**
3.0	To become familiar with image compression and segmentation techniques	**3.1**	The students will be able to use image restoration and segmentation techniques.	**c,f,i**
4.0	To study the image compression technique based on wavelets.	**4.1**	The students will be able to use image compression technique.	**a,c,f,h**
5.0	To learn to represent image in form of features	**5.1**	The students will be able to represent features of images.	**b,c,d,e,l,k**

UNIT I - DIGITAL IMAGE FUNDAMENTALS	**(9)**
Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels.	
UNIT II - IMAGE ENHANCEMENT	**(9)**
Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters – Image enchantment using MATLAB.	
UNIT III - IMAGE RESTORATION AND SEGMENTATION	**(9)**
Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering – Segmentation: Detection of Discontinuities – Edge Linking and Boundary detection – Region based segmentation.	
UNIT IV - WAVELETS AND IMAGE COMPRESSION	**(9)**
Wavelets – Subband coding – Multiresolution expansions – Compression: Fundamentals – Image Compression models – Error Free Compression – Run Length Coding – Bit-Plane Coding – Predictive Coding – Compression Standards.	
UNIT V - IMAGE REPRESENTATION AND RECOGNITION	**(9)**
Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, Statistical moments – Regional Descriptors – Topological feature – Texture – Patterns and Pattern classes – Recognition based on matching.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", 4th ed., Pearson/Prentice Hall, 2017.

REFERENCES:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", 3rd ed., Tata McGraw Hill Pvt. Ltd., 2011
2. Anil Jain K., "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011.
3. Willliam K Pratt, "Digital Image Processing", John Willey, 2002.
4. Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", 1st ed., PHI Learning Pvt. Ltd., 2011.

17ITX05 PHP PROGRAMMING (Common to CSE and IT Branches)					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17ITC09		**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To learn the basics of PHP	1.1	The students will be able to creating programs that include if, else, switch, for, while, and do loops to process statements repeatedly.	**a,b,c,d,l**
2.0	To understand the strings, arrays and functions concepts.	2.1	The students will be able to write simple PHP code to perform some functionality for a web application	**a,b,c,d,l**
3.0	To understand, design and build a webpage	3.1	The students will be able to design and implement a typical static web pages and interactive, dynamic web applications	**a,b,c,d,l**
4.0	To learn Object oriented programming concepts	4.1	The students will be able to know the Object oriented programming techniques in PHP	**a,b,c,d,l**
5.0	To learn Database creation and Files	5.1	The students will be able to build, populate, and access a database through server side programming to provide data access for a web application.	**a,b,c,d,l**

UNIT I - INTRODUCTION	**(9)**
Essential PHP: Enter PHP-Getting PHP-Creating Your Development Environment-Creating &Running PHP page– Mixing HTML and PHP-Printing Some Text & HTML-More Echo Power-Using PHP ”Here” Documents – Command Line – Comments – Variables - Interpolating Strings – Constants- PHP’s Internal Data Types. Operators and Flow Control: PHP’s Math Operators- PHP Operator - Precedence-if statement - else statement-else if statement – Switch statement – for - while - do…while -foreach Loop – break – continue - PHP Alternate Syntax.	
UNIT II - STRINGS,ARRAYS AND FUNCTIONS	**(9)**
Strings: The sting functions- Converting to and from strings- Formatting Text strings–Arrays: Modifying the data in Arrays – Deleting Array Elements –Handling Arrays with Loops-The PHP Array Functions-Extracting Data from arrays –Sorting Arrays-Using PHP’s Array Operators – Multidimensional Arrays–Splitting and Merging Arrays. Functions: Creating Functions - passing data to functions-passing arrays to functions-passing by reference-Default arguments-passing variable numbers of arguments-returning data from functions –returning arrays–variable functions –nesting functions –creating include files-returning errors from functions.	
UNIT III - PHP WEB PAGE CREATION	**(9)**
Reading data in web pages- PHP Browser and Handling Power - File Handling: Opening files – feof - reading text from a file - closing a file - Reading from a file character by character - reading a whole file at once - Reading a file into an array – checking if a file exists - Getting file size - Reading binary reads - Parsing files with fscanf - copying file - deleting files - writing to a file – Reading and writing binary files – Appending to files - writing a file all at once.	

UNIT IV - OBJECT ORIENTED PROGRAMMING	(9)
Object oriented programming: Creating Classes– creating objects– setting access to properties and methods– constructors – destructors –Basing one class on another with inheritance –Overriding methods –Overloading methods - Autoloading classes. Advanced object oriented programming: Creating static methods –static members and inheritance – creating abstract classes – creating interfaces - creating class constants- using the final keyword – Cloning Objects – Reflection.	
UNIT V - WORKING WITH DATABASES & FILES	**(9)**
Working With Databases: Creating a Mysql Database-Creating a New table-Accessing -Updating -Inserting Data - Deleting Records – Creating Tables-Creating a New Database-Sorting Your Data. Sessions Cookies and FTP: Setting a cookie –Reading a cookie- Setting cookie's Expiration -Delete Cookies – Working with FTP-Downloading files with FTP-uploading Files with FTP-Deleting a File with FTP-creating and removing directions with FTP-sending E-Mail-Storing Data in sessions –Counter Using Sessions .	
TOTAL (L:45) = 45 PERIODS	

TEXT BOOK:

1. Steven Holzner, "The Complete Reference PHP", McGraw Hill Education(India) Pvt.Ltd.2016

REFERENCES:

1. Ashok Appu, "PHP A Beginner's Guide", WILEY-dreamed India Pvt. Ltd.
2. W. Jason Gilmore, "Beginning PHP and MySQL: From Novice to Professional", 3rd ed., Apress, USA, 2010.
3. Vikram Vaswani, "MYSQL: The Complete Reference", 2nd ed., Tata McGraw- Hill Publishing Company Limited, Indian Reprint 2009.
4. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002

17ITX06 PROGRAMMING WITH JAVA2 ENTERPRISE EDITION (Common to CSE and IT Branches)				
L	T	P	C	
3	0	0	3	
PRE REQUISITE : 17ITC01	**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To design interactive applications with GUI Components such as JavaFX.	**1.1**	The students will be able to design GUI components with Java FX.	**b,c**
2.0	To develop database applications using JDBC.	**2.1**	The students will be able to develop database applications using JDBC.	**b,c,k**
3.0	To implement Java networking APIs to communicate with processes.	**3.1**	The students will be able to implement Java networking APIs.	**b,c,j,k**
4.0	To develop JSP and Servlet application.	**4.1**	The students will be able to develop JSP and Servlet application.	**b,c,j,k**
5.0	To learn about Java Reflection API and XML.	**5.1**	The students will be able to learn Java Reflection API and XML.	**c,k**

UNIT I - JAVA GUI PROGRAMMING USING JAVA FX	**(9)**
Basics of Java FX – Java FX and Containers – Frames – layout Managers – Menus – Toolbars – Event Handling.	
UNIT II - JAVA DATABASE CONCEPTS & EJB	**(9)**
Database Architecture : Components of JDBC – Two Tier/Three Tier Architecture Processing SQL Statements - Establish Connection ,Types – Concurrency – Read column values from rows – Updating rows in a result set - Exceptions – Prepared Statement Object – EJB – Stateless and Statefull Entity Bean – Message Driven Bean.	
UNIT III - NETWORKING IN JAVA	**(9)**
URL: Creating and Parsing URL – URL Connection: Connecting to a URL - Reading from and Writing to aURLConnection – Socket - InetAddress. Datagram's: Writing a datagram client and server - Datagram Socket, Datagram Packet – Broadcasting to multiple Recipients - Multicast Socket-SSL and HTTPS in Java, RMI	
UNIT IV - SERVER SIDE TECHNOLOGIES WITH JAVA	**(9)**
Overview of JSP2.2 and Servlet 3.1 - Creating dynamic WebPages using JSP and Servlet- Standard Tag Library - Java Beans - Custom Tags - Expression Language – Annotations - Filters-Event handling-Exception Handling – Asynchronous processing.	
UNIT V - REFLECTION & JAVA XML	**(9)**
Introduction – Introspection – Dynamic Proxies – Dynamic class loading and reloading – Java XML: XML Processing – DOM and SAX Parser.	
TOTAL (L:45) = 45 PERIODS	

TEXT BOOKS:

1. Carl Dea, Mark Heckler, GerritGrunwald, José Pereda, Sean Phillips “JavaFX 8: Introduction by Example” Apress 2nd Edition 2014.
2. Kogent Learning Solutions Inc, “Java Server Programming Java EE 7 (J2EE 1.7), Black Book”, dreamtechpress 2015.
3. Elliotte Rusty Harold, “Java Network Programming, 4th Edition Developing Networked Applications “O'Reilly Media, Final Release Date: October 2013

REFERENCES:

1. http://pdf.coreservlets.com/
2. https://docs.oracle.com/javase/tutorial.

17ITX07 ADVANCED WEB PROGRAMMING
(Common to CSE and IT Branches)

L	T	P	C
3	0	0	3

PRE REQUISITE : 17ITC09 | **QUESTION PATTERN: TYPE - I**

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To infer the basics of Bootstrap	**1.1**	The students will be able to design a web page using Bootstrap	**a,b,e,i,k,l**
2.0	To extend the concepts of Bootstrap	**2.1**	The students will be able to make use of Bootstrap grids.	**a,b,c,e,i,k,l**
3.0	To know about basics of Node JS	**3.1**	The students will be able to demonstrate use Node JS outside of web browser	**a,b,c,d,e,i,k,l**
4.0	To know about basics of Angular JS	**4.1**	The students will be able to make use of Angular JS for web page designing.	**a,b,c,d,e,f,i,k,l**
5.0	To know about basics of Ajax	**5.1**	The students will be able to make use of AJAX in web page development.	**a,b,c,d,e,f,i,k,l**

UNIT I - BOOTSTRAP 3 BASICS	**(9)**
Grid basic- Typography- Tables- Images- Jumbotron- Wells- Alerts- Buttons- Button groups- Glyphicons- Badges/Labels- Progress Bars- Pagination- Pager- List groups- Panels- Dropdowns	
UNIT II - BOOTSTRAP 3 GRIDS	**(9)**
Collapse- Tabs/Pills- Navbar- Forms- Inputs- Inputs2- Input sizing- Media objects- Carousel- Modal- Tooltip- Popover- Scrollspy- Utilitites- Grid system- Stacked/Horizontal- Grid XSmall- Grid Small- Grid Medium- Grid Large- Grid XLarge.	
UNIT III - NODE JS	**(9)**
Node JS Introduction – HTTP Modules – File System – URL Module – NPM – Events – Upload Files – Email	
UNIT IV -ANGULAR JS	**(9)**
Hello AngularJS- Structuring your AngularJS application- Views and controllers- Models and Services- Animations- Directives- Forms and validations.	
UNIT V - AJAX	**(9)**
XML Http- Request- Response- XML File- AJAX PHP- AJAX ASP- AJAX Database- AJAX Applications.	
TOTAL (L:45) = 45 PERIODS	

TEXT BOOKS:

1. Jennifer Kyrnin, “Bootstrap in 24 hours”, Pearson education, 2016.
2. Brad Green, Shyam Seshadri, “AngularJS: Up and Running”, O’Reilly Media, 2014.

REFERENCES:

1. Steve Suehring,“JavaScript– Step by Step”, PHI, 2nd ed.,2010.
2. https://www.w3schools.com/bootstrap/
3. https://www.w3schools.com/js/js_ajax_intro.asp
4. https://www.w3schools.com/js/js_ajax_intro.asp
5. https://www.w3schools.com/nodejs/.

17ITX08 C# AND .NET
(Common to CSE and IT Branches)

L	T	P	C
3	0	0	3

PRE REQUISITE : 17ITC01 | **QUESTION PATTERN: TYPE - II**

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To outline the knowledge about basic concepts and functions of c#.	**1.1**	The students will be able to explain the .NET framework.	**a,k,l**
2.0	To show the structure and the object oriented aspects of C#	**2.1**	The students will be able to explain how c# fits into the .NET Platform.	**a,k,l**
3.0	To demonstrate the application development Processes on .NET and building Windows Applications.	**3.1**	The students will be able to analyze the basic structure of a C# application and to develop real time application	**a,b,c,e,k,l**
4.0	To demonstrate the principles of Web based application development on .NET.	**4.1**	The students will be able to debug, compile, and run a simple web based application on .NET.	**a,b,c,k,l**
5.0	To learn .NET Framework and CLR	**5.1**	The students will be able to develop programs using C# on.NET.	**a,b,c,d,e,g,j, k,l**

UNIT I - INTRODUCTION TO C# **(9)**

Introducing C#, Understanding.NET, Overview of C#, Literals, Variables, Data Types, Operators and Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, and Enumerations.

UNIT II – OBJECT ORIENTED ASPECTS OF C# **(9)**

Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

UNIT III - APPLICATION DEVELOPMENT ON .NET **(9)**

Building Windows Applications, Accessing Data with ADO.NET.

UNIT IV - WEB BASED APPLICATION DEVELOPMENT ON .NET **(9)**

Programming Web Applications with Web Forms, Programming Web Services.

UNIT V - THE CLR AND THE .NET FRAMEWORK **(9)**

Assemblies, Versioning, Attributes, Reflection, Viewing Meta Data, Type Discovery, Reflecting on a Type, Marshaling, Remoting , Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads.

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

1. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2015.
2. J. Liberty, "Programming C#", 2nd ed., O'Reilly, 2002.

REFERENCES:

1. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 2004.
2. Robinson etal, "Professional C#", 2nd ed., Wrong Press, 2002.
3. S. Thamarai Selvi, R. Murugesan, "A Textbook on C#", Pearson Education, 2003.

17ITX09 RUBY PROGRAMMING (Common to CSE and IT Branches)				
	L	T	P	C
	3	0	0	3
PRE REQUISITE : NIL	**QUESTION PATTERN: TYPE - I**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand basic programming constructs of Ruby.	**1.1**	The students will be able to recall and describe basic of ruby programming.	**a,b,c,e,i,k,l**
2.0	To understand the concepts of operators, statements and control structures.	**2.1**	The students will be able to know the concepts of operators, statements and control structures.	**a,b,c,d,e,i,l**
3.0	To define classes and modules.	**3.1**	The students will be able to develop a program based on classes and modules	**a,b,c,d,e,f,i,k, l**
4.0	To describe the Reflection and Metaprogramming.	**4.1**	The students will be able to generate a Metaprogramming.	**a,b,c,e,f,g,k,l**
5.0	To deploy Ruby environment	**5.1**	The students will be able to design a Ruby environment	**a,b,c,d,e,f,g,i, k,l**

UNIT I - BASICS OF RUBY PROGRAM	**(9)**
The Structure and Execution of Ruby Programs: Lexical Structure, Syntactic Structure, File Structure, Program Encoding, Program Execution. Datatypes and Objects: Numbers, Text, Arrays, Hashes, Ranges, Symbols, True, False, and Nil, Objects	
UNIT II - OPERATORS, STATEMENTS AND CONTROL STRUCTURES	**(9)**
Expressions and Operators: Literals and Keyword Literals, Variable References, Constant References, Method Invocations, Assignments. Operators. Statements and Control Structures : Conditionals, Loops, Iterators and Enumerable Objects, Blocks, Altering Control Flow, Exceptions and Exception Handling, BEGIN and END, Threads, Fibers, and Continuations	
UNIT III - METHOD, CLASSES AND MODULES	**(9)**
Parentheses, Method Arguments, Procs and Lambdas, Closures, Method Objects, Functional Programming. Classes and Modules : Defining a Simple Class, Method Visibility: Public, Protected, Private, Subclassing and Inheritance, Object Creation and Initialization, Modules, Loading and Requiring Modules, Singleton Methods and the Eigenclass, Method Lookup, Constant Lookup	
UNIT IV - REFLECTION AND METAPROGRAMMING	**(9)**
Reflection and Metaprogramming : Types, Classes, and Modules, Evaluating Strings and Blocks, Variables and Constants, Methods, Hooks, Tracing, ObjectSpace and GC, Custom Control Structures, Missing Methods and Missing Constants, Dynamically Creating Methods, Alias Chaining, Domain-Specific Languages	
UNIT V - RUBY PLATFORM AND ENVIRONMENT	**(9)**
The Ruby Platform: Strings, Regular Expressions, Numbers and Math, Dates and Times, Collections, Files and Directories, Input/Output, Networking, Threads and Concurrency. The Ruby Environment: Invoking the Ruby Interpreter, The Top-Level Environment, Practical Extraction and Reporting Shortcuts, Calling the OS, Security	
TOTAL (L:45) = 45 PERIODS	

TEXT BOOK:

1. David Flanagan, Yukihiro Matsumoto, “The Ruby Programming Language - Everything You Need to Know”, O'Reilly Media, 2008.

