SRI CHANDRASEKHARENDRA SARASWATHI VISWA MAHAVIDYALAYA

(Deemed to be University U/S 3 of UGC Act 1956) (Accredited with "A" Grade by NAAC)

Enathur, Kanchipuram – 631561

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CURRICULUM AND SYLLABUS FOR FULL TIME

B.E. (Computer Science and Engineering)

(Applicable for students admitted from 2024-2025 onwards)

B.E. COMPUTER SCIENCE AND ENGINEERING

These regulations are applicable to the students admitted from the AY 2024-25 Onwards.

CHOICE BASED CREDIT SYSTEM FOR B.E. (CSE) FULL-TIME PROGRAMME CREDITS

Theory courses: Courses with 4/3 credits will be assigned 3 Lectures and 2/1 Tutorial hours per week.

Practical courses: Courses with 2 credits will be assigned 3 hours of lab/practical work per week

Each semester curriculum shall normally have a blend of theory and practical courses. In the first year the total number of credits will be 17 for each Semester. For semester III to VII, the average credits per semester will be 22 and for semester VIII, the credits will be 19. For the award of the degree, a student has to earn a minimum of 167 credits.

DURATION OF THE PROGRAMME

A student is normally expected to complete B.E (CSE) programme in four years and in any case, not more than seven years from the time of admission.

REGISTRATION FOR COURSES

A newly admitted student will automatically be registered for all the courses prescribed for the first year, without any option.

All other students shall submit a completed registration form indicating the list of courses intended to be credited during the next semester. This registration will be done a week before the last working day of the current semester. Late registration, with the approval of the Dean on the recommendation of the Head of the Department, along with a late fee will be done, up to the last working day.

Registration for the project work shall be done only for the final semester.

ASSESSMENT

The break-up of assessment and examination marks for theory subjects is as follows.

First Assessment Test	:	15 Marks
Second Assessment Test	:	15 Marks
Assignment & Attendance (seminars, group discussion)	:	10 Marks
Total (Internal Marks)	:	40 Marks
End semester Examination (External Marks)	:	60 Marks
Total (Internal + External)	:	100 Marks

The break-up of the assessment and examination marks for practical is as follows.

Observations	:	15 Marks
Model Test	:	15 Marks
Record book & Attendance	:	10 Marks

Total (Internal Marks)   :   40 Marks
End semester Examination (External Marks)   :   60 Marks
Total (Internal + External)   :   100 Marks

The project work will be assessed for 40 marks by a Committee consisting of the Guide and the Head of the Department. The Head of the Department shall be the Chairman. 60 marks are allotted for the project viva voce examination at the end of the semester.

WITHDRAWAL FROM A COURSE

A student can withdraw from the course at any time before a date fixed by the Head of the Department prior to the second assessment, with the approval of the Dean on the recommendation of the Head of the Department.

TEMPORARY BREAK OF STUDY

A student can take a one-time temporary break of study covering the current year/semester and/or the next semester with the approval of the Dean on the recommendation of the Head of the Department, not later than seven days after the completion of the mid-semester test. However, the student must complete the entire program within the maximum period of seven years.

SUBSTITUTE ASSESMENT

A student, who has missed, for genuine reasons accepted by the Head of the Department, one or more of the assessments of a course other than the end semester examination, may take a substitute assessment for any one of the missed assessments. The substitute assessment must be completed before the commencement of the end-semester examination.

A student who wishes to have a substitute assessment for a missed assessment must apply to the concerned faculty member within a week from the date of the missed assessment.

ATTENDANCE REQUIREMENTS

To be eligible to appear for the examination in a particular course, a student must put in a minimum of 80% of attendance in the course. However, if the attendance is 70% or above but less than 80% in any course, the authorities can permit the student to appear for the examination in the course on payment of the prescribed condonation fee.

A student who withdraws from or does not meet the minimum attendance requirement in the course must re-register for and repeat the course.

PASSING AND DECLARATION OF EXAMINATION RESULTS

All assessments of all the courses on the absolute mark basis will be considered and passed by the results passing board in accordance with the rules of the University. Thereafter, the Controller of Examinations shall convert the marks for each course to the corresponding letter grade as follows, compute the grade point average & cumulative grade point average and prepare the grade cards.

90 to 100 marks	-	Grade 'S'
80 to 89 marks	-	Grade 'A'
70 to 79 marks	-	Grade 'B'
60 to 69 marks	-	Grade 'C'
55 to 59 marks	-	Grade 'D'
50 to 54 marks	-	Grade 'E'
less than 50 marks	-	Grade 'F'
Insufficient attendance	-	Grade 'I'
Withdrawn from the course	-	Grade 'W'

A student who obtains less than 50 marks out of 100 in the subject or less than 24 out of 60 in External exam or is absent for the examination will be awarded Grade 'F'.

A student who earns a grade of S,A,B,C,D or E for a course is declared to have successfully completed that course and earned the credits for that course. Such a course cannot be repeated by the student.

A student who obtains letter grade F in a course has to reappear for the examination in that course.

The following grade points are associated with each letter grade for calculating the grade point average.

S – 10; A-9; B-8; C-7; D-6; E-5; F-0

A student can apply for revaluation of one or more of his /her examination answer papers within a week from the date of issue of Grade sheet to the student on payment of the prescribed fee per paper. The application must be made to the Controller of Examinations with the recommendation of the Head of the Department.

After results are declared, Grade cards will be issued to the students. The Grade card will contain the list of courses registered during the year/semester, the grades scored and the grade point average (GPA) for the year/semester.

GPA is the sum of the products of the number of credits of a course with the grade point scored in that course, taken over all the courses for the Year/Semester , divided by the sum of the number of credits for all courses taken in that year/semester. CGPA is similarly calculated considering all the courses taken from the time of admission.