REFERENCES:

1. Timothy Fisher, “Ruby on Rails Bible”, Wiley India Pvt. Ltd., 2009.
2. Chad Pytel, Tammer Saleh, ”Rails Anti Patterns: Best Practice Ruby on Rails Refactoring”, 1st ed., Addison-Wesley, 2010.
3. David A. Black, “The Well-Grounded Rubyist”, Manning Publications, 2nd ed., 2014.
4. Peter Cooper, “Beginning Ruby: From Novice to Professional”, Apress, 3rd ed., 2016.

17CSX17 SOFTWARE DESIGN AND ARCHITECTURE					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: TYPE - III**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To learn the fundamentals of software architecture.	**1.1**	The students will be able to explain influence of key architectural structures on business and technical activities.	**a,b,c,d,e,f,i,j,k,l**
2.0	To be familiar with software architecture process.	**2.1**	The students will be able to define software architecture process.	**a,b,c,d,e,f,h,i,j,k,l**
3.0	To interpret architectural models for emerging technologies.	**3.1**	The students will be able to design software architecture model for large scale software systems.	**a,b,c,d,e,f,g, h,i,j,k,l**
4.0	To analyze and design software quality models.	**4.1**	The students will be able to design and understand various software quality models.	**a,b,c,d,e,f,g, h,i,j,k,l**
5.0	To identify software design approaches and conformance.	**5.1**	The students will be able to recognize major software architectural styles, design patterns, and frameworks.	**a,b,c,d,e,f,g, h,i,j,k,l**

UNIT I - FUNDAMENTALS OF ARCHITECTURE AND DESIGN **(9)**

Software Architecture – Elements, Stakeholders, and Architectural Descriptions – Architectural Views – Viewpoints – Viewpoint Pitfalls – Architectural Perspectives – Role of Software Architect – Design Concepts – Design Characteristics – Design Elements – Design Factors.

UNIT II - PROCESS OF SOFTWARE ARCHITECTURE **(9)**

Introduction to Architecture – Architecture Definition Process – Guiding Principles - Process Outcomes – Process Context – Supporting Activities – Architecture Definition Activities – Process Exit Criteria – Architectural Scope – Architectural Scope and Concerns – Architectural Principles and Decisions – Identifying and Engaging Stakeholders – Identifying and Using Scenarios – Types of Scenarios – Uses for Scenarios – Identifying and Prioritizing Scenarios – Capturing Scenarios – Applying and Use of Scenarios – Software Styles, Patterns, and Idioms.

UNIT III - ARCHITECTURE MODELS & DESCRIPTION **(9)**

Producing Architectural Models – Need for Models – Types of Models – Modeling Languages – Guidelines for Creating Effective Models – Agile Modeling Techniques – Creating Architectural Description – Properties of Effective Architectural Description – Glossaries – IEEE Standard – Contents of Architectural Description – Validating the Architecture– Validation Techniques – Scenario Based Evaluation Methods – Introduction to View Point Catalog – Functional View Point.

UNIT IV - DESIGN QUALITY **(9)**

Software Quality Models – Effect of Design on Software Quality – Quality Attributes of Software Design – Design Principles: Design Roles, Design Processes, and Design Methods – Notion of Software Architecture – Software Architecture Style – Description of Software Architectures: Visual Notation and Client-Server Pair.

UNIT V - APPROACHES, ARCHITECTURAL & DESIGN STYLES **(9)**

Typical Architecture Styles – Data Flow – Independent Components – Call & Return – Data Centred and Virtual Machine – Design Styles – Choices of Styles – Combinations of Styles – Case Study on Keyword Frequency Vector – Architectural Design Space – Theory Of Design Spaces – Design Space of Architectural Elements – Design Space of Architectural Styles.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Nick Rozanski, Eoin Woods, “Software Systems Architecture – Working with Stakeholders Using Viewpoints and Perspectives”, Pearson Education, 2nd ed., 2012.
2. Hong Zhu, “Software Design Methodology – From Principles to Architectural Styles”, Elsevier, 2005.

REFERENCES:

1. David Budgen, “Software Design”, Pearson Education, 2003.
2. Len Bass, Paul Clements, Rick Kazman, “Software Architecture in Practice”, Pearson Education, 3rd ed., 2012.
3. Eric J. Braude, “Software Design: From Programming to Architecture”, John Wiley & Sons, 2004.

17CSX18 SOFTWARE TESTING METHODOLOGIES					
		L	T	P	C
		3	0	0	3
PRE REQUISITE :NIL		**QUESTION PATTERN: TYPE -III**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand the basics of software testing.	**1.1**	The students will be able to summarize software testing principles and defects.	**a,b,c,d,e,i,k,l**
2.0	To learn the various test case design strategies.	**2.1**	The students will be able to differentiate various test case design strategies.	**a,b,c,d,g,i,k,l**
3.0	To understand the levels of testing.	**3.1**	The students will be able to outline different levels of testing	**a,b,c,d,g,i,k,l**
4.0	To learn the test plan and test management.	**4.1**	The students will be able to develop a software test plan.	**a,b,c,d,g,i,j,k,l**
5.0	To know about the software testing tools and testing reviews.	**5.1**	The students will be able to determine suitable testing tool for a particular application.	**a,b,c,d,e,i,j,k,l**

UNIT I - INTRODUCTION **(9)**

Testing as an Engineering Activity – Role of Process in Software Quality – Testing as a Process – Basic Definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository.

UNIT II -TEST CASE DESIGN **(9)**

Test Case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Equivalence Class Partitioning – Boundary Value Analysis – Cause and Effect Graphing – State Transition Testing – Error Guessing – Using White Box Approach to Test design – Test Adequacy Criteria – Coverage and Control Flow Graphs – Covering Code Logic – Paths: Their Role in White box Test Design – Static Vs Structural testing – Evaluating Test Adequacy Criteria.

UNIT III - LEVELS OF TESTING **(9)**

The Need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests– The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – System Testing – Types of system testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad hoc testing.

UNIT IV - TEST PLAN AND MANAGEMENT **(9)**

People and Organizational Issues in Testing – Organization Structures for Testing Teams – Testing services –Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – Test Management – Test Process – Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the Test Specialist – Skills needed by a Test Specialist – Building a Testing Group.

UNIT V - TOOLS AND MONITORING **(9)**

Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements and Selecting a test tool – Challenges in Automation – Status Meetings, Reports and Control Issues – Criteria for Test Completion – Types of reviews – Components of Review Plans – Reporting Review Results – Test Metrics and Measurements – Case study: Using Java JUnit.

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

1. Ilene Burnstein, "Practical Software testing- A Process-Oriented Approach", Springer, 2009.
2. Srinivasan Desikan and Gopalaswamy Ramesh,"Software Testing–Principles and Practices", Pearson ed., 2006.

REFERENCES:

1. Aditya P.Mathur, “Foundations of Software Testing”, Pearson Education, 2008.
2. Boris Beizer, “Software Testing Techniques”, 2nd ed., Dreamtech, 2003
3. Elfriede Dustin, “Effective Software Testing”, 1st ed., Pearson Education, 2003.
4. Renu Rajani, Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004.
5. https://dzone.com/articles/junit-tutorial-beginners

17CSX19 SOFTWARE AGENTS					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: TYPE - III**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand the software agents that reduces information overhead.	**1.1**	The students will be able to define the characteristics of an intelligent agent.	**a,b,c,e,i,k,l**
2.0	To gain knowledge in use of software agents for cooperative learning and personal assistance.	**2.1**	The students will be able to identify agents for learning and assistance.	**a,b,c,d,g,i,k,l**
3.0	To know how agent can communicate and share knowledge using agent communication language.	**3.1**	The students will be able to describe the communication and collaboration among agents.	**a,b,c,g,i,k,l**
4.0	To gain knowledge in design of an agent interpreter and intelligent agent.	**4.1**	The students will be able to grasp Agent architectures.	**a,b,c,e,g,i,j,k,l**
5.0	To understand the concept of mobile technology and mobile agents and its security.	**5.1**	The students will be able to use agent development environment to develop the project.	**a,b,e,i,j,k,l**

UNIT I - AGENT AND USER EXPERIENCE	**(9)**
Agent Characteristics – Agent Types – Interacting with Agents – Agent from Direct Manipulation to Delegation – Interface Agent, Metaphor with Character – Designing Agents – Direct Manipulation versus Agent Path to Predictable.	
UNIT II - AGENTS FOR LEARNING AND ASSISTANCE	**(9)**
Agents for Information Sharing and Coordination – Agents that Reduce Work Information Overhead – Agents without Programming Language – Life like Computer Character – S/W Agents for Cooperative Learning – The M system.	
UNIT III - AGENT COMMUNICATION AND COLLABORATION	**(9)**
Overview of Agent Oriented Programming – Agent versus Object Oriented Programming – A Generic Agent Interpreter – Agent Communication Language – KQML – Applications – Agent Based Framework for Interoperability.	
UNIT IV - AGENT ARCHITECTURE	**(9)**
Agents for Information Gathering – Agent Organization – Knowledge of an Agent – Communication Language and Protocol – Query Processing – Open Agent Architecture – Communicative Action for Artificial Agent.	
UNIT V - MOBILE AGENTS	**(9)**
Mobile Agent Paradigm – Mobile Agent Concepts – Mobile Agent Technology – Programming Mobile Agents – Application of Mobile Agents – Teleshopping – Mobile Agent Security – Trust, Reliability and Reputation.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Jeffrey M.Bradshaw, “Software Agents”, PHI Learning Private Limited, 2010.

REFERENCES:

1. Lin, Fuhua Oscar (Ed.), “Designing Distributed Learning Environments with Intelligent Software Agents”, Information Science Publishing, 2004.
2. Knapik, Michael and Jay Johnson “Developing Intelligent Agents for Distributed Systems: Exploring Architecture, Technologies, and Applications”, McGraw-Hill, 1998.
3. William R. Cockayne, Michael Zyda, “Mobile Agents”, Prentice Hall, 1998.

17CSX20 SOFTWARE QUALITY ASSURANCE				
L	T	P	C	
3	0	0	3	

PRE REQUISITE : NIL | **QUESTION PATTERN: TYPE - III**

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To know the role and planning of quality assurance.	**1.1**	The students will be able to explain the quality and configuration management processes.	**a,b,i,l**
2.0	To illustrate the software quality program concepts.	**2.1**	The students will be able to describe the various activities of quality planning and quality control.	**a,j,l**
3.0	To understand the software metrics for software quality and maintenance.	**3.1**	The students will be able to analyze the software metrics and apply the quality tools in software development.	**a,b,i,l**
4.0	To understand the software configuration management.	**4.1**	The students will be able to analyze the software configuration standards and activities	**a,b,e,k,l**
5.0	To learn about software quality assurance standards	**5.1**	The students will be able to measure the quality of the software based on different standards	**a,e,h,l**

UNIT I - FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE **(9)**

The Role of SQA –Launching the SQA Program –SQA considerations –SQA people –Quality Management – Software Configuration Management-Defect Management

UNIT II - SOFTWARE QUALITY PROGRAM **(9)**

The Quality Challenges-Quality control v/s Quality Assurance-The SQA function- Quality management system-Quality Assurance-Software Quality Assurance Plans- Product Quality and Process Quality-Softwmare Systems Evolution-Model for Software Product Quality.

UNIT III - SOFTWARE QUALITY ASSURANCE AND METRICS **(9)**

Software Measurement and Metrics-Defect Metrics-Metrics for Software Maintenance-Classification of Software Metrics-Requirement Related Metrics-Measurement Principles-Metrics implementation in Projects-planning for metrics program-Issues in Software Measurements and Metrics Program Implementation.

UNIT IV - SOFTWARE CONFIGURATION MANAGEMENT **(9)**

Overview-Configuration Management- Software Configuration Management Activities-Standards for Configuration Audit Functions-Personnel in SCM Activities- Software Configuration Management Pitfalls.

UNIT V - SOFTWARE QUALITY ASSURANCE STANDARDIZATION **(9)**

ISO 9001-The Origins of ISO 9000-ISO Standards Development Process-ISO 9001:2000-ISO Certification – Assessment/Audit Preparation-The Assessment Process-CMM and ISO-Types of Capability Maturity Models (CMMs)-The People Maturity Model (P-CMM).

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Nina S Godbole, “Software Quality Assurance: Principles and Practice”, Narosa publishing house PVT Ltd, 2016.
2. Watts S Humphrey, “Managing the Software Process”, 5th Indian Impression, Pearson Education, 2008.

REFERENCES:

1. Mordechai Ben-Menachem / Garry S Marliss, “Software Quality”, BS Publications, Hyderabad, 2014.
2. Ian Sommerville, “Software Engineering”, 10th ed., Pearson Education, 2015.
3. Gordon G Schulmeyer, “Handbook of Software Quality Assurance”, 4th ed., Artech House Publishers, 2008

17CSX21 SOFTWARE PROJECT MANAGEMENT					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL	**QUESTION PATTERN: TYPE -I**				

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To plan and manage projects at each stage of the software development life cycle (SDLC)	**1.1**	The students will be able to evaluate and select the most desirable projects & Identify desirable characteristics of effective project managers.	**a,b,c,e,f,g,h,i,j ,k,l**
2.0	To be familiar with project planning steps.	**2.1**	The students will be able to apply appropriate approaches to plan a new project.	**a,b,c,e,f,g,h,i,j ,k,l**
3.0	To gain exposure about activity planning and project risks.	**3.1**	The students will be able to apply appropriate methodologies to develop a project schedule.	**b,c,d,e,f,h,i,j,k ,l**
4.0	To get knowledge about project monitoring and control.	**4.1**	The students will be able to develop a suitable budget for a new project.	**b,c,d,e,f,h,i,j,k ,l**
5.0	To learn about behaviors of organization and managing people.	**5.1**	The students will be able to practice project management principles while developing software.	**b,c,d,e,f,h,i,j,k ,l**

UNIT I - INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT	**(9)**
Importance of Software Project Management- Activities of software project management- –Plans, Methods and Methodologies - Management control – Traditional versus modern project management-Project evaluation and project management.	
UNIT II - PROJECT PLANNING	**(9)**
An overview of project planning-Selection of an Appropriate Project Approach- Choosing methodologies and technologies-Software Processes and process models-structure versus speed of delivery. Software Effort estimation-Basics of Software estimation – Effort and Cost estimation techniques – Staffing Pattern.	
UNIT III - ACTIVITY PLANNING AND RISK MANAGEMENT	**(9)**
Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass –Identifying the critical path - Risk Management –types of risk-risk identification- risk assessment-risk planning-risk management- PERT technique.	
UNIT IV - RESOURCE ALLOCATION AND PROJECT MONITORING CONTROL	**(9)**
The Nature of Resources – Identifying Resource Requirements – Scheduling Resources – Creating Critical Paths – Cost Schedules – The Scheduling Sequence –Creating the framework-collecting the data-review-visualizing progress-cost monitoring-Earned value analysis- prioritizing monitoring-change control-Software configuration management(SCM).	
UNIT V - MANAGING PEOPLE AND ORGANIZING TEAMS	**(9)**
Introduction – Understanding Behavior – Organizational Behaviour: A Background –Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation– The Oldman – Hackman Job Characteristics Model- Stress – Health And Safety – Working In Teams – Becoming A Team –Decision Making – Leadership – Organizational Structures — Case Studies.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Bob Hughes, Mike Cotterell, "Software Project Management" Tata McGraw Hill, 5th ed, 2012.

REFERENCES:

1. Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), 14th Reprint 2013.
2. Walker Royce, "Software Project Management– A Unified Framework ", Pearson Education, 2004
3. Robert K. Wysocki "Effective Software Project Management" – Wiley Publication, 2011.