After successful completion of the program, the Degree will be awarded with the following classification based on CGPA:

For First Class with Distinction, the student must earn a minimum of 167 credits within four years from the time of admission, pass all the courses in the first attempt and obtain a CGPA of 8.25 or above.

For First Class, the student must earn a minimum of 167 credits within five years from the time of admission and obtain a CGPA of 6.5 or above.

For Second Class, the student must earn a minimum of 167 credits within seven years from the time of admission.

ELECTIVES

Apart from the various Core courses offered in the curriculum of the branch of specialization, a student can choose electives from a list of electives offered by the Department and from other Departments with the approval of the Head of the Department and the Head of the Department offering the course.

EXAMINATION PATTERN FOR SANSKRIT & INDIAN CULTURE PAPER

There will not be any External examination for Sanskrit and Indian Culture paper. Performance of students will be assessed through tests and assignments conducted by the same Department. The internal assessment pattern is as follows.

First test	: 30 Marks
Second test	: 30 Marks
Assignment (G.D + Seminar + Attendance + Class test)	: 40 Marks
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Total	: 100 Marks
Total Marks	: 100 Marks
Passing Minimum marks	: 50%

In the last semester (B.E. - VI) marks are allotted for test (50) and project work (50). A Candidate shall be declared to have passed the examination, if he/she has secured a minimum mark of 50%.

EXAMINATION PATTERN FOR INDUSTRIAL AND TRAINING PRACTICE

There will be external examination for Industrial and Training Practice. Performance of students will be assessed through offline and online internship in various companies along with presentation.

The internal and external assessment pattern is as follows.

Internal Presentation and Certificates	: 40 Marks
External Presentation	: 60 Marks
Total Marks	: 100Marks
Passing Minimum marks	: 50%

In the last semester (B.E. - VII) marks are allotted for continuous reviews and presentation (40) and external presentation (60). A Candidate shall be declared to have passed the examination, if he/she has secured a minimum mark of 50%.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

I. Provide engineering insight to problem solving to succeed in Technical Profession through precise education and to prepare students to excel in postgraduate programs.

II. To provide students with fundamental knowledge and ability to expertise in Computer Science and Engineering.

III. III. Prepare students with good scientific and engineering breadth so as to analyze, design and create products, solutions to problems in the area of Computer Science and Engineering.

IV. IV. To inculcate in students professional, effective communication skills, team work, multidisciplinary approach and an ability to relate engineering issues to broader social context.

V. Prepare students to be aware of excellence, leadership, written ethical codes and guidelines and lifelong learning needed for successful professional career by providing them with an excellent academic environment.

PROGRAM OUTCOME(S) (POs) for B.E (CSE)

a) **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

b) **Problem Analysis:** Identify, formulate, review research literature, and analyzes complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

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

d) **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

e) **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

f) **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

g) **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

h) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

i) **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

k) **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

l) **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (Pso) for B.E.(CSE)

- To apply fundamental knowledge of computing and techniques to develop more efficient and effective in software, hardware mechanisms.
- To analyze, design, implement, and evaluate a computational system to meet desired needs within dynamic realistic constraints.
- To apply innovative ideas into reality, enhancing research capability, ethical and entrepreneurial practice.

DEFINITION OF CREDIT

Sl.No	No of hours per week	No of credits
1.	1 Hr. Lecture (L) per week	1
2.	1 Hr. Tutorial (T) per week	1
3.	1 Hr. Practical (P) per week	0.5

CREDIT DISTRIBUTION

Sl.No	Category	Credit
1.	Humanities and Social Science Including Management Courses (HSMC)	03
2.	Basic Science Courses(BSC)	25
3.	Engineering Science Courses(ESC)	25
4.	Professional Core Courses(PCC)	69
5.	Professional Elective Course(PEC)	18
6.	Open Elective Courses(OEC)	09
7.	Mandatory Courses(MC)	04
8.	Industrial Training & Practice(INT.)	02
9.	Project Work(PROJ)	16
Total Credits		**171**

COURSE CODE AND DEFINITION

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
S	Strong
M	Medium
L	Low
IA	Internal Assessment
EA	External Assessment
TM	Total Marks
HSMC	Humanities and Social Science Including Management Courses
BSC	Basic Science Courses
ESC	Engineering Science Courses
PCC	Professional Core Courses
PEC	Professional Elective Course
OEC	Open Elective Courses
MC	Mandatory Courses
INTE.	Industrial Training & Practice
PROJ.	Project Work

SUMMARY OF CREDITS

Category/ Semester	HSMC	BSC	ESC	PCC	PEC	OEC	MC	Inte.	Proj.	Total
I	-	09	08	-	-	-	-	-	-	17
II	03	09	07	-	-	-	02	-	-	21
III	-	04	05	15	-	-	-	-	-	24
IV	-	-	05	19	-	-	02	-	-	26
V	-	-	-	19	03	-	-	-	-	22
VI	-	-	-	16	06	-	-	-	03	25
VII	-	03	-	-	06	03	-	02	03	17
VIII	-	-	-	-	03	06	-	-	10	19
Total	03	25	25	69	18	09	04	02	16	171

CURRICULUM OF B.E.(CSE)

SEMESTER – I									
Sl. No	Course Code	Course Title	Hours per Week			C	IA	EA	TM
			L	T	P				
1		Mathematics – I (Calculus &Linear Algebra)	3	2	0	4	40	60	100
2		Engineering Chemistry	3	1	0	3	40	60	100
3		Basic Electrical Engineering	3	1	0	3	40	60	100
4		Engineering Graphics and Design	1	0	4	3	40	60	100
5		Chemistry Lab	0	0	3	2	40	60	100
6		Basic Electrical Engineering Lab	0	0	2	2	40	60	100
Total						**17**			

SEMESTER – II									
Sl. No	Course Code	Course Title	Hours per Week			C	IA	EA	TM
			L	T	P				
1		English	2	0	2	3	40	60	100
2		Mathematics-II (Probability and Statistics)	3	2	0	4	40	60	100
3		Engineering Physics (Semi-Conductors & Physics)	3	1	0	3	40	60	100
4		Programming for Problem Solving	3	1	0	3	40	60	100
5		Environmental Science	0	0	0	*2	40	60	100
6		Physics Lab	0	0	3	2	40	60	100
7		Programming for Problem Solving Lab	0	0	4	2	40	60	100
8		Workshop/Manufacture Practices	1	0	4	2	40	60	100
Total						**19**			

Sl. No	Course Code	Course Title	Hours per Week L	T	P	C	IA	EA	TM
SEMESTER – III									
1		Mathematics- III (Differential Calculus)	4	1	0	4	40	60	100
2		Digital Electronics	3	0	0	3	40	60	100
3		Data Structures and Algorithms	3	0	0	3	40	60	100
4		Object Oriented Programming using C++	3	0	0	3	40	60	100
5		Python Programming	3	0	0	3	40	60	100
6		Soft Skill – I	-	-	-	*1	-	100	100
7		Digital Electronics Lab	0	0	3	2	40	60	100
8		Data Structures and Algorithms Lab	0	0	3	2	40	60	100
9		Object Oriented Programming using C++ Lab	0	0	3	2	40	60	100
10		Python Programming Lab	0	0	3	2	40	60	100
Total						**24**			

Sl. No	Course Code	Course Title	Hours per Week L	T	P	C	IA	EA	TM
SEMESTER – IV									
1		Discrete Mathematics	4	1	0	4	40	60	100
2		Computer System Architecture	3	0	0	3	40	60	100
3		Microprocessor and Microcontroller	3	0	0	3	40	60	100
4		Design and Analysis of Algorithms	3	0	0	3	40	60	100
5		Operating Systems	3	0	0	3	40	60	100
6		Sanskrit and Indian Culture	2	0	0	*2	-	100	100
7		Soft Skills- II	-	-	-	*1	-	100	100
8		Computer Architecture Lab	0	0	3	2	40	60	100
9		Microprocessor and Microcontroller Lab	0	0	3	2	40	60	100
10		Design and Analysis of Algorithms Lab	0	0	3	2	40	60	100
11		Operating Systems Lab	0	0	3	2	40	60	100
Total						**24**			

SEMESTER – V									
Sl. No	Course Code	Course Title	Hours per Week			C	IA	EA	TM
			L	T	P				
1		Automata Theory	4	1	0	4	40	60	100
2		Computer Networks	3	0	0	3	40	60	100
3		Programming in Java	3	0	0	3	40	60	100
4		Database Management System	3	0	0	3	40	60	100
5		Professional Elective-I	3	0	0	3	40	60	100
6		Soft Skills- III	-	-	-	*1	-	100	100
7		Computer Networks Lab	0	0	3	2	40	60	100
8		Java Programming Lab	0	0	3	2	40	60	100
9		Database Management System Lab	0	0	3	2	40	60	100
Total						22			

SEMESTER – VI									
Sl. No	Course Code	Course Title	Hours per Week			C	IA	EA	TM
			L	T	P				
1		Compiler Design	3	0	0	3	40	60	100
2		Software Engineering	3	0	0	3	40	60	100
3		Cyber Security	3	0	0	3	40	60	100
4		Professional Elective-II	3	0	0	3	40	60	100
5		Professional Elective –III	3	0	0	3	40	60	100
6		Soft Skills- IV	-	-	-	*1	-	100	100
7		Compiler Design Lab	0	0	3	2	40	60	100
8		Web Development Lab	1	0	2	3	40	60	100
9		Computer vision Lab	0	0	3	2	40	60	100
10		Creative and Innovative Project	0	0	0	3	40	60	100
Total						25			

SEMESTER – VII									
Sl. No	Course Code	Course Title	Hours per Week			C	IA	EA	TM
			L	T	P				
1		Professional Elective-IV	3	0	0	3	40	60	100
2		Professional Elective-V	3	0	0	3	40	60	100
3		Open Elective – I	3	0	0	3	40	60	100
4		Computational Biology	2	1	-	3	40	60	100
5		Project work – Phase-I	-	-	-	3	40	60	100
6		Industrial Training & Practice	-	-	-	2	40	60	100
Total						17			

SEMESTER – VIII									
Sl. No	Course Code	Course Title	Hours per Week			C	IA	EA	TM
			L	T	P				
1		Professional Elective-VI	3	0	0	3	40	60	100
2		Open Elective –II	3	0	0	3	40	60	100
3		Open Elective –III	3	0	0	3	40	60	100
4		Project work – Phase-II	-	-	-	10	40	60	100
Total						19			

HUMANITIES AND SOCIAL SCIENCE INCLUDING MANAGEMENT COURSES (HSMC)						
Sl.No	Category	Course Title	L	T	P	C
1.	HSMC	English	2	0	1	3
Total						3

BASIC SCIENCE COURSES(BSC)						
Sl.No	Category	Course Title	L	T	P	C
1	BSC	Mathematics – I (Calculus and Linear Algebra)	3	1	0	4
2.	BSC	Engineering Chemistry	3	0	0	3
3.	BSC	Chemistry Lab	0	0	3	2
4.	BSC	Mathematics-II (Probability and Statistics)	3	1	0	4
5.	BSC	Engineering Physics (Semi-Conductor and Physics)	3	0	0	3
6.	BSC	Physics Lab	0	0	3	2
7.	BSC	Mathematics- III (Differential Calculus)	4	1	0	4
8.	BSC	Computational Biology	2	1	0	3
Total						25