17CSX22 NATURAL LANGUAGE PROCESSING				
L	T	P	C	
3	0	0	3	

PRE REQUISITE : NIL | **QUESTION PATTERN: TYPE -III**

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To know about tagging a given text with basic Language processing features.	**1.1**	The students will be able to tag text with basic Language processing features	**a,b,c,d,e,h, j,k,l**
2.0	To learn about the application development using NLP components.	**2.1**	The students will be able to design an innovative application using NLP components.	**a,b,c,d,e,h,i, j,k,l**
3.0	To comprehend the rule based system to start analyzing the morphology of a Language.	**3.1**	The students will be able to implement a rule based system to tackle morphology/syntax of a Language.	**a,b,c,d,e,h,i, j,k,l**
4.0	To be familiar with designing a tag set to be used for statistical processing of an application.	**4.1**	The students will be able to design a tag set to be used for statistical processing keeping an application in mind.	**a,b,c,d,e,h,i, j,k,l**
5.0	To propose a Statistical technique for a new application.	**5.1**	The students will be able to design a Statistical technique for a new application.	**a,b,c,d,e,h,i, j,k,l**

UNIT I - INTRODUCTION	**(9)**
Natural Language Processing tasks in syntax, semantics, and pragmatics – Issues - Applications - The role of machine learning - Probability Basics –Information theory – Collocations -N-gram Language Models - Estimating parameters and smoothing - Evaluating language models.	
UNIT II - MORPHOLOGY AND PART OF SPEECH TAGGING	**(9)**
Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields.	
UNIT III - SYNTAX PARSING	**(9)**
Syntax Parsing - Grammar formalisms and tree banks - Parsing with Context Free Grammars - Features and Unification -Statistical parsing and probabilistic CFGs (PCFGs)-Lexicalized PCFGs.	
UNIT IV - SEMANTIC ANALYSIS	**(9)**
Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation - Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics, Semantic Role Labeling and Semantic Parsing – Discourse Analysis.	
UNIT V - APPLICATIONS	**(9)**
Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) - Basic issues in MT-Statistical translation-word alignment- phrase-based translation – Question Answering.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Daniel Jurafsky and James H. Martin Speech and Language Processing (2nd Edition), Prentice Hall; 2nd ed., 2008.
2. Roland R. Hausser, Foundations of Computational Linguistics: Human- C o m p u t e r Communication in Natural Language, Paperback, MIT Press, 2011.

17CSX23 TEXT MINING				
L	T	P	C	
3	0	0	3	

PRE REQUISITE : 17CSX22 | **QUESTION PATTERN: TYPE - III**

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand the basic issues and types of text mining.	**1.1**	The students will be able to identify the different features that can be mined from text and web documents.	**a,b,c,d,h,i,l**
2.0	To appreciate the different aspects of text categorization and clustering.	**2.1**	The students will be able to use available open source classification and clustering tools on some standard text data sets.	**a,b,c,d,f,h,i,l**
3.0	To understand the role played by text mining in Information retrieval and extraction.	**3.1**	The students will be able to modify existing classification/clustering algorithms in terms of functionality or features used.	**a,b,c,d,f,g,h,i,l**
4.0	To appreciate the use of probabilistic models for text mining.	**4.1**	The students will be able to design a system that uses text mining to improve the functions of an existing open source search engine.	**a,b,c,d,f,g,h,i,l**
5.0	To appreciate the current trends in text mining.	**5.1**	The students will be able to implement a text mining system that can be used for an application of your choice.	**a,b,c,d,f,g,h,i,l**

UNIT I - INTRODUCTION	**(8)**
Overview of text mining- Definition- General Architecture– Algorithms– Core Operations – Preprocessing– Types of Problems- basics of document classification- information retrieval- clustering and organizing documents- information extraction- prediction and evaluation-Textual information to numerical vectors -Collecting documents- document standardization- tokenization- lemmatization vector generation for prediction- sentence boundary determination - evaluation performance.	
UNIT II - TEXT CATEGORIZATION AND CLUSTERING	**(10)**
Text Categorization – Definition – Document Representation –Feature Selection - Decision Tree Classifiers - Rule-based Classifiers - Probabilistic and Naive Bayes Classifiers - Linear Classifiers Classification of Linked and Web Data - Meta-Algorithms– Clustering –Definition- Vector Space Models - Distance-based Algorithms- Word and Phrase-based Clustering -Semi-Supervised Clustering - Transfer Learning.	
UNIT III - TEXT MINING FOR INFORMATION RETRIEVAL AND INFORMATION EXTRACTION	**(10)**
Information retrieval and text mining- keyword search- nearest-neighbor methods- similarity- webbased document search- matching- inverted lists- evaluation. Information extraction- Architecture - Co-reference - Named Entity and Relation Extraction- Template filling and database construction – Applications. Inductive -Unsupervised Algorithms for Information Extraction. Text Summarization Techniques - Topic Representation - Influence of Context - Indicator Representations - Pattern Extraction - Apriori Algorithm – FP Tree algorithm.	
UNIT IV - PROBABILISTIC MODELS	**(9)**
Probabilistic Models for Text Mining -Mixture Models - Stochastic Processes in Bayesian Nonparametric Models - Graphical Models - Relationship Between Clustering, Dimension Reduction and Topic Modeling - Latent Semantic Indexing - Probabilistic Latent Semantic Indexing -Latent Dirichlet Allocation- Interpretation and Evaluation - Probabilistic Document Clustering and Topic Models - Probabilistic Models for Information Extraction - Hidden Markov Models - Stochastic Context-Free Grammars - Maximal Entropy Modeling - Maximal Entropy Markov Models - Conditional Random Fields.	

UNIT V - RECENT TRENDS	(8)
Visualization Approaches - Architectural Considerations - Visualization Techniques in Link Analysis - Example- Mining Text Streams - Text Mining in Multimedia - Text Analytics in Social Media - Opinion Mining and Sentiment Analysis - Document Sentiment Classification - Opinion Lexicon Expansion - Aspect-Based Sentiment Analysis - Opinion Spam Detection – Text Mining Applications and Case studies.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Sholom Weiss, Nitin Indurkhya, Tong Zhang, Fred Damerau "The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data", Springer, paperback 2010.

REFERENCES:

1. Ronen Feldman, James Sanger -"The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data"-Cambridge University press, 2006.
2. Charu C. Aggarwal ,ChengXiang Zhai,Mining Text Data, Springer.
3. NLTK – Natural Language Tool Kit - http://www.nltk.org.

17CSX24 DISTRIBUTED SYSTEMS				
L	T	P	C	
3	0	0	3	

PRE REQUISITE : NIL | **QUESTION PATTERN: TYPE -III**

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To study the core ideas behind modern coordination and communication paradigms and distributed data structures.	**1.1**	The students will be able to explain the differences among: concurrent, networked, distributed, and mobile systems.	**a,b,c,d,e,f,g,h, i,k,l**
2.0	To realize not only the basic principles but also the best practice engineering techniques of concurrent and distributed computing.	**2.1**	The students will be able to use communication between distributed objects by Remote procedure calls in real time applications.	**a,b,c,d,e,f,g,h, i,k,l**
3.0	To present the techniques to formally study the safety and progress properties of concurrent and distributed algorithms.	**3.1**	The students will be able to design distributed systems based on security, file systems architecture in distributed operating system.	**a,b,c,d,e,f,g,h, i,k,l**
4.0	To analyze the performance of synchronization in distributed systems.	**4.1**	The students will be able to implement and analyze the event synchronization and distributed mutual exclusion problems.	**a,b,c,d,e,f,g,h, i,k,l**
5.0	To handle transactions and deadlocks in distributed systems in engineering applications.	**5.1**	The students will be able to apply transactions and deadlock handling techniques in distributed systems in engineering applications.	**a,b,c,d,e,f,g,h, i,k,l**

UNIT I - BASIC CONCEPTS **(9)**

Characterization of Distributed Systems – Examples – Resource Sharing and the Web – Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles – Internet Protocols – Case Studies.

UNIT II - COMMUNICATION AND DISTRIBUTED OBJECTS **(9)**

Inter–process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Client – Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI.

UNIT III - SECURITY AND DISTRIBUTED FILE SYSTEMS **(9)**

Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Case Studies – Distributed File Systems – File Service Architecture – Sun Network File System – The Andrew File System.

UNIT IV - SYNCHRONIZATION IN DISTRIBUTED SYSTEMS **(9)**

Name Services – Domain Name System – Directory and Discovery Services – Global Name Service – X.500 Directory Service – Clocks – Events and Process States – Synchronizing Physical Clocks – Logical Time and Logical Clocks – Global States – Distributed Debugging – Distributed Mutual Exclusion – Election algorithm.

UNIT V - DISTRIBUTED TRANSACTION PROCESSING **(9)**

Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols – Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery.

TOTAL (L: 45) = 45 PERIODS

TEXT BOOKS:

1. Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, “Principles and Paradigms”, Pearson Education, 2013.
2. George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, 4th ed., Pearson Education, 2009.

REFERENCES:

1. SapeMullender, “Distributed Systems”, 2nd ed., Addison Wesley, 1993.
2. Albert Fleishman, Distributes Systems, “Software Design and Implementation”, Springer, Verlag, 2012.
3. M. L. Liu, “Distributed Computing Principles and Applications”, Pearson Education, 2004.
4. MugeshSinghal, Niranjan G Shivaratri, “Advanced Concepts in Operating Systems”, Tata McGraw Hill, 2001.

17CSX25 GAME PROGRAMMING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: III**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To understand the concepts of Game design and development.	**1.1**	The students will be able to discuss the concepts of Game design and development.	**a,e,f,g,h,i,l**	
2.0	To learn the processes, mechanics and issues in Game Design.	**2.1**	The students will be able to design the processes, and use mechanics for game development.	**a,e,f,g,h,i,l**	
3.0	To be exposed to the Core architectures of Game Programming.	**3.1**	The students will be able to explain the Core architectures of Game Programming.	**e,f,g,j,l**	
4.0	To know about Game programming platforms, frame works and engines.	**4.1**	The students will be able to use Game programming platforms, frame works and engines.	**e,g,i,l**	
5.0	To learn to develop games.	**5.1**	The students will be able to create interactive Games.	**e,f,j,l**	

UNIT I - 3D GRAPHICS FOR GAME PROGRAMMING	**(9)**
3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-based Simulation, Scene Graphs.	
UNIT II - GAME ENGINE DESIGN	**(9)**
Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling.	
UNIT III - GAME PROGRAMMING	**(9)**
Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management.	
UNIT IV - GAMING PLATFORMS AND FRAMEWORKS	**(9)**
2D and 3D Game development using Flash, DirectX, Java, Python, Game engines - DX Studio, Unity.	
UNIT V - GAME DEVELOPMENT	**(9)**
Developing 2D and 3D interactive games using DirectX or Python – Isometric and Tile Based Games.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Mike Mc Shaffrfy and David Graham, “Game Coding Complete”, Fourth Edition, Cengage Learning, PTR, 2012.
2. Jason Gregory, “Game Engine Architecture”, CRC Press / A K Peters, 2009.

REFERENCES:

1. Ernest Adams and Andrew Rollings, “Fundamentals of Game Design”, 2nd Edition Prentice Hall / New Riders, 2009.
2. Eric Lengyel, “Mathematics for 3D Game Programming and Computer Graphics”, 3rd Edition, Course Technology PTR, 2011.
3. Jesse Schell, The Art of Game Design: A book of lenses, 1st Edition, CRC Press, 2008.
4. David H. Eberly, “3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics” 2 nd Editions, Morgan Kaufmann, 2006.

17CSX26 BLOCKCHAIN TECHNOLOGIES					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: TYPE - III**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To acquire knowledge various data storage mechanisms and blockchain.	**1.1**	The students will be able to describe blockchain technology and its key concepts.	**a,b,c,d,l**
2.0	To understand fundamental security technologies for supporting e-payment and cryptocurrency.	**2.1**	The students will be able to design and implement cryptocurrency and e-payment systems/applications.	**a,b,c,d,i,k,l**
3.0	To learn about bitcoin and its transaction process.	**3.1**	The students will be able explain bitcoin transaction process.	**a,b,c,d,l**
4.0	To get familiar with Ethereum and DLT.	**4.1**	The students will be able to deploy a private Ethereum block chain.	**a,b,c,d,e,i,k,l**
5.0	To program and work with Corda.	**5.1**	The students will be able to develop applications using Corda.	**a,b,c,d,e,i,k,l**

UNIT I - INTRODUCTION TO BLOCKCHAIN	**(9)**
What is blockchain? – Different data storage mechanisms (Centralized, decentralized and Distributed) – Problems with centralized system and advantages of blockchain over centralized system – Distributed, master slave and peer to peer architecture – A simplified representation of blockchain – Advantages of block chain.	
UNIT II - FUNDAMENTALS OF CRYPTO CURRENCIES	**(9)**
Hashing – Properties of hash function – Cryptography [encryption/decryption] – Public key – Private key – ECC – Linked List storage – Pointer – Hashed pointer – Binary Tree – Hashed Binary tree [Merkle tree] – Verifying a leaf in Merkle tree.	
UNIT III – BLOCK CHAIN IN BITCOIN	**(9)**
Ledger in common terms – How bank shares ledger – Some reasons to existence of a crypto backed currency – How bitcoin works – How a bitcoin network is formed – How participants are added and identified – Identity in bitcoin – Transaction wallet – Transaction in bitcoin – UTXO – Transaction broadcasting – Block mining and miners – Consensus – POW – Chaining a block.	
UNIT IV – BLOCK CHAIN 2.0 & DLT	**(9)**
History of Ethereum – Programming on blockchain – Smart Contracts – Public Blockchain – Private Blockchain & consortium Blockchain – DLT – Intro to privacy in data storage – Intro to Hyper Ledger -Intro to Corda.	
UNIT V - CORDA DLT	**(9)**
Corda in brief – Getting started to programming in Corda- Basic program in Corda – State/ Transaction/ Flow/ Contract with examples – Real code walk through – Corda demo bench – Sample application development using Corda.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, “Bitcoin and Cryptocurrency Technologies”, Princeton University Press, 2016.
2. Francisco Liébana-Cabanillas, “Electronic Payment Systems for Competitive Advantage in E-Commerce”, IGI Global, 2014.

REFERENCES:

1. https://cointelegraph.com/explained/decentralized-and-distributed-databases-explained
2. https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=XIM12354USEN
3. https://medium.com/coinmonks/merkle-tree-101-a3ca025dc318
4. https://coincentral.com/merkle-tree-hashing-blockchain/

17CSX27 QUANTUM COMPUTING					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17MYB04		**QUESTION PATTERN: TYPE - III**			

COURSE OBJECTIVES AND OUTCOMES:

Course objectives		Course outcomes		Related program outcomes
1.0	To learn basics of the quantum computing.	**1.1**	The students will be able to explain the fundamentals of quantum computing.	**a,c,j,k**
2.0	To know the quantum gates related technique.	**2.1**	The students will be able to design quantum system with quantum gates.	**a,b,j,k**
3.0	To learn the quantum algorithm.	**3.1**	The students will be able to design the quantum system with the quantum algorithm	**a,b,j,k**
4.0	To learn the physical realization of quantum computers	**4.1**	The students will be able to converse the physical realization of quantum computers	**a,b,c,j,k**
5.0	To gain knowledge of quantum computing software	**5.1**	The students will be able to propose quantum tools using quantum computing software	**a,c,k**

UNIT I:INTRODUCTION	**(9)**
Introduction, From Bits to Qubits, Power of Quantum Computing, Startling Algorithms and Applications, Quantum Physics Differ from Classical Physics, Obstacles and Research. Qubits, Quantum Mechanics and Computer Science Perspectives.	
UNIT II: QUANTUM GATES	**(9)**
Single Qubit Gates, Multiple Qubit Gates, Matrix Representation, Bell States, Quantum Measurement, Quantum Half-Adder and Subtractor. Application of Quantum Computing-Quantum Teleportation, Quantum Parallelism, Superdense Coding, Quantum Communication.	
UNIT III: QUANTUM ALGORITHM	**(9)**
Shor's Algorithm, Quantum Fourier Transform, Phase Estimation, Grover's Algorithm-Steps in Grover's Search Algorithm, Order of Grover's Algorithm, Applied to an Unstructured Database.	
UNIT IV: PHYSICAL REALIZATION OF QUANTUM COMPUTERS	**(9)**
Basic Requirements, Harmonic Oscillator, Optical Photon Quantum Computer, Optical Cavity Quantum Electrodynamics, Ion Traps, Nuclear Magnetic Resonance, Silicon Quantum Computer, The Future Outlook.	
UNIT V: QUANTUM COMPUTING SOFTWARE	**(9)**
Quantum Qudit Simulator, CAD for Quantum Computer Simulator, Quack, Quantum Circuit Viewer.	
	Total (I: 45) = 45 Periods

TEXT BOOK:

1. Vishal Sahni, "Quantum Computing", Tata McGrawHill Education Private Limited, 2010.

REFERENCES:

1. Phillip Kaye, Raymond Laflamme, Michele Mosca , "An introduction to Quantum Computing" , Oxford University Press, 2007.
2. Seth Lloyd, "Programming the Universe-A Quantum Computer Scientist", Vintage Books, 2007.