Engineering Science Courses(ESC)						
Sl. No	Category	Course Title	L	T	P	C
1	ESC	Basic Electrical Engineering	3	0	0	3
2.	ESC	Engineering Graphics and Design	1	0	4	3
3.	ESC	Basic Electrical Engineering Lab	0	0	3	2
4.	ESC	Workshop/Manufacturing Practices	1	0	4	2
5.	ESC	Digital Electronics	3	1	0	3
6.	ESC	Digital Electronics Lab	0	0	3	2
7.	ESC	Microprocessor and Microcontroller	3	0	0	3
8.	ESC	Microprocessor and Microcontroller Lab	0	0	3	2

9.	ESC	Programming for Problem Solving	3	0	0	3
10.	ESC	Programming for Problem Solving Lab	0	0	4	2
Total						**25**

PROFESSIONAL CORE COURSES(PCC)						
Sl.No	**Category**	**Course Title**	**L**	**T**	**P**	**C**
1.	PCC	Data Structures and Algorithms	3	0	0	3
2.	PCC	Data Structures and Algorithms Lab	0	0	4	2
3.	PCC	Object Oriented Programming using C++	3	0	0	3
4.	PCC	Object Oriented Programming using C++ Lab	0	0	4	2
5.	PCC	Python Programming	3	0	0	3
6.	PCC	Python Programming Lab	0	0	3	2
7.	PCC	Discrete Mathematics	4	1	0	4
8.	PCC	Computer System Architecture	3	0	0	3
9.	PCC	Computer Architecture Lab	0	0	4	2
10.	PCC	Design and Analysis of Algorithms	3	0	0	3
11.	PCC	Design and Analysis of Algorithms Lab	0	0	4	2
12.	PCC	Operating Systems	3	0	0	3
13.	PCC	Operating Systems Lab	0	0	4	2
14.	PCC	Automata Theory	4	1	0	4
15.	PCC	Software Engineering	3	0	0	3
16.	PCC	Cyber Security	3	0	0	3
17.	PCC	Programming in Java	3	0	0	3
18.	PCC	Java Programming Lab	0	0	4	2
19.	PCC	Database Management System	3	0	0	3
20.	PCC	Database Management System Lab	0	0	4	2
21.	PCC	Compiler Design	3	0	0	3

22.	PCC	Compiler Design Lab	0	0	4	2
23.	PCC	Computer Networks	3	0	0	3
24.	PCC	Computer Networks Lab	0	0	4	2
25.	PCC	Computer vision Lab	0	0	4	2
26	PCC	Web Development Lab	1	0	3	3
Total						**69**

PROFESSIONAL ELECTIVE COURSE(PEC)						
Sl.No	**Category**	**Course Title**	**L**	**T**	**P**	**C**
1.	PEC	Professional Elective-I	3	0	0	3
2.	PEC	Professional Elective-II	3	0	0	3
3.	PEC	Professional Elective –III	3	0	0	3
4.	PEC	Professional Elective-IV	3	0	0	3
5.	PEC	Professional Elective-V	3	0	0	3
6.	PEC	Professional Elective-VI	3	0	0	3
Total						**18**

OPEN ELECTIVE COURSES(OEC)						
Sl.No	**Category**	**Course Title**	**L**	**T**	**P**	**C**
1.	OEC	Open Elective – I	3	0	0	3
2.	OEC	Open Elective –II	3	0	0	3
3.	OEC	Open Elective –III	3	0	0	3
Total						**9**

MANDATORY COURSES(MC)						
Sl. No	**Category**	**Course Title**	**L**	**T**	**P**	**C**
1.	MC	Sanskrit and Indian Culture –I	2	0	0	2
2.	MC	Environmental Science	2	0	0	2
Total						**4**

Sl. No	Category	Course Title	L	T	P	C
1.		Soft Skill – I	0	0	0	1
2.		Soft Skills- II	0	0	0	1
3.		Soft Skills- III	0	0	1	1
4.		Soft Skills- IV	0	0	0	1
Total						**4**

PROFESSIONAL ELECTIVES	
SEMESTER–V	
Subject Code	**Subject Name**
Elective - I	
	Internet Of Things
	Object Oriented Analysis and Design
SEMESTER–VI	
Elective–II	
	Artificial Intelligence & Machine Learning
	Dataware Housing and Mining
	E- Commerce
Elective–III	
	Block Chain Technology
	Cloud Computing
	Digital Image Processing
SEMESTER– VII	
Elective–IV	
	Business Intelligence
	Cryptography and Network Security
	Mobile Computing
Elective-V	
	Data Analytics
	Information Retrieval Techniques
	Soft Computing

SEMESTER–VIII
Elective-VI
Software Quality Assurance
Natural Language Processing
Data science for Engineers
Professional Ethics & Cyber Law

OPEN ELECTIVES	
SEMESTER– VII	
Subject Code	**Subject Name**
Open Elective – I	
	PLC And DCS
	Disaster Management
	Digital Marketing
SEMESTER– VIII	
Open Elective – II	
	Economic Policies In India
	Knowledge Management
	Business Analytics
Open Elective – III	
	Entrepreneurship
	Organizational Behavior
	Human Resource Development

I – SEMESTER

Course Title		MATHEMATICS – I (Calculus and Linear Algebra)	L	T	P	C
Course Code			3	2	0	4

OBJECTIVES

- To familiarize the prospective engineers with techniques in calculus, multi-variable calculus and sequence and series.
- To equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics.

POs and COs MAPPING TABLES

	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO01	✓	✓	✓	✓	✓							
CO02	✓	✓		✓	✓							
CO03	✓	✓	✓	✓	✓							
CO04	✓	✓	✓	✓	✓							
CO05	✓	✓	✓	✓	✓							

UNIT – I   CALCULUS

Evaluation of definite and improper integrals- Beta and Gamma functions and their properties - Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT – II   NUMERICAL METHODS

Solution of polynomial and transcendental equations–Bisection method-Newton-Raphson method-Regula-Falsi Method. Interpolation- Newton's forward and backward difference formulae- Interpolation with unequal intervals-Newton's divided difference and Lagrange's formulae-Numerical Differentiation.

UNIT – III   SEQUENCES AND SERIES

Convergence of sequence and series-tests for convergence- Comparison test- D'Alembert's ratio test-Raabe's test-Logarithmic test- Cauchy's root test- Fourier series: Half range sine and cosine series-Parseval's theorem.

UNIT – IV   MULTIVARIABLE CALCULUS (DIFFERENTIATION)

Limit-Continuity - Partial derivatives, total derivatives- Directional Derivatives-Tangent plane and normal line-Maxima, minima and saddle points-Method of Lagrange multipliers – Gradient Curl-Divergence.

UNIT – V   MATRICES

Matrices: Rank of a matrix-rank-nullity theorem-System of linear equations- Symmetric matrices-Skew symmetric matrices- Orthogonal matrices; Eigen values and Eigenvectors-Cayley-Hamilton theorem-Diagonalization of matrices.

TEXT BOOK

B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 2000.

REFERENCES

1.	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson, 2002.
2.	T. Veerarajan, Engineering Mathematics, McGraw-Hill, New Delhi, 2008.

3.	B. V. Ramana, Higher Engineering Mathematics, McGraw Hill, New Delhi, 2010.
4.	N.P. Bali and M. Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2010.
5.	E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2006.
PREPARED BY	
Dept. of Mathematics	

Course Title	ENGINEERING CHEMISTRY	L	T	P	C
Course Code		3	1	0	3

OBJECTIVES

- To learn the basics of atomic structure, bonding, analytical methods and various types of reactions in organic chemistry

OUTCOMES

After the course the students will be able to

Sl.No	Course Outcome	Bloom's Level
1.	Realize the importance of knowledge in atomic structure and wave mechanics in studying the properties of elements	K1,K2,K3,K4, K5
2.	Analyze and deduce the properties molecules on the basis of different bonding modes	K1,K2,K3,K4
3.	Rationalize bulk properties and processes using thermodynamic considerations	K1,K2,K3,K4, K5
4.	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques	K1,K2,K3,K4
5.	Understand the major types of chemical reactions and effect of three dimensional structures on the product of reactions	K1,K2,K3

POs and COs MAPPING TABLES

	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO01	✓	✓										
CO02	✓	✓										
CO03	✓	✓										
CO04	✓	✓		✓	✓	✓	✓					
CO05	✓	✓										

UNIT – I   ATOMIC STRUCTURE

Comparison between Rutherford's model of atom and Bohr's model - Bohr-Sommerfeld model (Concepts only)-its limitations - de Broglie theory-Heisenberg's uncertainty principle - Schrodinger's wave equation (derivation not needed)-significance of Ψ and $\Psi2$ – shapes of different orbital's –Aufbau principle-Pauli Exclusion Principle- Hund's rule. Electronic configuration of atoms- Mosley's law – Modern periodic table - periodic properties: atomic size- ionization energies- electron affinity- electro negativity.

UNIT – II   CHEMICAL BONDING

Types of bonds – ionic - covalent – coordinate bond - Molecular Orbital Theory –types of molecular orbitals- energy level diagrams- e-ns filling in MO – bond order – MO diagrams of H2, He2, N2, O2, CO and HF molecules- Metallic bond – band theory of solids (primitive treatment only) and the role of doping on band structures - Hybridization – definition - geometry of the molecules- CH4, C2H4, C2H2 - Molecular forces-Ionic, dipolar, van der waals interactions.

UNIT – III   THERMAL AND ELECTROCHEMICAL EQUILIBRA

Thermodynamic functions: State functions, Path functions, Internal energy, enthalpy,

entropy and free energy-Gibbs Helmholtz equation and its applications. Feasibility of reaction - Ellingham diagrams.

Types of electrodes- Standard electrodes-Standard hydrogen electrode, standard calomel electrode, Single electrode potential, electrochemical series - galvanic cell - emf
- Nernst equation and its applications - Glass electrode, Potentiometric acid base titrations and Solubility equilibria-Corrosion-types- Chemical corrosion-electrochemical corrosion-factors influencing and control measures.

UNIT – IV   SPECTROSCOPIC TECHNIQUES AND APPLICATIONS
Electromagnetic radiations – wavelength – frequency – energy of a radiation – electromagnetic spectrum – changes brought about by the radiations - components of a spectrometer – rotational spectra of diatomic molecules – rigid and non-rigid rotor models (energy expressions only) - selection rule– schematic instrumentation – types of vibrations in molecules (CO_2, H_2O) – vibrational spectra(primitive treatment) – selection rule-instrumentation and applications – electronic transitions – electronic spectra - Beer-Lambert's law- instrumentation and applications – NMR – principle – chemical shift - instrumentation – NMR spectra of CH_4 – CH_3OH – xylene isomers – MRI (Introduction only)

UNIT – V   STEREOCHEMISTRY & ORGANIC REACTIONS
Stereochemistry - Representation of 3D structures - Fisher projection, Newman and Sawhorse projection formulae – Ethane, 3-bromo-2-butanol Conformation of Ethane, Butane & Ethylene glycol, , Symmetry and Chirality - Stereo isomers, Enantiomers, Diastereomers. Configuration - R-S system. Optical activity - Lactic acid, Tartaric acid- Geometrical isomerism – cis-trans & E-Z notations.