17CSX28 CONTAINER ORCHESTRATION USING KUBERNETES					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17CSC14	**QUESTION PATTERN: TYPE - III**				

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To infer the basic concepts of container orchestration in distributed environment.	**1.1**	The students will be able to manage container orchestration in disturbed environments.	**a,b,c,d,e,l**
2.0	To create the kubernetes cluster in cloud	**2.1**	The students will be able to create clusters.	**a,b,c,d,e,l**
3.0	To learn process like monitoring, logging and troubleshooting	**3.1**	The students will be able to manage process like monitoring, logging and troubleshooting in clusters.	**a,b,c,d,e,l**
4.0	To familiarize the kubernetes resource management in distributed environments.	**4.1**	The students will be able to utilize kubernetes resource	**a,b,c,d,e,l**
5.0	To apply storage mechanisms to create applications in cloud.	**5.1**	The students will be able to create applications in cloud.	**a,b,c,d,e,l**

UNIT I UNDERSTANDING KUBERNETES ARCHITECTURE	**(9)**
Container orchestration - Kubernetes concepts - Diving into Kubernetes architecture in-depth - The Kubernetes APIs - Kubernetes components - Kubernetes runtimes - Continuous integration and deployment.	
UNIT II KUBERNETES CLUSTERS	**(9)**
Single-node cluster with Minikube - Multinode cluster using kubeadm - Creating clusters in the cloud - Creating a bare-metal cluster from scratch - The process - Using virtual private cloud infrastructure	
UNIT III MONITORING, LOGGING, AND TROUBLESHOOTING	**(9)**
Monitoring Kubernetes with Heapster - Installing Heapster - InfluxDB backend - Performance analysis with the dashboard - Detecting node problems - Troubleshooting scenarios - Designing robust systems - Hardware failure - Using Prometheus	
UNIT IV KUBERNETES RESOURCES	**(9)**
High-availability concepts - Kubernetes security challenges - Hardening Kubernetes - Designing the Hue platform - Using Kubernetes to build the Hue platform - Separating internal and external services - Using namespace to limit access - Mixing non-cluster components - Employing Init Containers for orderly pod bring-up - Evolving the Hue platform with Kubernetes.	
UNIT V KUBERNETES STORAGE	**(9)**
Persistent volumes walk-through - Public storage volume types – GCE, AWS, and Azure - GlusterFS and Ceph volumes in Kubernetes - Flocker as a clustered container data volume manager -Integrating enterprise storage into Kubernetes -Projecting volumes -Using out-of-tree volume plugins with FlexVolume -The Container Storage Interface - Running Stateful Applications With Kubernetes.	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. Gigi Sayfan, “Mastering Kubernetes”, Packt Publishing, 2nd ed., 2018.

REFERENCES:

1. Jonathan Baier, “Getting Started with Kubernetes”, Packt Publishing, 2015.
2. David K. Rensin, “Kubernetes Scheduling the Future at Cloud Scale”, O’Reilly publication, 2015.

17CSX29 INTERNET OF THINGS (Common to CSE and IT Branches)					
			L	T	P	C
			3	0	0	3
PRE REQUISITE : 17CSC08		**QUESTION PATTERN: TYPE - I**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To learn the microcontroller architecture and the basic issues, policy and challenges in the Internet	**1.1**	The students will be able to explain the internal architecture of microcontroller and the concepts and the cause of technology.	**a,k,l**	
2.0	To understand the components and the protocols in Internet	**2.1**	The students will be able to classify the sensors and controller as part of IoT.	**a,b,c,e,j,k,l**	
3.0	To build a communication technologies with the internet	**3.1**	The students will be able to plan a communication framework with fog computing.	**a,b,c,k,l**	
4.0	To apply the various data analytical and visualization tools.	**4.1**	The students will be able to plan the data analytical and data visualization platforms	**a,b,c,d,e,g,j,k,l**	
5.0	To learn to manage the security concerns in IoT.	**5.1**	The students will be able to discover knowledge on security in IoT.	**a,b,c,d,e,f,g,h,l**	
UNIT I - INTRODUCTION TO IOT AND MICROCONTROLLER					**(9)**
Basics of Embedded Systems - Definition of IoT - Evolution of IoT - IoT and related terms – Key Drivers of IoT Discipline – The Diversity of IoT data sources – Architecture of 8051 – 8051 Addressing modes – Interfacing of LCD, Sensors and Servo motor – Popular M2M applications – Emerging IoT Flavors.					
UNIT II - ELEMENTS AND IOT GATEWAYS					**(9)**
Introduction to Elements of IoT - Sensors & Actuators - Gateways - Layered architecture of IoT - IoT Communication Model – 6LoWPAN – Mobile Technologies for IoT.					
UNIT III - COMPUTING AND CONNECTING TECHNOLOGIES					**(9)**
Cloud Computing in IoT – Introduction of Fog/Edge Computing – Use Cases of Fog/Edge computing - IoT Communication protocol requirements - BLE,ZigBee , Z-Wave - LPWAN – Sigfox - LoRa – Cloud Connectivity					
UNIT IV - DATA ANALYTICS AND IOT PLATFORMS					**(9)**
Big Data Analytics - Real Time and Streaming Analytics – Key Drivers for IoT Data analytics – Emergence of Edge Clouds – Renowned Edge Analytics Use Cases - Data Visualization Platform – Modules of IoT Data Analytics Platform – Renowned Use Cases for IoT Data Analytics.					
UNIT V - SECURITY CONCERNS OF IOT PLATFORM					**(9)**
Security Requirements of an IoT Infrastructure – AAA Framework – Security concerns of Cloud Platforms – Security concerns in IoT components – Smart Use Cases of IoT.					
TOTAL (L: 45) = 45 PERIODS					

TEXT BOOK:

1. Pethuru Raj and Anupama C.Raman, "The Internet of Things – Enabling Technologies, Platforms and Use Cases", CRC Press, 2017.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", 2nd ed., Pearson education, 2011.

REFERENCE:

1. Raj Kamal, "Internet of Things Architecture and Design Principles", Tata McGraw Hill Edition, Tata McGraw Hill Publication, 2017.
2. Fortino, Giancarlo, Liotta, Antonio, "Internet of Things", Springer.

17CSX30 AGILE METHODOLOGIES				
L	T	P	C	
3	0	0	3	

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course objectives		Course outcomes	Related program outcomes
1.0	To provide students with a theoretical as well as practical understanding of Agile software development practices and how small teams can apply them to create high-quality software	**1.1**	The student will able to interact with business stakeholders in determining the requirements for a software system.	**a,b,c,d,j,k**
2.0	To provide a good understanding of software design and a set of software technologies and APIs	**2.1**	The student will able to perform iterative software development processes: how to plan them, how to execute them.	**a,b,j,k**
3.0	To do a detailed examination and demonstration of Agile development and testing techniques	**3.1**	The student will able to point out the impact of social aspects on software development success.	**a,b,c,j,k**
4.0	To understand the benefits and pitfalls of working in an Agile team	**4.1**	The student will able to develop techniques and tools for improving team collaboration and software quality.	**a,b,c,j,k**
5.0	To understand Agile development and testing	**5.1**	The student will be able to perform Software process improvement as an ongoing task for development teams.	**a,c,k**

UNIT I:AGILE METHODOLOGY	**(9)**
Theories for Agile Management –Agile Software Development –Traditional Model vs. Agile Model -Classification ofAgile Methods –Agile Manifesto and Principles –Agile Project Management –Agile Team Interactions –Ethics in Agile Teams -Agility in Design, Testing –Agile Documentations Agile Drivers, Capabilities and Values.	
UNIT II: AGILE PROCESSES	**(9)**
Lean Production -SCRUM, Crystal, Feature Driven Development-Adaptive Software Development - Extreme Programming: Method Overview –Lifecycle –Work Products, Roles and Practices.	
UNIT III: AGILITY AND KNOWLEDGE MANAGEMENT	**(9)**
Agile Information Systems –Agile Decision Making -EarlS Schools of KM Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging –KM in Software Engineering –Managing Software Knowledge –Challenges of Migrating to Agile Methodologies –Agile Knowledge Sharing –Role of Story-Cards – Story-Card Maturity Model (SMM).	
UNIT IV: AGILITY AND REQUIREMENTS ENGINEERING	**(9)**
Impact of Agile Processes in RE–Current Agile Practices –Variance –Overview of RE Using Agile –Managing Unstable Requirements –Requirements Elicitation –Agile Requirements Abstraction Model –Requirements Management in Agile Environment, Agile Requirements Prioritization –Agile Requirements Modeling and Generation –Concurrency in Agile Requirements Generation.	
UNIT V: AGILITY AND QUALITY ASSURANCE	**(9)**
Agile Product Development –Agile Metrics –Feature Driven Development (FDD) –Financial and Production Metrics in FDD – Agile Approach to Quality Assurance -Test Driven Development –Agile Approach in Global Software Development.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. David J. Anderson and Eli Schragenheim, "Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results", Prentice Hall, 2003.
2. Hazza and Dubinsky, "Agile Software Engineering, Series: Undergraduate Topics in Computer Science", Springer, 2009.

REFERENCES:

1. CraigLarman, —Agile and Iterative Development: A manager s Guide, Addison-Wesley, 2004.
2. .Kevin C. Desouza, —Agile information systems: conceptualization, construction, and management, Butterworth-SHeinemann, 2007.

17CSX32 SOCIAL NETWORK ANALYSIS					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL	**QUESTION PATTERN: TYPE - III**				
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand the concept of semantic web and related applications.	**1.1**	The students will be able to explain the concept of semantic web and related applications	**a,b,c,d,e,l**
2.0	To learn knowledge representation using ontology.	**2.1**	The students will be able to represent knowledge using ontology	**a,b,c,d,e,l**
3.0	To learn about the extraction and mining in social network.	**3.1**	The students will be able to develop semantic web related applications.	**a,b,c,d,e,l**
4.0	To understand human behaviour in social web and related communities.	**4.1**	The students will be able to predict human behaviour in social web and related communities.	**a,b,c,d,e,l**
5.0	To learn visualization of social networks	**5.1**	The students will be able to visualize social networks	**a,b,c,d,e,l**

UNIT I INTRODUCTION	**(9)**
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 – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web-based networks – Applications of Social Network Analysis.	
UNIT II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION	**(9)**
Ontology and their role in the Semantic Web: Ontology-based knowledge Representation – Ontology languages for the Semantic Web: Resource Description Framework – Web Ontology Language – Modelling and aggregating social network data: State-of-the-art in network data representation – Ontological representation of social individuals – Ontological representation of social relationships – Aggregating and reasoning with social network data – Advanced representations.	
UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS	**(9)**
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 – Decentralized online social networks – Multi-Relational characterization of dynamic social network communities.	
UNIT IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES	**(9)**
Understanding and predicting human behaviour 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 – Trust models based on subjective logic – Trust network analysis – Trust transitivity analysis – Combining trust and reputation – Trust derivation based on trust comparisons – Attack spectrum and countermeasures.	
UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS	**(9)**
Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix-based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications – Cover networks – Community welfare – Collaboration networks – Co-Citation	

networks.
TOTAL (L: 45) = 45 PERIODS
TEXT BOOKS: 1. Peter Mika, ―Social Networks and the Semantic Web, First Edition, Springer 2007. 2. Borko Furht, ―Handbook of Social Network Technologies and Applications, 1st Edition, Springer, 2010.
REFERENCES: 1. Guandong Xu ,Yanchun Zhang and Lin Li,"Web Mining and Social Networking Techniques and applications", 1st ed, Springer, 2011. 2. Dion Goh and Schubert Foo,"Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.

17MYB12 BASIC STATISTICS AND NUMERICAL ANALYSIS					
		L	T	P	C
		3	0	0	3
PREREQUISITE : NIL		**QUESTION PATTERN: TYPE - IV**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	Understanding of statistical fundamentals to interpret data	**1.1**	The students will be able to use statistical tools to solve problems from different fields.	**a,i,l**
2.0	Find numerical approximations to the roots of an equation by Newton method, numerical solution to a system of linear equations by Gaussian Elimination and Gauss-Seidel.	**2.1**	The students will be able to acquaint the basic concepts in numerical methods and their uses.	**a,k,l**
3.0	Find the Lagrange Interpolation Polynomial for any given set of points.	**3.1**	The students will be able to represent the data and find the intermediate values, when huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial.	**a,e,l**
4.0	Apply several methods of numerical integration, including Romberg integration.	**4.1**	The students will be able to explain the consequences of finite precision and the inherent limits of the numerical methods considered and by using differentiation and integration.	**a,c,d,l**
5.0	Find numerical solution of a differential equation by Euler's, Predictor Corrector and Runge-Kutta Methods	**5.1**	The students will be able to understand the solution of ordinary differential equations will be useful in attempting any engineering problem.	**a,i,l**

UNIT I - BASIC STATISTICS	**(9)**
Measures of central tendency-Arithmetic mean and its properties, weighted arithmetic mean, Geometric mean, Harmonic mean, Median, Mode.	
UNIT II - SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS	**(9)**
Solution of equation – Newton Raphson method – Solution of linear system by Gaussian elimination and Gauss – Jordon method – Iterative methods: Gauss-Seidel method.	
UNIT III - INTERPOLATION AND APPROXIMATION	**(9)**
Divided differences in unequal intervals – Lagrangian Polynomials — Newton's forward and backward difference formulas for equal intervals.	
UNIT IV - NUMERICAL DIFFERENTIATION AND INTEGRATION	**(9)**
Numerical Differentiation using interpolation formulae – Numerical integration by Trapezoidal and Simpson's 1/3 rule – Romberg's method – Two and Three point Gaussian quadrature formulae.	
UNIT V - INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS	**(9)**
Single step methods: Taylor series method – Euler's method for first order equation – Fourth order Runge – Kutta method for solving first order equations – Multistep methods: Milne's predictor and corrector methods.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. S.C.Gupta and V. K. Kappor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 11th ed., 2002.
2. T. Veerarajan and T. Ramachandran., "Numerical Methods with programming in C", 2nd ed., Tata McGraw-Hill, 2006, First reprint 2007.
3. P. Kandasamy, K.Thilagavathy and K. Gunavathy, "Numerical Methods – Vol: IV", S.Chand & Co. Ltd. New Delhi, 2003, Reprint 2007.

REFERENCES:

1. C.F Gerald and P.O Wheatley, "Applied Numerical Analysis", 7th ed., Pearson Education Asia, New Delhi 2007.
2. K. Sankar Rao, "Numerical Methods for Scientists and Engineers", 3rd ed., Prentice Hall of India, New Delhi, 2007, 10th reprint 2012.
3. E. Balagurusamy, "Numerical Methods", Tata McGraw-Hill, New Delhi, 1999, 25th Reprint 2008.
4. M.K Venkatraman, "Numerical Methods" National Publication, New Delhi, 2000, Reprint 2005.
5. B.S.Grewal, "Numerical Methods in Engineering & Science", Khanna Publisher, New Delhi, 2012.