Organic Reactions – Substitution - SN1 & SN2 (simple examples, mechanism not expected) – electrophilic substitutions – Friedel Crafts alkylations - Additions – 1,2- addition – types-addition of HX - Elimination – E1 & E2 (Examples only, mechanism not expected) - Oxidations – cis-hydroxylation with OsO_4, Reductions – Clemmensen & wolff-Kishner reductions, Cyclization – Diels Alder, Ring-Opening – Nylon-6 from caprolactum.

Synthesis of most commonly used drugs – Aspirin, Paracetamol.

TEXT BOOKS	
1.	Textbook of Inorganic Chemistry, P.L.Soni, Sultan Chand & Sons, Delhi, 2013. (For units I and II)
2.	Principles of Physical Chemistry, B.R. Puri, L.R. Sharma and Madan S. Pathania, Shoban Lal Nagin Chand & Co., Jalandhar, 2000. (For units III and IV)
3.	Advanced Organic Chemistry, B. S. Bahl and Arun Bahl, S.Chand, Delhi, 2012. (For unit-V).

REFERENCES	
1.	Engineering Chemistry, P.C. Jain and Monika Jain, Dhanpat Rai Publishing Co Pvt. Ltd., New Delhi, 2008.
2.	Applied Chemistry, K. Sivakumar, Anuradha Publications, Chennai, 2009.
3.	Textbook of Engineering Chemistry, S.S.Dara & S.S. Umare, S.Chand, Delhi, 2004.
4.	Fundamentals of Molecular Spectroscopy, C.N.Banwell and Elaine.M.McCash, 4th Edition, McGraw Hill Education, 2017.
5.	Physical Chemistry, P. W. Atkins and Julio De Paula, 10th Edition, Oxford University Press,2014.

PREPARED BY
Dept. of Chemistry

Course Title		BASIC ELECTRICAL ENGINEERING	L	T	P	C
Course Code			3	1	0	3

OBJECTIVES

- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations.

COURSE OUTCOMES

- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations.

CO1	Explain the basic electrical quantities and laws.
CO2	Explain the construction, types and applications of electrical machines.
CO3	Study the working principles of power converters.
CO4	Show the tariff for a given load and energy consumption.
CO5	Introduce the components of low voltage electrical installations and its applications.

POs and COs MAPPING TABLES

	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO01	S	S	L	L	M	M	M	-	S	M	-	S
CO02	S	S	M	M	M	S	M	L	S	M	L	M
CO03	S	S	M	M	S	M	M	-	M	M	-	M
CO04	S	S	S	S	S	M	M	M	M	M	L	M
CO05	S	S	M	S	M	M	L	L	S	M	L	M

UNIT – I   DC CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT – II   AC CIRCUITS

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

UNIT – III   ELECTRICAL MACHINES

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, Torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three- phase transformer connections.

UNIT – IV   POWER CONVERTERS

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

UNIT – V   ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS

1.	D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2.	D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

REFERENCES

1.	L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2.	E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3.	V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

PREPARED BY

Dept. of EEE

Course Title	ENGINEERING GRAPHICS AND DESIGN	L	T	P	C
Course Code		1	0	4	3

OBJECTIVES

- To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
- To expose them to existing national standards related to technical drawings.

OUTCOMES

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

- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings Exposure to engineering communication

TRADITIONAL ENGINEERING GRAPHICS

Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

COMPUTER GRAPHICS

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling; Introduction to Building Information Modelling (BIM).
(Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory)

UNIT - I   INTRODUCTION TO ENGINEERING DRAWING

covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

UNIT - II   ORTHOGRAPHIC PROJECTIONS

Covering, Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

UNIT - III   PROJECTIONS OF REGULAR SOLIDS

Covering, those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc

UNIT - IV   SECTIONS AND SECTIONAL VIEWS OF RIGHT ANGULAR SOLIDS

covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT – V	**ISOMETRIC PROJECTIONS**

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT - VI	

Overview of Computer Graphics-theory of CAD software-Drawing Area, Dialog boxes and windows- Different methods of zoom as used in CAD-Isometric Views of lines, Planes, Simple and compound Solids- Customisation & CAD Drawing-ISO and ANSI standards for coordinate dimensioning and tolerancing; dimensions to objects-various ways of drawing circles, Annotations, layering & other functions-Setting up and use of Layers, layers to create drawings-color coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling-Introduction to Building Information Modelling (BIM)

LIST OF EXPERIMENTS	
I.	Introduction to engineering design (CAD)
II.	Introduction to Auto cad
III.	Introduction to BIM
1.	Drafting and modeling with co-ordinate systems
2.	Creation of a simple machined component
3.	Creation of title block
4.	Creation of orthographic views of a cone, cylinder and hexagon
5.	Creation of sectional views of a cone, cylinder and hexagon
6.	Creation of orthographic views
7.	Creation of isometric view of a V-block.
8.	Conversion of 3D to 2D drawings
9.	Creation of 3D solid machine component
10.	Creation of 3D solid V block
11.	Building plan of a simple office
12.	Building plan of a simple home
13.	Creation of simple steel truss

TEXT BOOKS	
1.	Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House.
2.	Shah, M.B. & Rana B.C. (2010), Engineering Drawing and Computer Graphics, Pearson Education.
REFERENCES	
1.	Agrawal B. & Agrawal C. M. (2017), Engineering Graphics, TMH Publication.
2.	Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
3.	Auto Cad User Manual.

PREPARED BY
Dept. of Mech.

Course Title	CHEMISTRY LAB	L	T	P	C
Course Code		0	0	3	2

	OBJECTIVES
•	To learn the basics and perform experiments involving volumetric analysis, colligative properties, simple synthesis and other instrumental techniques.