17CSX31- PROBLEM SOLVING AND PROGRAMMING					
		L	T	P	C
		3	0	0	3
PREREQUISITE : 17CSC01 / 17CSC02		**QUESTION PATTERN : TYPE 1**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**			**Related Program Outcomes**
1.0	To gain knowledge about the basics of programming	**1.1**	The students will be able to understand the basics of Python Programming constructs.		**a,c,l**
2.0	To gain exposure about selection structure	**2.1**	The students will be able to design programs involving selection structure		**a,b,c,d,l**
3.0	To get knowledge about repetition structure, function and modules	**3.1**	The students will be able to design programs involving function, modules and loops.		**a,b,c,d,k,l**
4.0	To gain exposure about string	**4.1**	The students will be able to realize the need of strings.		**a,b,c,d,k,l**
5.0	To get knowledge about mutable and Immutable types	**5.1**	The students will be able to realize the need of list, tuples and dictionary.		**a,b,c,d,k,l**

UNIT I - INTRODUCTION TO BASICS OF PROGRAMMING	**(9)**
Basics - Variables and Assignment - Basic Data Types- Comments - Operators - print() - Floats	
UNIT II - SELECTION STRUCTURE	**(9)**
Introduction to Selection Structure - if statements, else statements, nested elif statements, truthy and falsey values, Control Structure	
UNIT III - VALUE – REPETITION AND RETURNING STRUCTURE	**(9)**
Loops - while loops, for loops - Nested Loops - Functions - modules - variable scope	
UNIT IV - DATA AND STRING PROCESSING	**(9)**
Strings - Accessing the Strings - Traversing the Strings - Working with Strings - Formatting Strings	
UNIT V - MUTABLE AND IMMUTABLE TYPES AND METHODS	**(9)**
Introduction to lists, indexing and slicing of list, del and list methods, Tuples, Dictionary and its methods.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Dr. R. Nageswara Rao, ―Core Python Programming, Dreamtech Press, 2017 Edition.
2. Reema Thareja - Problem Solving and Programming – Python, Oxford University Press, 2nd Edition.

REFERENCES:

1. Wesley J. Chun, ―Core Python Programming, Pearson Education, 2nd edition, 2010.

17ITX26 - PROBLEM SOLVING AND ALGORITHMIC SKILLS					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL		**QUESTION PATTERN : TYPE - 1**			

COURSE OBJECTIVES AND OUTCOMES

Course Objectives		Course Outcomes		Related Program Outcomes
1.0	To impart fundamental concepts of OOP using python	**1.1**	The students will be able to understand the basics of object oriented concepts in python.	**a,c,l**
2.0	To gain exposure about inheritance and polymorphism	**2.1**	The students will be able to develop applications using inheritance and polymorphism	**a,b,c,d,e,k,l**
3.0	To understand the abstract data types and tree data structures	**3.1**	The students will be able to implement the ADTs and trees	**a,b,c,d,e,k,l**
4.0	To see how graphs and heaps can be used to solve a wide variety of problems	**4.1**	The students will be able to design graph abstract data type and heap	**a,b,c,d,e,k,l**
5.0	To understand the sorting techniques and shortest path algorithms.	**5.1**	The students will be able to implement the sorting techniques and shortest path algorithms.	**a,b,c,d,e,k,l**

UNIT I - MOTIVATION OF FUNDAMENTAL CONCEPT IN PROGRAMMING	**(9)**
Implementation of Classes and Objects in Python - Class Attributes and Instance Attributes - 'self ' parameter - Static Methods and Instance Methods - init() method	
UNIT II - ADVANCED FEATURES IN CONCEPT OF PROGRAMMING	**(9)**
Performing Abstraction and Encapsulation in Python - Single Inheritance - Multiple Inheritance - Multilevel Inheritance - Public, Protected and Private - Naming Conventions. Polymorphism- Overriding and the super() method - Diamond Shape Problem in Multiple Inheritance - Overloading an Operator - Implementing an Abstract Base Class (ABC)	
UNIT III - INTRODUCTION TO ALGORITHMIC THINKING AND PEAK FINDING	**(9)**
Array data structure - Linked List Data Structure and Its Implementation - Stacks and Queues - Binary Search Trees - Balanced Trees: AVL Trees and Red-Black Trees	
UNIT IV - MAPPING VALUES AND PRINCIPLE OF OPTIMALITY	**(9)**
Heaps - Heapsort Algorithm - Associative Arrays and Dictionaries - Ternary Search Trees as Associative Arrays - Basic Graph Algorithms - Breadth - First And Depth - First Search - Spanning Trees	
UNIT V - ANALYZING NUMBER OF EXCHANGES IN CRAZY-SORT	**(9)**
Shortest Path Algorithms, Dijkstra's Algorithm - Bellman-Ford Algorithm - Kruskal Algorithm - Sorting Algorithms- Bubble Sort, Selection Sort and Insertion Sort - Quicksort and Merge Sort, Non-Comparison Based Sorting Algorithms, Counting Sort and Radix Sort	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Dusty Phillips, Python 3 Object-oriented Programming, Packt Publishing, Second Edition.
2. Bradley N. Miller, David L. Ranum,- Problem Solving with Algorithms and Data Structures Using Python, Franklin, Beedle & Associates, 2011.

REFERENCES:

1. Mark Summerfield - Programming in Python 3, Pearson Education, 2nd Edition
2. Michael T. Goodrich, Irvine Roberto Tamassia, Michael H. Goldwasser, - Data Structures and Algorithms in Pythonll, 2013 edition.

17ECX16 INTERNET OF THINGS AND ITS APPLICATIONS				
L	T	P	C	
3	0	0	3	

PREREQUISITE : NIL | **QUESTION PATTERN : TYPE - 1**

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To make the students to know about basics of Electrical and Electronic devices	**1.1**	The students will be able to understand basics of Electrical circuits and Electronic devices	**a,c,d,i**
2.0	To make the students to know about basics and block diagram of IoT	2.1	The students will be able to understand IOT characteristics and its essential components.	**a,b,d,e**
3.0	To make the students to know about Arduino processor and working of Analog and Digital I/O pins	3.1	The students will be able to describe Arduino processor and working of Analog and Digital I/O pins	**a,b,c,g**
4.0	To make the students to know about Raspberry pi and its interface with other devices	4.1	The students will be able to understand Raspberry pi and its interface with other devices	**a,b,c,j**
5.0	To motivate the students to implement the IoT using Arduino/ Raspberry Pi.	5.1	The students will be able to implement a IoT system using Arduino/Raspberry Pi.	**a,f,k,l**

UNIT I - BASIC ELECTRICAL CIRCUITS AND ELECTRONICS	**(9)**
Introduction - Current, voltage and resistance - Analog and Digital Signal - conductors Vs Insulators – KCL- KVL - Basic Electronics components - calculating equivalent resistance for series and parallel circuits- Ohm's law- Color coding for a resistor – LED – LCD - LDR.	
UNIT II - INTRODUCTION TO INTERNET OF THINGS	**(9)**
Introduction - Definition and characteristics of Internet of Things - General Block Diagram and essential components of IOT - Role of microprocessor & Micro controller- communication of things - IOT connection with internet.	
UNIT III- ARDUINO PROCESSOR	**(9)**
Introduction to Arduino processor- General Block diagram- Working of Analog and Digital I/O pins- Serial (UART) , I2C Communications and SPI communication - Arduino Boards: Mega, Due, Zero and 101 - Prototyping basics - Technical description - Setting Up Arduino IDE- Introduction to Arduino programming.	
UNIT IV - RASPBERRY PI	**(9)**
Technical Description of Raspberry Pi - comparison of Raspberry Pi Vs Arduino - Operating Systems for RPi - Preparing SD Card for Pi - Connecting Raspberry Pi as PC - Exploring Raspberry Pi Environment- Logical design using Python.	
UNIT V- APPLICATIONS OF IOT	**(9)**
Various Real time applications of IoT- automation - Smart Parking - Environment: Weather monitoring system - Agriculture: Smart irrigation – Domain Specific applications.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things-A hands-on approach", Universities Press, 2015.

REFERENCES :

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics and Computer Engineering”,Tata McGraw Hill, Second Edition, (2006).
2. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things: Key applications and Protocols”, Wiley Publications 2nd edition, 2013.
3. Marco Schwartz, ― Internet of Things with the Arduino Yun, Packt Publishing, 2014.
4. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley Publications, 2012.

17CSX33 GOOGLE CLOUD PLATFORM					
		L	T	P	C
		3	0	0	3
PRE-REQUISITE: 17CSC05		**QUESTION PATTERN: TYPE - III**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To Learn the basic concepts of Google Cloud Platform.	**1.1**	The students will be able to recall and describe Google Cloud Platform products and services.	**a,j,l**	
2.0	To be familiar with the containerize workloads in Docker containers, deployment of Kubernetes clusters provided by Google.	**2.1**	The students will be able to describe about container basics, containerize an existing application and Kubernetes concepts and principles.	**a,e,j,l**	
3.0	To know the configuration of VPC networks, virtual machines and cloud IAM.	**3.1**	The students will be able to Configure VPC networks, virtual machines and cloud IAM.	**a,b,c,e,j,l**	
4.0	To Implement data storage services in GCP Manage and examine billing of GCP resources Monitor resources using Stack driver services.	**4.1**	The students will be able to Manage and examine billing of GCP resources and Monitor resources using Stack driver services.	**a,b,c,e,j,l**	
5.0	To configure the load balancers ,auto scaling for VM instances , deploy the GCP infrastructure services and Leverage managed services in GCP	**5.1**	The students will be able to deploy the load balancers and auto scaling for VM instances	**a,b,c,d,e,i,j,k,l**	

UNIT I – INTRODUCTION TO GOOGLE PLATFORM	**(9)**
Introduction: Advantages of Google Cloud Platform – components of Google's network infrastructure – Getting Started with Google Cloud Platform – Google App Engine and Google Cloud Data store– Google Cloud Platform Storage Options– Google Container Engine– Google Compute Engine and Networking– Big Data and Machine Learning	
UNIT II - GETTINGSTARTEDWITH GOOGLEKUBERNETESENGINE	**(9)**
Introduction to Containers and Docker: Create a container, Package a container using Docker – Kubernetes Basics – Deploying to Kubernetes – Continuous Deployment with Jenkins.	
UNIT III - VIRTUAL NETWORKS, VIRTUAL MACHINES AND CLOUD IAM	**(9)**
Virtual Networks: VPC objects in GCP– Types of VPC networks Implement VPC networks and firewall rules - Virtual Machines: CPU and memory options disk options - VM pricing and discounts - create and customize VM instances – Cloud IAM: – Cloud IAM resource hierarchy - Types of IAM roles- Types of IAM members - Implement access control for resources using Cloud IAM.	

UNIT IV – STORAGE AND DATABASE SERVICES, RESOURCE MANAGEMENT AND MONITORING	(9)
Cloud Storage, Cloud SQL, Cloud Spanner, Cloud Firestore and Cloud Bigtable – data storage services – Resource Management: cloud resource manager hierarchy – protect GCP customers - organize resources - budget alerts in GCP - billing data with BigQuery - Resource Monitoring: Stackdriver services for monitoring, logging, error reporting, tracing, and debugging	
UNIT V - LOAD BALANCING AND AUTOSCALING, INFRASTRUCTURE AUTOMATION, MANAGED SERVICES	**(9)**
Various load balancing services- Determine which GCP load balancer to use in specific circumstances - Auto scaling behavior - Configure load balancers and auto scaling - Automate the deployment of GCP services using Deployment Manager or Terraform - GCP Marketplace- Managed services for data processing in GCP	
TOTAL (L: 45) = 45 PERIODS	

WEB REFERENCES:

1. **https://cloud.google.com/certification/cloud-engineer**
2. https://cloud.google.com/blog/topics/developers-practitioners/what-compute-engine-use-cases-security-pricing-and-more/
3. https://g.co/kgs/BgSNTZ

17CSX34 TABLEAU					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL		**QUESTION PATTERN: TYPE - III**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To Learn the basic concepts of Tableau products, Tableau Desktop interface and Types of connection	**1.1**	The students will be able to recall various Tableau products.	**a,j,l**
2.0	To describe different date types like Discrete and Continuous dates, combined axis chart, Dualaxis chart, Maps and Text tables.	**2.1**	The students will be able to create discrete dates, continuous dates, multiple measures, measure on opposite axis, maps and show number in viz using text tables.	**a,e,j,l**
3.0	To explore the concepts and creation of calculated fields, quick table calculation, reference line and dashboards	**3.1**	The students will be able to develop calculated field using existing fields, quick table calculation, reference line and reference band, dashboard and using dashboard actions.	**a,b,c,e,j,l**
4.0	To design Joins, Cross database joins, Subsets ,levels of detail calculation and advanced table calculation	**4.1**	The Students will be able to implement Join the data from same database ,different database, dynamic grouping called Subsets ,Level of details Calculation and advanced table calculation	**a,b,c,e,j,l**
5.0	To be familiar with Parameters, type of data connection like Extract, comparing measures, back ground maps, Device specific dashboards and Stories	**5.1**	The student will be able to design parameters from dynamic selection of a value, extract and comparing measure using bar in bar chart, bullet chart, back ground maps and Device specific dashboards like Desktop, Laptop, Mobile and story-telling.	**a,b,c,d,e,i,j,k,l**

UNIT I – INTRODUCTION TO TABLEAU DESKTOP	**(9)**
Introduction: The Tableau Product Line - Interface of Tableau Desktop - Data types and their symbols - Dekstop Workflow- Connect, Analyse and Share - Panes of Tableau like Data , Analytics, marks ,Shelf - Data connection: Live and Extract - Split: smart and custom splits - Saving and Editing Data sources - Filtering - Dim, measures - sorting -Manual and Computed – Groups – Hierarchies.	
UNIT II – SLICING YOUR DATA BY DATE, COMBINED AND DUAL AXIS CHART, MAPS AND CROSSTAB	**(9)**
Slicing Your Data by Date: Discreate and continuous dates - custom dates - Using Multiple Measures in a View: Measure values and Measure Name - Combined Axis chart - Dual Axis chart - Showing the Relationship Between Numerical Values : Scatter plots - Mapping Data Geographically: Mapping- Navigation and selection in map - Creating Geographic Groups - Viewing Specific Values: Creating crosstab - Highlight Tables - Heat Map.	

UNIT III -CUSTOMIZING YOUR DATA,TABLE CALCULATION OVERVIEW, REFERENCE LINE AND DASHBOARDS	**(9)**
Customizing Your Data: Calculation and Aggregation - String and Date fn - Analyzing Data with Quick Table Calculations: Table Calculation Overview - Year over Year Changes - Running total of sales - Showing Breakdowns of the Whole: Pie chart - Tree maps - Highlighting Data with Reference Lines: Reference Lines and bands - Making Your Views Available: Dashboard - Dashboard Action(Highlight, Filter and URL).	
UNIT IV -JOINS,SUBSETS,LODs AND ADVANCED TABLE CALCULATION	**(9)**
Review: Measure Values and Measure Names - Measure Values and Measure Names - Dates-Discrete and continuous - Creating and Connecting to Data Sources: Data source and connection- Joins, Crosstab join, Blends and Union - Defining Subsets of Your Data: Sets - Nested Top N with Context - Nested Top N with Rank - Using Calculations in Tableau: Creating and Editing Calculated Fields – LOD - Advanced Table Calculations: Table Calculation Overview - Scope and Direction.	
UNIT V -PARAMETERS,DATA EXTRACT ,COMPARING MEASURES,BACKGROUND MAPS AND DEVICE SPECIFIC DASHBOARDS	**(9)**
Creating and Using Parameters: Create, Use and Show Parameters with Reference lines - Data Extracts: Using Data Extract - Comparing Measures: Bar in Bar chart- Bullet Chart - Tableau Geocoding: Navigation and Selection in Maps - Background Maps and Layers - Using Background Images for Spatial Analysis - Dashboards and Stories: Dash boarding - Device Specific - Story telling.	
	TOTAL (L: 45) = 45 PERIODS

WEB REFERENCES:

1. https://www.tableau.com/learn/training/20212
2. https://help.tableau.com/current/pro/desktop/en-us/buildexamples_bar.htm
3. https://help.tableau.com/current/pro/desktop/en-us/buildexamples_line.htm
4. https://help.tableau.com/current/pro/desktop/en-us/dashboards_create.htm

17CSX35 NODE JS					
			L	T	P	C
			3	0	0	3
PRE REQUISITE : 17ITC09, 17ITX05					
COURSE OBJECTIVES AND OUTCOMES:					
Course objectives		**Course outcomes**		**Related program outcomes**	
1.0	To provide students with a theoretical as well as practical understanding of Node JS	**1.1**	The student will able to gain knowledge on Node JS environment setup	**a,b,c,e,k,l**	
2.0	To provide a good understanding of Node Package manager	**2.1**	The student will able to create a web server	**a,b,c,e,g,k,l**	
3.0	To learn the File System Concepts in Node JS	**3.1**	The student will able to work with file system concepts	**a,b,c,k,l**	
4.0	To understand the Events and Express JS	**4.1**	The student will able to know about Events and Express JS	**a,b,c,e,g,k,l**	
5.0	To understand database connectivity	**5.1**	The student will be able to develop project using Node JS	**a,b,c,e,g,i,k,l**	

UNIT I: INTRODUCTION	**(9)**
Introduction to Node JS: Introduction to Node JS, What is Node JS, Node.js Process Model, Advantages of Node JS, Traditional Web Server Model. Setup Development Environment: Install Node.js on Windows, Working in REPL, Node JS Console, Node JS Modules, Functions, Buffer, Module, Core Modules, Local Modules, Modules Types, Modules Exports.	
UNIT II: NODE PACKAGE MANAGER	**(9)**
Node Package Manager: What is NPM, Installing Packages Locally, Adding dependency in package json, Installing package globally, Updating packages. Creating Web Server: Creating Web Server, Handling http requests, Sending Requests	
UNIT III: FILE SYSTEM	**(9)**
File System: Fs.readFile, Writing a File, Writing a file asynchronously, Opening a file, Deleting a file, Other IO Operations Debugging Node JS Application, Core Node JS Debugger.	
UNIT IV: EVENTS AND EXPRESS JS	**(9)**
Events: Event Emitter class, Returning event emitter, Inheriting Events. Express JS: Configuring Routes, Working with Express. Serving Static Resources: Serving Static Files, Working with Middle Ware.	
UNIT V: DATABASE CONNECTIVITY	**(9)**
Database Connectivity: Connecting String, Configuring, Working with Select Command, Updating Records, Deleting Records. Project Development using Node JS.	
TOTAL (L: 45) = 45 PERIODS	

REFERENCES:

1. https://www.w3schools.com/nodejs/
2. Max Beerbohm, MoamlMohmmed, “Express.js: The Ultimate Beginner's Guide to Learn Express.js Step by Step”, 2020 (2st Edition), Kindle Edition.
3. Ethan Brown, “Web Development with Node and Express”, O'Reilly Media, 2nd Edition, November 2019.
4. Jon Wexler, “Get Programming with Node.js”, Manning Publications, April 2019.

17CSX36 REACTJS					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17ITC09, 17ITX05					
COURSE OBJECTIVES AND OUTCOMES:					
Course objectives		**Course outcomes**		**Related program outcomes**	
1.0	To understand the basics of React JS	**1.1**	The student will able to gain knowledge on React JS	**a,b,c,e,k,l**	
2.0	To learn the props and component of React JS	**2.1**	The student will able to know about components in React JS	**a,b,c,e,k,l**	
3.0	To learn the Forms and Events	**3.1**	The student will able to the forms and events in React JS	**a,b,c,k,l**	
4.0	To understand the Router and Flux of React JS	**4.1**	The student will able to know usage of Router and Flux	**a,b,c,e,k,l**	
5.0	To understand and develop an animation.	**5.1**	The student will be able to develop an animation project.	**a,b,c,e,g,i,k,l**	

UNIT I: OVERVIEW OF REACT JS AND JSX	**(9)**
REACTJS — Overview: React — Features, Advantages, Limitations. REACTJS — Environment Setup. REACTJS — JSX: Using JSX, Nested Elements, Attributes, JavaScript Expressions, Styling, Comments, Naming Convention	
UNIT II: PROPS, COMPONENT	**(9)**
Components, State, props Overview: Using Props, Default Props, State and Props. Props validation: Validating Props. Component API: Set State, Force Update, Find Dom Node, Component Lifecycle Methods.	
UNIT III: FORMS AND EVENTS	**(9)**
Forms, Events, REFS: Using Refs, KEYS: Using Keys	
UNIT IV: ROUTER AND FLUX	**(9)**
Router: Install a React Router, Create Components, Add a Router. Flux Concept: Flux Elements, Flux Pros, Using Flux	
UNIT V: ANIMATIONS	**(9)**
Animations: React CSS Transitions Group, Adding a CSS file, Appear Animation, Enter and Leave Animations	
TOTAL (L: 45) = 45 PERIODS	

REFERENCES:

1. https://www.w3schools.com/react/
2. “HTML to REACT: The Ultimate Guide”, NgNinja Academy, 2020.
3. Greg Sidelnikov, “React.js Book: Learning React JavaScript Library From Scratch”, Kindle Edition, 2016.
4. Alex Banks, Eve Porcello, “Learning React: Functional Web Development with React and Redux”, 1st Edition, ”, O'Reilly Media.
5. Mark Tielens Thomas, “React in Action,1st Edition, Manning Publication, 2018.

17ITX29 IT OPERATIONS				
L	T	P	C	
3	0	0	3	
PREREQUISITE : NIL	**QUESTION PATTERN: TYPE – III**			

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand the basics of IT operations and differentiate IT Operation Management & IT Service Management.	**1.1**	The student will be able to identify the operation policies and procedures.	**a,b,c,d,g,l**
2.0	To learn policies and procedures to achieve a safe working environment in terms of health and safety regulations.	**2.1**	The student will be able to apply the Corporate Etiquettes and make the working environment safer.	**c,d,f,g,h,i,l**
3.0	To know the basic principles of an Organization in IT Operations.	**3.1**	The student will be able to recognize the Key Concepts of Service Management in IT - enabled services.	**a,b,c,d,g,i,l**
4.0	To learn the basics of information security in IT environments.	**4.1**	The student will be able to design IT infrastructure and security mechanism in networks.	**a,b,c,d,e,f,g,h,l**
5.0	To learn the basics of Microsoft 365 in IT Operations.	**5.1**	The student can Implement the policies in Microsoft 365.	**a,b,c,d,e,f,g,l**

UNIT I - IT OPERATIONS	**9**
IT Operation Definition - Roles & Responsibilities of IT Operations - IT Monitoring - IT operations Management - Responsibilities of IT operations Management. IT Service Management: IT Service Management Best Practices - The Service Life Cycle(Service Strategy - Service Design - Service Transition - Service Operation - Continual Service Improvement) Functions of IT Service Management (Incident Management, Event Management, Request fulfillment, Problem Management, Change Management, Availability Management - The Service Desk) - Escalation & Governance Management.	
UNIT II - HEALTHY SAFE AND SECURE WORKING ENVIRONMENT & ETIQUETTE	**9**
Health and Safety Essentials - Control and Management Systems - Facilities Management and Ergonomics - Managing Equipment - Managing Material. Etiquette: Professionalism in Relationships - First Impressions - Conducting Yourself in a Working Environment - Make Your Work Place Healthy - Dinning Etiquette - Elevator Etiquette - Cafeteria Etiquette - Meeting Etiquette - Telephone Etiquette - Dealing with Difficult People and Conflicting Situations.	
UNIT III - ITIL	**9**
Introduction –Understanding ITIL Guiding Principles in an Organization–Optimize and Automate – Four Dimensions of Service Management – Key Activities of the Service Value Chain	
UNIT IV - IT INFRASTRUCTURE & INFORMATION SECURITY	**9**
Definition - Components of IT Infrastructure (Hardware, Software, Network) - Types of IT infrastructure (Traditional, Cloud, Hyperconverged)- Risk, Response and Recovery: Risk Management and Information Security - The Risk Management Process - Business Continuity Management - Backing Up Data and Applications - Incident Handling - Recovery From a Disaster.	

UNIT V – AMS & Tools	9
Introduction – Support Models – Activities Type – Audits – Microsoft 365 – Domain Management – Licensing – Managing Teams – Meeting Policies – Messaging Policies	
TOTAL (L:45) : 45 PERIODS	

REFERENCE BOOKS:

1. IT Service Management Support for your ITSM Foundation exam by John Sansbury, Ernest Brewster, Aidan Lawes, Richard Griffiths.
2. Managing Health, Safety and Working Environment Revised Edition: Management Extra 1st Edition by Elearn
3. Everything About Corporate Etiquette by Vivek Bindra
4. AXELOS, "ITIL® Foundation ITIL 4 Edition", TSO, 2019
5. Fundamentals of Information Systems Security 3rd Edition by David Kim, Michael G. Solomon
6. https://docs.microsoft.com/en-us/learn/m365/

17ITX30 ADVANCED IT OPERATIONS					
		L	T	P	C
		3	0	0	3
PREREQUISITE : 17ITX29		**QUESTION PATTERN : TYPE - III**			
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To understand basic concepts of cloud platform & design intelligent Cloud Services and Applications.	**1.1**	The student will be able to Recognize the essentials of Cloud Computing.	**a,b,c,e,g,i,k,l**
2.0	To explore the concepts of Map Reduce Programming.	**2.1**	The student will be able to work with Big Data Platform and its Use cases	**a,b,c,d,e,f,i,k,l**
3.0	To introduce the basic concepts and techniques of Machine Learning, Deep Learning and Artificial Intelligence.	**3.1**	The student will be able to use ML and other AI technologies to automate the identification and Resolution of common IT issues.	**a,b,c,d,e,i,k**
4.0	To understand the key concepts of intelligent automation.	**4.1**	The student will be able to identify different types of Variables, control flow and data table automation.	**a,b,c,d,e,f,g,h,i, j,k,l**
5.0	To learn how to use ServiceNow to manage IT tasks at any organization.	**5.1**	The student will be able to do Site Reliability Engineering and to do simulation using SeriveNow.	**a,b,c,e,f,g**

UNIT I - CLOUD COMPUTING	**8**
Introduction – Characteristics of Cloud computing – Architecture – Types – Service Models – SaaS, IaaS, PaaS – Regions – Cloud Security.	
UNIT II - BIG DATA & DATA SCIENCE	**10**
Introduction – Data science and Challenges – HDFS & Hadoop – Structured and Unstructured data – Processing Big Data – Supervised & Unsupervised Learning – Text Analysis – Data visualization	
UNIT III - AI/ML & AIOps	**10**
Introduction – Structure of Intelligent Agents – Knowledge and Reasoning – Machine Learning – Deep Learning – Applications of AI – AIOps Technologies – AIOps Benefits – Implementation	
UNIT IV - ROBOTIC PROCESS AUTOMATION (RPA)	**8**
Introduction – Variables – Control flow – Data Tables and Excel Automation – UI Automation – Selectors – Email Automation	
UNIT V - SRE & SERVICENOW	**9**
Introduction – Adopting a DevOps & SRE Model – SRE vs DevOps – Architecture & Lifecycle – Practices – Error Budgets – Toil Management – DevOps Tools – Introduction to ServiceNow – Reporting & Managing Issue – Benefits.	
TOTAL (L:45) : 45 PERIODS	

REFERENCE BOOKS:

1. Cloud Computing: Concepts, Technology & Architecture by Erl, Thomas, Puttini, Ricardo, Mahmood, Zaigham
2. Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem (Addison-wesley Data & Analytics Series) 1st Edition, Kindle Edition by Douglas Eadline
3. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 2015.
4. Machine Learning in the AWS Cloud - Add Intelligence to Applications with Amazon Sage Maker and Amazon Recognition By Abhishek Mishra
5. Deep Learning for Vision Systems By Mohamed Elgendy ·
6. Learning Robotic Process Automation - Create Software Robots and Automate Business Processes with the Leading RPA Tool – UiPath By Alok Mani Tripathi
7. Ui Path, "RPA Design and Development", UiPath Academic Alliance Resource.
8. Hands-on Site Reliability Engineering - Build Capability to Design, Deploy, Monitor, and Sustain Enterprise Software Systems at Scale By Shamayel Mohammed Farooqui Vishnu Vardhan Chikoti.
9. Tim Woodruff, "Learning ServiceNow", 2nd Edition, 2018

17CSX37 – PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP					
			L	T	P	C
			1	0	4	3
PREREQUISITE : NIL		**QUESTION PATTERN : TYPE -NIL**			
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**			**Related Program outcomes**
1.0	To give practice to access the resources, gain knowledge about the technology used and list the ideas for project in the chosen domain.	**1.1**	The students will be able to access the resources, gain knowledge about the technology used and list the ideas for project in the chosen domain.		**a,b,c,d,e,f,g,h,i,j, k,l**
2.0	To develop an ability to propose a solution document fit to the problem, prepare Solution Architecture, Data Flow Diagram and Technology Architecture.	**2.1**	The students will be able propose a solution document fit to the problem, prepare Solution Architecture, Data Flow Diagram and Technology Architecture.		**a,b,c,d,e,f,g,h,i,j, k,l**
3.0	To prepare milestones and tasks, sprint schedules, coding and Testing.	**3.1**	The students will be able to prepare milestones and tasks, sprint schedules, coding and Testing.		**a,b,c,d,e,f,g,h,i,j, k,l**

PHASE I – PREPARATION PHASE	**(3+3)**
Access the resources - Join the mentoring channel - Register on IBM academic Initiative - Create Github account – Setup the System based on pre-requisites.	
PHASE II – IDEATION PHASE	**(3+15)**
Literature Survey – Technology Trainings – Empathy Canvas map Preparation – List the ideas.	
PHASE III – PROJECT DESIGN PHASE - I	**(3+9)**
Proposed solution document preparation – Problem solution fit - Solution Architecture Preparation.	
PHASE IV – PROJECT DESIGN PHASE - II	**(3+9)**
Requirement Analysis - Customer Journey – Data Flow Diagrams – Technology Architecture.	
PHASE V – PROJECT PLANNING PHASE	**(3+3)**
Milestones and Tasks preparation – Sprint Schedules	
PHASE VI – PROJECT DEVELOPMENT PHASE	**(0+21)**
Coding & Solutioning – Acceptance Testing – Performance Testing	
TOTAL (T:15+P:60) = 75 PERIODS	

17ITX32 TEST DRIVEN PROGRAMMING (Common to AI&DS,IT & CSE)					
			L	T	P	C
			3	0	0	3
PRE REQUISITE : Nil					
COURSE OBJECTIVES AND OUTCOMES:					
Course objectives		**Course outcomes**			**Related program outcomes**
1.0	To understand Object Oriented Programming concepts and basic characteristics of Java	1.1	The students will be able to implement fundamental concepts of Java.		**a,b,c,e,g,h,i, j,l**
2.0	To gain exposure about Abstract classes and collection framework	2.1	The students will be able to develop applications using Abstract classes and collection framework		**a,b,c,i,j,k,l**
3.0	To develop a java application with multiple threads and to access database through Java programs, using Java Data Base Connectivity (JDBC)	3.1	The students will be able to access database through Java programs, using Java Data Base Connectivity (JDBC)		**a,b,c,e,f,g,h, i,j,k,l**
4.0	Design and develop Web applications	4.1	The students will be able to Design and develop Web applications		**a,b,c,d, g,h,i,j,k,l**
5.0	To know about Servlet, XML and AJAX	5.1	The students will be able to apply servlets and AJAX for their web development		**a,b,c,d,e,f, h,j,k,l**

UNIT I - JAVA FUNDAMENTALS	**(9)**
Java Architecture, Environment Setup, Variables, Data Types, Assignment, Operators.**Flow Control Statements**: If statement, If--Else Statement, Nested--If Statement, Switch Statement, While Statement, For Loop Statement, Enhanced For Loop Statement, Do while loop, Break and Continue Statement. **Arrays:** One dimensional and Two Dimensional Array. **OOPS / Inheritance:** Classes and Objects, Constructor, Return Statements. Encapsulation/Abstraction, Inheritance, Overriding/Polymorphism, Method Overloading, Garbage Collection, String, String Buffer.**Eclipse Overview:** Creating packages, classes, Adding Jar Files, Setting eclipse Preferences, Refactoring renaming classes or interfaces	
UNIT II - COLLECTION AND ABSTRACTION	**(9)**
Abstraction /Packages / Exception Handling: Abstract Classes, Final Keyword, Packages-import, Interfaces, Introduction to Exception Handling, Exception types, Try and Catch Block, Throws, Throw clause, Finally clause, Runtime exception.**Wrapper Classes:** Autoboxing, Unboxing and Cloneable Interface. **I/O Streams:** Introduction to I/O, I/O Operations, Object Serialization. **Collection Framework:** Introduction to Collection, List, ArrayLists, LinkedLists, Sorting Lists, Using Iterators, Generics, Set, Map, HashMap, SortedMaps, Using Custom Objects, Map	
UNIT III - TEST CASES AND DATABASE CONNECTIVITY	**(9)**
Junit: Introduction to Junit, Junit Features, Junit with Eclipse, Assert Methods, Annotations, Test Suite, Introduction to Mockito. **Multithreading I / II:** Introduction to Multithreading, Thread Creation-Thread class and Runnable Interface,Thread Control and Priorities, Thread Synchronization.**RDBMS / SQL / JDBC**: Introduction to RDBMS, Oracle 11g Introduction, Select Statement, Restricting and Sorting Data, DML, DDL, Introduction to JDBC, Establishing Connection, Executing Query and Processing Results, Meta data & Prepared Statement, Using Callable Statement and Transactions	