	OUTCOMES
	After the course the students will be able to
•	Estimate rate constants of reactions from concentration of reactants/products as a function of time.
•	Measure molecular/system properties such as, conductance of solutions, redox potentials, and chloride content of water.
•	Analyze a salt sample.
•	Know the determination of physical properties such as adsorption and viscosity.
•	Acquire the practical skills for the separation of compounds through the chromatographic techniques.

	ANY TEN EXPERIMENTS OF THE FOLLOWING
1.	Determination of surface tension and viscosity of a liquid or a solution
2.	Thin layer chromatography / Paper chromatography for separation of a mixture.
3.	Ion exchange column for removal of hardness of water
4.	Determination of chloride content of water by volumetry.
5.	Determination of M.wt of a non-volatile solute by Rast's method.
6.	Determination of the rate constant of the reaction between $K_2S_2O_8$ and KI – Clock reaction method.
7.	Conductometry -Verification of Debye-Huckel-Onsager equation for a strong electrolyte.
8.	Potentiometry - Determination of formal redox potential of Fe^{3+}/Fe^{2+} couple
9.	Synthesis of Nylon 66 by interfacial polymerization method.
10.	Determination of Saponification/acid value of oil.
11.	Systematic qualitative analysis of a salt
12.	Lattice structures and packing of spheres
13.	Models of potential energy surfaces – computational experiment.
14.	Chemical oscillations- Potentiometric study of the oscillations of Belousov- Zhabotinsky reaction
15.	Determination of the partition coefficient of I_2 between water and CCl_4
16.	Verification of Freundlich isotherm for adsorption of acetic acid / oxalic acid by charcoal.
17.	Determination of isoelectric point of Gelatin sols by using capillary viscosmeter.

	TEXT BOOKS
1.	Advanced Practical Physical Chemistry, J.B.Yadhav, Krishna Prakasan Media, 2016.

2.	Experiments in Applied Chemistry, Sunita Rattan, S.K. Kataria& Sons, 2012
PREPARED BY	
Dept. of Chemistry	

Course Title	BASIC ELECTRICAL ENGINEERING LAB			L	T	P	C
Course Code				0	0	2	2

OBJECTIVES

- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters. To introduce the components of low voltage electrical installations.

COURSE OUTCOMES

- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters. To introduce the components of low voltage electrical installations.

After the successful completion of the course students will be able to

CO1	Obtain load characteristics of Single Phase Induction Motor, Three Phase Induction Motor, Single Phase Transformer and Three Phase Alternator
CO2	Obtain Speed Control of DC Motor, Three Phase Induction Motor (Pole Changing Method)
CO3	To demonstrate the working of Multi meter, CRO and LCR Meter and Measurement of Voltage, Current and Power.
CO4	To Verify experimentally Kirchhoff's Law and The venin's Theorem
CO5	Obtain the B•H Curve of a Magnetic Material
CO6	Analysis of RLC circuit
CO7	Analysis of Converter circuit

POs and COs MAPPING TABLES

	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO01	S	M	M	M	M	M	-	-	S	M	-	L
CO02	S	S	M	M	S	M	L	-	S	S	-	M
CO03	S	S	M	M	S	M	L	-	S	M	L	M
CO04	S	S	S	S	M	M	L	L	M	M	-	S
CO05	M	M	M	S	M	M	L	-	M	M	-	M
CO06	S	S	M	M	M	M	-	-	M	M	-	M
CO07	S	S	M	M	M	M	-	-	M	M	-	M

LIST OF EXPERIMENTS

1.	Study of Electric Motors (AC & DC Motors).
2.	Load Test on Single Phase Induction Motor.
3.	Load Test on Three Phase Induction Motor.
4.	Load Test on Single Phase Transformer.
5.	Load Test on Three Phase Alternator.
6.	Speed Control of DC Motor.

7.	Speed Control of Three Phase Induction Motor (Pole Changing Method).
8.	Study of Multi meter, CRO and LCR Meter.
9.	Measurement of Voltage, Current and Power.
10.	Verification of Kirchoff's Law.
11.	Verification of Thevenin's Theorem.
12.	B·H Curve of a Magnetic Material.
13.	Rectifier Circuit Analysis (AC – DC).
14.	Inverter Circuit Analysis (DC – AC).
15.	Chopper Circuit Analysis (DC – DC).
16.	Series and Parallel RLC Circuit Analysis.
TEXT BOOKS	
1.	D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
REFERENCES	
1.	L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
ONLINE RESOURCES	
1.	www.nptl.co.in
2.	www.electrical4u.com
PREPARED BY	
Dept. of EEE	

II - SEMESTER

Course Title	ENGLISH	L	T	P	C
Course Code		2	0	2	3

UNIT – I   VOCABULARY BUILDING

1.1   The concept of Word Formation
1.2   Root words from foreign languages and their use in English
1.3   Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
1.4   Synonyms, antonyms, and standard abbreviations.