UNIT IV- ANT,HTML & JAVASCRIPT	(9)
ANT: Introduction to ANT, Building sample java projects. **HTML :** Introduction to HTML and its elemets, Basic Tags, Basic Elements, Formatting Tags, Layout tags and Semantic Tags, Tables, Forms and Frames, Style and div tags, Introduction to HTML5. **JavaScript / CSS**: Introduction to CSS, Styles and Style sheets, Formatting with CSS, Links and Lists, CSS Box Model, CSS3, Introduction to Javascripts, JS Functions, JS Strings, JS Events, JS Objects, JS Validations, JS Regular Expressions, Introduction to Bootstrap, Formatting and styling using Boostrap, Table, Bootstrap Grid System.	
UNIT V - SERVLET, XML AND AJAX	**(9)**
Servlets and JSP: Introduction to Servlets, Servlet-Get and Post Requests, Servlet Config and Servlet Context, Servlet-Cookies and Session Management, Introduction to JSP, JavaBeans in JSP.**XML-I and XML-II**: Introduction to XML, Document Type Definition, XML Namespaces, XML Schema, XSLT.**AJAX:** Introduction to AJAX, AJAX working principle, AJAX Application, AJAX Database Application.	
	TOTAL (L: 45) = 45 PERIODS

TEXT BOOK:

1. Core Java Volume I- Fundamentals, Cay S. Horstmann, Gary Cornell, Pearson India Education Services Pvt. Ltd., 11th Edition,
2. Java: The Complete Reference, Eleventh Edition, 11th Edition by Herbert Schildt Released December 2018
3. HTML 5 Black Book, Kogent Learning Solutions Inc., ISBN:978-93-5004-095-9

REFERENCES

1. Head First EJB 3.0 by Kathy Sierra, Bert Bates, Publisher: O'Reilly Media
2. Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media

17ITX33 JAVA-FULL STACK IMPLEMENTATION Common to AI&DS,CSE&IT				
L	T	P	C	
3	0	0	3	
PRE REQUISITE : Nil				

COURSE OBJECTIVES AND OUTCOMES:

Course objectives		Course outcomes		Related program outcomes
1.0	Designing Enterprise based applications by encapsulating an application's business logic.	1.1	The students will be able to map Java classes and object associations to relational database tables with Hibernate mapping files	a,b,c,e,g,h,i, j,l
2.0	Learn Spring configuration using Java Configuration and Annotations	2.1	The students will be able to implement Spring configuration using Java Configuration and Annotations	a,b,c,i,j,k,l
3.0	Simplifying application development with Spring Boot	3.1	The students will be able to simplify application development using Spring Boot.	a,b,c,e,f,g,h, i,j,k,l
4.0	Consume REST services using observables	4.1	The students will be able to use REST web services	a,b,c,d, g,h,i,j,k,l
5.0	Utilizing AngularJS formats adequately	5.1	The students will be able to use various Angular features including directives, components, and services.	a,b,c,d,e,f, h,j,k,l

UNIT I - HIBERNATE	**(9)**
Hibernate Overview, Architecture, Configuration, Sessions, Annotations, Query Language, Native SQL, Batch Processing, Interceptors	
UNIT II -SPRING CORE	**(9)**
Spring Overview, Architecture, IoC Containers, Bean Definition and Scope, Bean Life cycle, Bean inheritance, Dependancy injection, Beans auto wiring, java based configuration, event handling, Custom events, AOP with spring framework, JDBC framework, transaction management.	
UNIT III - SPRING BOOT	**(9)**
Spring Boot-Introduction, Boostrapting, Tomcat deployment, Build systems, code structure, Spring beans and dependancy, Spring boot runners, Application properties, Logging, Building RESTful web services, Exception handling, Interceptor, Servlet filter, tomcat port number, File handling, Consuming RESTful web services, Internationalization, Spring boot scheduling	
UNIT IV - REST WEB SERVICE	**(9)**
RESTful-Introduction, Environment setup, Resources, Messages, Addressing, Methods, Statelessness, Caching, Security, JAX-RS.	
UNIT V - ANGULAR	**(9)**
Angular Introduction, Features, Apps Loading, Architecture, Directives, ngIf Directive, ngFor Directive, ngSwitch Directive, Data Binding, Property Binding, String Interpolation, Event Binding, Two way data binding, Forms.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Soni, R. K. (2017). Full stack angularJS for java developers: Build a full-featured web application from scratch using angularJS with spring RESTful. Apress.
2. Duldulao, D. B., & Villafranca, S. R. (2022). Spring Boot and Angular: Hands-on full stack web development with Java, Spring, and Angular. Packt Publishing Ltd.
3. Fisher, P. T., & Murphy, B. D. (2010). Spring persistence with Hibernate. Apress.

REFERENCES:

1. Just Hibernate, A Lightweight Introduction to the Hibernate Framework by Madhusudhan Konda, Publisher: O'Reilly Media

17CSX38 – DEVOPS					
(Common to 17AIX09)					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related program outcomes**	
1.0	To introduce DevOps terminology, definition & concepts	**1.1**	The students will be able to Understand different actions performed through Version control tools like Git.	**a,b,c,d,e,i,j, k,l**	
2.0	To understand the different Version control tools like Git, Mercurial.	**2.1**	The students will be able to Perform Continuous Integration and Continuous Testing and Continuous Deployment using Jenkins by building and automating test cases using Maven & Gradle	**a,b,c,d,e,i,j,k, l**	
3.0	To understand the concepts of Continuous Integration/ Continuous Testing/ Continuous Deployment.	**3.1**	The students will be able to Perform Automated Continuous Deployment.	**a,b,c,d,e,i,j,k, l**	
4.0	To understand Configuration management using Ansible	**4.1**	The students will be able to do configuration management using Ansible	**a,b,c,d,e,i,j,k, l**	
5.0	Illustrate the benefits and drive the adoption of cloud-based Devops tools to solve real world problems	**5.1**	The students will be able to Understand to leverage Cloud-based DevOps tools using Azure DevOps	**a,b,c,d,e,i,j,k, l**	

UNIT I NTRODUCTION TO DEVOPS	**(9)**
Devops Essentials - Introduction To AWS, GCP, Azure - Version control systems: Git and Github.	
UNIT II COMPILE AND BUILD USING MAVEN & GRADLE	**(9)**
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 III CONTINUOUS INTEGRATION USING JENKINS	**(9)**
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, HTMLPublisher, Copy Artifact and Extended choice parameters). Configuring Jenkins to work with java, Git and Maven, Creating a Jenkins Build and Jenkins workspace.	
UNIT IV CONFIGURATION MANAGEMENT USING ANSIBLE	**(9)**
Ansible Introduction, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible	
UNIT V BUILDING DEVOPS PIPELINES USING AZURE	**(9)**
Create Github Account, Create Repository, Create Azure Organization, Create a new pipeline, Build a sample code, Modify azure-pipelines.yaml file	
TOTAL(L:45)=45PERIODS	

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

REFERENCES:

1. Mitesh Soni “Hands-On Azure Devops: CICD Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure”, English Edition, Paperback – 1 January 2020.
2. Jeff Geerling, “Ansible for DevOps: Server and configuration management for humans”, First Edition, 2015.
3. David Johnson, “Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps”, Second Edition, 2016.
4. MariotTsitoara, “Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer”, Second Edition, 2019.
5. https://www.jenkins.io/user-handbook.pdf
6. https://maven.apache.org/guides/getting-started

17CSM01 - USER INTERFACE DESIGN					
			L	T	P	C
			3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course objectives		**Course outcomes**			**Related program outcomes**
1.0	To understand the concepts of HCI	**1.1**	The students will be able to know the fundamental concepts of HCI		**a,b,c,e,g,h,i, j,l**
2.0	To gain exposure about Usability Engineering	**2.1**	The students will be able to get exposure in usability engineering		**a,b,c,i,j,k,l**
3.0	To understand the guidelines in HCI	**3.1**	The students will be able to gain knowledge in the guidelines in HCI		**a,b,c,e,f,g,h, i,j,k,l**
4.0	To understand the concepts of User Interface design process and object oriented design process	**4.1**	The students will be able to use User Interface design process and object oriented design process		**a,b,c,d, g,h,i,j,k,l**
5.0	To design the web interface and mobile user interface.	**5.1**	The students will be able to develop web interface and mobile user interface.		**a,b,c,d,e,f, h,j,k,l**

UNIT I - FOUNDATIONS OF HCI	**(9)**
The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – Processing; Interaction: – Frameworks – Ergonomics – Styles – Elements – InteractivityParadigms	
UNIT II -USABILITY ENGINEERING	**(9)**
Definition - UI Generations - Evaluation - Lifecycle - Classification of Users – Prototyping - Usability Testing Stages	
UNIT III - GUIDELINES IN HCI	**(9)**
Principles to Support Usability - HCI Golden Rules - Shneiderman‘s Eight Golden Rules - Norman‘s Seven Principles - Norman‘s Model of Interaction.	
UNIT IV - DESIGN PROCESS	**(9)**
UI Design Process - Task Oriented Design - Object Oriented Design - CSCW UI Design - Case Studies	
UNIT V - WEB AND MOBILE UI	**(9)**
Designing Web Interfaces – Drag & Drop -Direct Selection-Contextual Tools-Overlays-Inlays and Virtual Pages-Process Flow - Mobile User Characteristics - Mobile Devices: Taxonomy - Anatomy – Mobile Design Principles - Mobile UIDesign Patterns.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Dix A, Finlay J, Abowd G D, Beale R , "Human Computer Interaction", 3rd Edition, Pearson Education, USA, 2008.
2. Linda Mcaulay , "HCI for Software Designers", Thompson Computer Press, USA, 1998.

REFERENCES:

1. Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven Jacobs, Niklas Elmqvist, Nicholas Diakopoulos , "Designing the User Interface: Strategies for effective HCI", 6th Edition, Pearson, USA, 2017.
2. Barbara Ballard , "Designing the Mobile User Experience", John Wiley & Sons, Ltd, USA, 2007.
3. Bill Scott, Theresa Neil , "Designing Web Interfaces", 1st Edition, O'Reilly Media, Inc, USA, 2009.
4. Jenifer Tidwell , "Designing Interfaces", 2nd Edition, O'Reilly Media, Inc, Canada, 2011.

17CSM02 – PROGRAMMING USING JAVA					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To impart the fundamental concepts of core JAVA.	**1.1**	Know how to solve basic design problems using object oriented concepts	**a,b,c,d,e,l**	
2.0	To gain exposure about packages and collections Interfaces.	**2.1**	Develop applications in JAVA using packages and Collection Interfaces	**a,b,c,d,e,l**	
3.0	To learn about exception handling and multithreading concepts	**3.1**	Implement the robust and multitasking applications using exception handling and multithreading concepts	**a,b,c,d,e**	
4.0	To get knowledge about building Event handling applications using AWT and SWING	**4.1**	Develop the simple GUI interfaces to interact with users and real time applications.	**a,b,c,d,e,l**	
5.0	To build applications using Networking and JDBC concepts.	**5.1**	Deploy the real time engineering applications using networking and JDBC concepts.	**a,b,c,d,e,l**	

UNIT I - INTRODUCTION	**(9)**
Features of Java – Data types – Operators –Arrays –Control Statements – Classes – Methods – Objects – Constructors – Garbage Collection –Inheritance – Using Super – Method Overriding – Abstract Classes – Using final with inheritance – String Handling – String class – String buffer class.	
UNIT II - PACKAGES &INPUT / OUTPUT OPERATIONS	**(9)**
Packages – Interfaces – Exploring java.util Package – Collection Interfaces – Collection Classes – Exploring java.io Package – File – Byte Streams – Character Streams. Exploring Java.lang package – Simple type wrappers – Runtime – System – Object – Class – Math thread – Using clone() and the Cloneable Interface.	
UNIT III - EXCEPTION HANDLING AND THREADS	**(9)**
EXCEPTION HANDLING: Fundamentals – Compile time errors –Run time errors – Exception types – try catch block – Multiple catch statement – Nested try – Throw – Finally – User defined exceptions. THREADS: Java threads – Priorities – Synchronization – Thread class and Runnable interfaces – Creating threads – Multiple threads – Inter thread communication.	
UNIT IV - APPLETS & SWING	**(9)**
Applet Basics – AWT classes – Frames – Graphics – AWT controls – Layout managers – Swing – ModelView-Controller Design Pattern – Swing Components – Programming examples.	
UNIT V - NETWORKING & JAVA DATABASE CONN ECTIVITY	**(9)**
JAVA NETWORKING: Basics – Socket overview – TCP/IP client sockets – TCP/IP server sockets –URL – Datagram sockets. JDBC: Manipulating Database with JDBC- Connecting to and querying the database – RowSet Interface – Prepared Statements and Stored Procedures – Transaction Processing.	
TOTAL(L:45)=45PERIODS	

TEXT BOOK:

1. Patrick Naughton and Herbert Schildt, “Java 2- The Complete Reference”, 8th ed., Tata McGraw Hill, New Delhi, 2011.

REFERENCES:

1. H.M. Deitel and P.J. Deitel, “JAVATM How to program”, 9th ed., Pearson Education, 2009.
2. Advanced programming in JAVA prentice – Hall of India Private Limited NIIT – 2003
3. George Reese, “Database Programming with JDBC & Java”,2nd ed., O‟Reilly Media,2000.

17CSM03 - DATABASE SYSTEM CONCEPTS (Common to 17ITM03)					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course objectives		**Course outcomes**		**Related program outcomes**	
1.0	To understand the different issues involved in the design and implementation of a database system.	**1.1**	The students will be able to describe the role of Database Management System in an Organization.	**a,c,j,k**	
2.0	To study the physical and logical database designs, database modeling.	**2.1**	The students will be able to study basic database concepts including the structure and operations of the relational data model.	**a,c,j,k**	
3.0	To understand and use data manipulation language to query, update, and manage a database	**3.1**	The students will be able to construct simple and Moderately advanced database queries using SQL	**a,b,c,j,k**	
4.0	To develop an understanding of essential DBMS concepts.	**4.1**	The students will be able to apply logical database design principles includes E-R diagrams & Normalization.	**a,b,c,k**	
5.0	To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS	**5.1**	The students will be able to explain various file organizing & Indexing structure	**a,b,c,k**	

UNIT I - INTRODUCTION	**(9)**
Introduction to database systems - Definition of DBMS - Advantages of dbms - Views of data - Levels of data abstraction - Data Models and types - Database architecture - Entity relationship model - ER diagram.	
UNIT II - RELATIONAL DATA MODELING	**(9)**
Relational database structure - Procedural and Non procedural languages - Relational algebra : operations - Relational Calculus : Tuple relational calculus - Domain Relational Calculus - Integrity Constraints - SQL Commands : DDL - DML - TCL	
UNIT III - DATABASE DESIGN	**(9)**
Functional dependency: Full functional Dependency - Partial dependency - Transitive dependency - multi valued dependency - Decomposition - Normalization - Normal Forms: 1NF - 2NF - 3NF - BCNF - 4NF - 5NF	
UNIT IV - TRANSACTION PROCESSING	**(9)**
Transaction - Properties of transaction - Transaction state - Serialization : types - Need for Serialization - Two Phase Commit - Save Point - Concurrency - Advantages of concurrency - Concurrency control mechanism - Locking protocols	
UNIT V - MEMORY STRUCTURES AND FILE ORGANIZATION	**(9)**
Memory hierarchy - Disk storage - Raid levels - Indexing: types - Hashing techniques - Query Processing tool - Query Evaluation.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Seventh Edition, McGraw Hill, 2020.

REFERENCES:

1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education, 2007.

17CSM04 - XML AND WEB SERVICES					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course objectives		**Course outcomes**		**Related program outcomes**	
1.0	To understand XML technologies and and basic concepts in schemas.	**1.1**	The students will be able to implement fundamental concepts of XML	**a,b,c,e,g,h,i, j,l**	
2.0	To gain exposure about XML Processing	**2.1**	The students will be able to work on updating XML ,extracting data from XML,XPATH	**a,b,c,i,j,k,l**	
3.0	To understand the concepts of Web services	**3.1**	The students will be able to understand the web services concepts.	**a,b,c,e,f,g,h, i,j,k,l**	
4.0	To Implement of web services using protocols	**4.1**	The students will be able to implement web services	**a,b,c,d, g,h,i,j,k,l**	
5.0	To know about REST based web services	**5.1**	The students will be able to apply servlets and AJAX for their web development	**a,b,c,d,e,f, h,j,k,l**	

UNIT I - XML TECHNOLOGY	**(9)**
Benefits – XML Documents - Well-Formed XML – Validation - DTD - XML Schemas - Relax NG-Schematron.	
UNIT II - XMLPROCESSING	**(9)**
Parsing XML–Updating XML- Extracting Data from XML- XPATH-Xquery-XSLT	
UNIT III - WEBSERVICES	**(9)**
Architecture - Messaging - Service Description - Service Discovery - Service Transport Security	
UNIT IV- WEBSERVICES IMPLEMENTATION	**(9)**
SOAP Protocol - WSDL - UDDI - Web Service Clients and Service Invocation - WS-* Standards.	
UNIT V - REST BASED WEB SERVICES	**(9)**
Principles - Comparison with SOAP - XML Based Web Services - Design and Implementation of REST Services - Resource Oriented Architecture - best practices.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Ron Schmelzer et al , "XML and Web Services", Pearson Education, 2008.
2. Sandeep Chatterjee, James Webber , "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.

REFERENCES

1. Fawcett J, Danny Ayers, Liam R.E.Quin , "Beginning XML", 5th Edition, Wrox, 2012.
2. Hansen MD , "SOA Using Java Web Services", Prentice Hall, USA, 2007.
3. Martin Kalin , "Java Web Services: Up and Running", O'Reilly Media, USA, 2013.
4. Richardson L, Ruby S , "Restful Web Services", O'Reilly, USA, 2008.

17CSM05 – WEB TECHNOLOGIES					
			L	T	P	C
			3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To understand the basic concepts of web programming and internet	**1.1**	The students will be able to Implement the basic concepts of web programming	**a,b,d**	
2.0	To learn how to use javascript in web applications	**2.1**	The students will be able to Develop interactive web applications using Javascript	**a,b,c,d,e,f,,l,k,l**	
3.0	To Have an basic knowledge of Java servlets and Java server pages	**3.1**	The students will be able to Differentiate how servlets and Java Server Pages (JSP) fit into java-based web application architecture	**a,e,k,l**	
4.0	To learn the basics of XML and AJAX technologies	**4.1**	The students will be able to Present data in XML format and design rich client presentation using AJAX	**a,b,c,d,e,f,k,l**	
5.0	To describe the working of web services.	**5.1**	The students will be able to Design and launch web services	**a,b,c,d,e,f,l,k,l**	
UNIT I - INTRODUCTION TO INTERNET, HTML AND CSS					**(9)**
Web Essentials: Basic Internet Protocol - WWW - HTTP Request Message - HTTP Response Message - HTML Introduction - Basic XHTML syntax and Semantics - HTML Elements & Attributes - Lists - Tables - Frames - Forms- Defining XHTML's Abstract Syntax - CSS - Features - Syntax - Cascading and Inheritance - Text Properties - Box Model					
UNIT II JAVASCRIPT					**(9)**
Introduction - Basic Syntax - Variable - Data Types - Operators and Literals - Functions - Objects - Arrays - Event Handling - Validation - Introduction to Node.js					
UNIT III SERVLETS AND JSP					**(9)**
Java Servlets: Architecture - Servlet Generating Dynamic Content-Life Cycle - Parameter Data-Sessions - Cookies; JSP : Overview - Running JSP Application - Basic JSP - JavaBeans Classes and JSP - Libraries and Files - MVC Paradigm.					
UNIT IV XML and AJAX					**(9)**
XML: XML Namespaces - XML Processing - Transforming XML Documents - XSLT; AJAX: Ajax Client Server Architecture-XML Http Request Object - Call Back Methods					
UNIT V INTRODUCTION TO WEB SERVICES					**(9)**
JAX-RPC Concepts-Writing a Java Web Service-Writing a Java Web Service Client-Describing Web Services: WSDL-Representing Data Types: XML Schema-Communicating Object Data: SOAP- Related Technologies.					
TOTAL(L:45)=45PERIODS					

TEXT BOOKS:

1. Jeffrey C.Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2011
2. Deitel Deitel Nieto, “Internet & World Wide Web How to Program”, 5 th ed., 2012.

REFERENCES:

1. Thomas A. Powell, “The Complete Reference HTML & CSS”, 5 th ed., 2010
2. Steve Suehring, “JavaScript – Step by Step”, PHI, 3 rd ed., 2013.
3. Brad Dayley,” Node.js, MongoDB and AngularJS Web Development”, Pearson Education, 2014

17CSM06 - OPEN SOURCE SYSTEMS					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcomes**	
1.0	To understand the need of open source software	**1.1**	The students will be able to Know the basic concepts of open source and LINUX.	**a,b,c,d,l**	
2.0	To gain knowledge about web server and tools	**2.1**	The students will be able to Configure web server and MySQL	**a,b,c,d,l**	
3.0	To gain knowledge about PHP	**3.1**	The students will be able to Develop a webpage using PHP.	**a,b,c,d,e,l**	
4.0	To gain knowledge about PYTHON	**4.1**	The students will be able to Design an application using python	**a,b,c,d,e,f,g,h, l**	
5.0	To create Software applications that can be accessed by all the people over the internet and to allow the users to customize the software based on their requirements.	**5.1**	The students will be able to Build an application with PERL	**a,b,c,d,e,f,g,h, l**	

UNIT I - OPEN SOURCE OPERATING SYSYTEM	**(9)**
Introduction to Open sources – Need of Open Sources – Advantages of Open Sources– Application of Open Sources – Open Source Licenses. Open Source Operating Systems: LINUX - Kernel Mode and User Mode- Installation – Processes – User Management – File Systems – Development with Linux	
UNIT II - WEB SERVER AND TOOLS	**(9)**
Web Server: Apache Web server – Working with Web Server – Configuring and Using apache web services - MySQL: Introduction – Installing and configuring MySQL – Data Types – Working with Databases and Tables – Open Source Software tools and processors – Eclipse IDE platform – Compilers – Model Driven Architecture tools.	
UNIT III - PHP	**(9)**
PHP: Introduction- Programming in Web Environment- Variables- Constants- Data types- Operators- StatementsFunctions- Arrays- OOP- String manipulation and regular expression- File handling and data storage- PHP and SQL database- PHP and LDAP- PHP connectivity- Sending and Receiving E-mails- debugging and Error HandlingSecurity	
UNIT IV - PYTHON	**(9)**
Overview of PYTHON - Syntax and Style- Python objects-Numbers-Sequences-Strings-Lists and Tuples - Dictionaries- Conditionals and loops – Files – Input and Output – Error and Exceptions – Functions – Modules – Classes and OOP – Execution Environment	
UNIT V - PERL	**(9)**
Perl Backgrounder – Perl Overview – Perl Parsing Rules – Variables and Data – Statements and Control Structures – Subroutines - Packages and Modules - Working with Files – Data Manipulation	
TOTAL(L:45)=45PERIODS	

TEXT BOOKS:

1. Hitesh Singh, NidhiArora, "Linux and X-WINDOWS PROGRAMMING", 1st editon., S.K. Kataria& Sons, NewDelhi, 2011.
2. W. Jason Gilmore, "Beginning PHP and MySQL: From Novice to Professional", 3rd edition., Apress, USA, 2010.
3. Wesley J. Chun, "Core Phython Programming", Prentice Hall, 2001
4. Martin C. Brown, "Perl: The Complete Reference", 2nd edition., Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

REFERENCES:

1. Richard Petersen "The Complete Reference Linux ", 6 th ed., Tata McGraw Hill Edition 2010.
2. Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003
3. VikramVaswani, "MYSQL: The Complete Reference", 2 nd ed., Tata McGraw- Hill Publishing Company Limited, Indian Reprint 2009.
4. Rasmus Lerdorf and Levin Tatroe, "Programming PHP",O"Reilly, 2002
5. Steven Holzner, "PHP: The Complete Reference", 2 nd ed., Tata McGraw-Hill Publishing Company Limited, indian Reprint 2009.
6. Peter Wainwright, "Professional Apache",Wrox Press, USA, 2002.

17CSM07 - UI AND UX DESIGN
(Common to 17ITM04)

L	T	P	C
3	0	0	3

PRE REQUISITE : NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To provide a sound knowledge in UI & UX	1.1	The students will be able toBuild UI for user Applications.	a,b,c,d,e,l,j,k,l
2.0	To understand the need for UI and UX	2.1	The students will be able to Evaluate UX design of any product or application	a,b,c,d,e,l,j,k,l
3.0	To understand the various Research Methods used in Design	3.1	The students will be able to Demonstrate UX Skills in product development.	a,b,c,d,e,l,j,k,l
4.0	To explore the various Tools used in UI & UX	4.1	The students will be able to Implement Sketching principles	a,b,c,d,e,l,j,k,l
5.0	To Create a wireframe and prototype	5.1	The students will be able to Create Wireframe and Prototype	a,b,c,d,e,l,j,k,l

UNIT I FOUNDATIONS OF DESIGN **(9)**

UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy

UNIT II FOUNDATIONS OF UI DESIGN **(9)**

Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides

UNIT III FOUNDATIONS OF UX DESIGN **(9)**

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 IV WIREFRAMING, PROTOTYPING AND TESTING **(9)**

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 V RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE **(9)**

Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow Diagrams - Flow Mapping - Information Architecture

TOTAL(L:45)=45PERIODS

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

REFERENCES:

1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, “Designing Interface” 3 rdEdition , 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.

17CSM08 - C# AND .NET FRAMEWORK

L	T	P	C
3	0	0	3

PRE REQUISITE : 17CSM02

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Program outcomes
1.0	To outline the knowledge about basic concepts and functions of c#.	**1.1**	The students will be able to explain the .NET framework.	**a,k,l**
2.0	To show the structure and the object oriented aspects of C#	**2.1**	The students will be able to explain how c# fits into the .NET Platform.	**a,k,l**
3.0	To demonstrate the application development Processes on .NET and building Windows Applications.	**3.1**	The students will be able to analyze the basic structure of a C# application and to develop real time application	**a,b,c,e,k,l**
4.0	To demonstrate the principles of Web based application development on .NET.	**4.1**	The students will be able to debug, compile, and run a simple web based application on .NET.	**a,b,c,k,l**
5.0	To learn .NET Framework and CLR	**5.1**	The students will be able to develop programs using C# on.NET.	**a,b,c,d,e,g,j,k,l**

UNIT I - INTRODUCTION TO C# **(9)**

Introducing C#, Understanding.NET, Overview of C#, Literals, Variables, Data Types, Operators and Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, and Enumerations.

UNIT II – OBJECT ORIENTED ASPECTS OF C# **(9)**

Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

UNIT III - APPLICATION DEVELOPMENT ON .NET **(9)**

Building Windows Applications, Accessing Data with ADO.NET.

UNIT IV - WEB BASED APPLICATION DEVELOPMENT ON .NET **(9)**

Programming Web Applications with Web Forms, Programming Web Services.

UNIT V - THE CLR AND THE .NET FRAMEWORK **(9)**

Assemblies, Versioning, Attributes, Reflection, Viewing Meta Data, Type Discovery, Reflecting on a Type, Marshaling, Remoting , Garbage Collection.

TOTAL (L:45) = 45 PERIODS

TEXT BOOKS:

1. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2015.
2. J. Liberty, "Programming C#", 2nd ed., O'Reilly, 2002.

REFERENCES:

1. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 2004.
2. Robinson etal, "Professional C#", 2nd ed., Wrong Press, 2002.
3. S. Thamarai Selvi, R. Murugesan, "A Textbook on C#", Pearson Education, 2003.

17ITX17 - BUILDING ENTERPRISE APPLICATIONS					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : 17ITX06	**QUESTION PATTERN: TYPE - III**				

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Program outcomes
1.0	To infer the basics of enterprise applications	**1.1**	The students will be able to outline the basics of enterprise applications.	**a,e,l**
2.0	To interpret the enterprise applications	**2.1**	The students will be able to demonstrate the enterprise applications further	**a,c**
3.0	To build engineering and intriguing of enterprise applications	**3.1**	The students will be able to experiment with various architectures and designs of enterprise applications	**a,c**
4.0	To develop enterprise applications	**4.1**	The students will be able to construct enterprise applications	**c,d,e,i**
5.0	To know about testing and rising of enterprise applications	**5.1**	The students will be able to measure the quality of enterprise applications	**h,k**

UNIT I INTRODUCTION	**(9)**
Introduction to enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications	
UNIT II INCEPTING ENTERPRSIE APPLICATIONS	**(9)**
Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non-functional requirements, requirements validation, planning and estimation	
UNIT III ARCHITECTING AND DESIGNING ENTERPRISE APPLICATIONS	**(9)**
Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture-design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design	
UNIT IV CONSTRUCTING ENTERPRISE APPLICATIONS	**(9)**
Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage	
UNIT V TESTING AND ROLLING OUT ENTERPRISE APPLICATIONS	**(9)**
Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Anubhav Pradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, Veerakumar Esakimuthu "Raising Enterprise Applications", John Wiley Publication 2015.(Unit 1 to 5)

REFERENCES:

1. Brett McLaughlin, “Building Java Enterprise Applications”, O'Reilly Media Publication 2002.
2. “Software Requirements: Styles & Techniques”, Addison-Wesley Professional.
3. “Software Systems Requirements Engineering: In Practice”, McGraw-Hill Osborne Media.
4. “Managing Software Requirements: A Use Case Approach”, Second Edition, Pearson Publication.
5. “Software Architecture: A Case Based Approach”, Pearson Publication.

17ITX37 PROBLEM SOLVING USING JAVA					
		L	T	P	C
		3	0	0	3
PRE REQUISITE : NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Program outcome**	
1.0	To understand the basics of Java Programming Language	**1.1**	The Students will be able to solve simple problems using Java.	**a,b,c,d,e, h,j,k,l**	
2.0	To understand fundamentals of programming such as conditional and iterative execution	**2.1**	The students will be able to write programs using branching and looping statements	**a,b,c,d,e, h,i,j,k,l**	
3.0	To understand the concepts of Java arrays and Strings.	**3.1**	The students will be able to Be able to develop confidently with Strings and implement arrays.	**a,b,c,d,e, h,i,j,k,l**	
4.0	To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods.	**4.1**	The students will be able to understand basic oops concepts and develop applications using inheritance and interfaces.	**a,b,c,d,e, h,i,j,k,l**	
5.0	To understand threads and collection concepts	**5.1**	The students will be able to build applications using threads and collection framework.	**a,b,c,d,e, h,i,j,k,l**	

UNIT I - INTRODUCTION TO JAVA	(9)
History of java-Features-Glimpse of java-Data types and Variables-Local variable-Instance variable-static variable-Keywords: this, super, final- Type conversion & casting- Importance of Scanner class-Getting started with Eclipse IDE and VSCode.	
UNIT II-OPERATORS AND DECISION MAKING STATEMENTS	(9)
Operators- Arithmetic Operator, Bitwise Operator, Conditional Operator, Unary Operator-Relational and Logical operators-Conditional statements: If else, If else if, Nested if -Looping Statements: For Loop, while Loop, do while loop-switch-break-continue- auto boxing and unboxing**.**	
UNIT III-ARRAYS AND STRINGS	(9)
Arrays: One Dimensional Array-Two Dimensional Array-Inbuilt functions in arrays. Strings-String array-Inbuilt functions in Strings-String Buffer class-String Builder class-String Tokenizer class	
UNIT IV-OBJECT-ORIENTED PROGRAMMING PARADIGM	(9)
Class-objects-Encapsulation-Inheritance and its types-Polymorphism: Static binding and dynamic binding-Methods –Constructors and its types-Abstract class-Interface.	
UNIT V- MULTITHREADING AND COLLECTIONS	(9)
Throwable classes-Exception types-Exception keywords-Collection classes: List, Set-Thread-Ways of thread creation-methods-thread priorities-Synchronization-multithreading-Lambda Expression.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOK:

1. Herbert Schildt, “Java:The Complete Reference”,McGraw Hill Education, Twelfth edition,2021.

REFERENCE:

1. Cay.S.Horstmann,GaryCornell, “Core Java-JAVA Fundamentals”, Prentice Hall,Eleventh edition, 2020.