UNIT – II   BASIC WRITING SKILLS

2.1   Sentence Structures
2.2   Use of phrases and clauses in sentences
2.3   Importance of proper punctuation
2.4   Creating coherence
2.5   Organizing principles of paragraphs in documents
2.6   Techniques for writing precisely

UNIT – III   IDENTIFYING COMMON ERRORS IN WRITING

3.1   Subject-verb agreement
3.2   Noun-pronoun agreement
3.3   Misplaced modifiers
3.4   Articles
3.5   Prepositions
3.6   Redundancies
3.7   Clichés

UNIT – IV   NATURE AND STYLE OF SENSIBLE WRITING

4.1   Describing
4.2   Defining
4.3   Classifying
4.4   Providing examples or evidence
4.5   Writing introduction and conclusion

UNIT – V   WRITING PRACTICES

5.1   Comprehension
5.2   Précis Writing
5.3   Essay Writing

PRACTICE: ORAL COMMUNICATION

(This unit involves interactive practice sessions in Language Lab)
•   Listening Comprehension
•   Pronunciation, Intonation, Stress and Rhythm
•   Common Everyday Situations: Conversations and Dialogues
•   Communication at Workplace
•   Interviews
•   Formal Presentations

REFERENCES

1.	Practical English Usage. Michael Swan. OUP. 1995.
2.	Remedial English Grammar. F.T. Wood. Macmillan.2007

3.	On Writing Well. William Zinsser. Harper Resource Book. 2001
4.	Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5.	Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6.	Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.
PREPARED BY	
Dept. of English	

Course Title	MATHEMATICS – II (Probability And Statistics)	L	T	P	C
Course Code		3	2	0	4

COURSE OUTCOMES

- The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

UNIT – I   BASIC PROBABILITY

Probability spaces, conditional probability, Independent random variables, sums of independent random variables, Bayes' Theorem, Discrete and Continuous one dimensional random variables - Expectations, Moments, Variance of a sum, Moment generating function, Tchebyshev's Inequality.

UNIT – II   PROBABILITY DISTRIBUTIONS

Discrete Distributions – Binomial, Poisson and Negative Binomial distributions, Continuous Distributions - Normal, Exponential and Gamma distributions.

UNIT – III   BASIC STATISTICS

Measures of Central tendency: Averages, mean, median, mode, Measures of dispersion – Range, Mean deviation, Quartile deviation and Standard deviation, Moments, skewness and Kurtosis, Correlation and regression – Rank correlation.

UNIT – IV   APPLIED STATISTICS

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

UNIT – V   SMALL SAMPLES

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

REFERENCES

1.	T. Veerarajan, Probability, Statistics and Random Processes, Third edition, Tata McGraw Hill, New Delhi, 2010.
2.	S.P. Gupta, Statistical Methods, 31st edition, Sultan chand and sons, New Delhi, 2002.
3.	Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
4.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
5.	S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
6.	W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed.,Wiley, 1968.
7.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

PREPARED BY

Dept. of Mathematics

Course Title		ENGINEERING PHYSICS (Semi-Conductors & Physics)	L	T	P	C
Course Code			3	1	0	3

PRE-REQUISITES

Basic knowledge of Physics theory in higher secondary level.

OBJECTIVES

The student will acquire knowledge on:

- Theory of Interference- Newton's rings, Michelson Interferometer, Fresnel and Fraunh offer diffraction, Diffraction due to "n" slits – Plane Transmission grating.
- Energy distribution in black body-Planck's law, De Broglie matter waves – dual nature and expression, Schrodinger Time Independent and Dependent, wave equation, Expression for particle in 1-D box and applications.
- Laser-Principles and Properties, Einstein's theory, Types of lasers – Nd:YAG and CO_2 laser Applications of lasers – IR Thermography, Optical fibers- Types of optical fibers, Acceptance angle and numerical aperture, Fiber losses, Applications in engineering and medicine.
- PN Junction diode and Zener diode - V-I characteristics, BJT, SCR, FET, D-MOSFET, E-MOSFET Characteristics, Characteristics of CMOS, Logic Gates and Universal Building Blocks.
- Fundamentals of dielectric materials, Internal field and Clausius-Mossotti relation, Superconductors – properties and types - BCS theory, Nanomaterials – Synthesis, Ball milling and PVD method. Principle and properties of SMA and Biomaterials.

COURSE OUTCOMES

CO1	To develop an understanding of the principles of optics.
CO2	Experience the diverse applications of the wave equation. Learn the mathematical tools needed to solve quantum mechanics problems.
CO3	To provide adequate knowledge on laser fundamentals types and applications and to expose the basics of signal propagation through fiber optics
CO4	Understand the principles and concepts of semiconductor Physics. Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.
CO5	Acquire basic knowledge on various newly developed smart materials

POs and COs MAPPING TABLES

	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO01	x	-	-	x	-	-	-	x	-	-	-	-
CO02	x	-	-	x	-	-	-	x	-	-	-	-
CO03	X	-	-	x	-	-	-	x	-	-	-	-
CO04	X	-	-	x	-	-	-	x	-	-	-	-
CO05	X	-	-	x	-	-	-	x	-	-	-	-

UNIT - I   WAVE OPTICS

Huygens' principle, superposition of waves –Theory of interference of light -Young's double slit experiment. Thin films- Newton's rings, Michelson interferometer-Anti reflection coating.

Fresnel and Fraunhofer diffraction– diffraction due to 'n' slits- plane transmission grating. Rayleigh criterion for limit of resolution - resolving power of grating	
UNIT - II QUANTUM PHYSICS	
Black body radiation-Planck's law – Energy distribution function, Wave – particle duality-de Broglie matter waves – Concept of wave function and its physical significance – Heisenberg's Uncertainity Principle – Schrodinger's wave equation – Time independent and Time dependent equations – Particle in a one dimensional rigid box – tunneling (Qualitative) – Scanning tunneling microscope.	
UNIT - III PHOTONICS	
Einstein's theory of matter radiation interaction and A and B coefficients; Properties of laser-spontaneous and stimulated emission, amplification of light by population inversion, different types of lasers: solid-state laser(Neodymium), gas lasers (CO2), applications –IR Thermography. Optical fibre- principle [TIR]-types-material, mode, refractive index-Fibre loss- Expression for acceptance angle and numerical aperture. Application-Communication.	
UNIT – IV SEMICONDUCTOR DEVICES AND APPLICATIONS	
Introduction to P-N junction Diode and V-I characteristics, Zener diode and its characteristics, Introduction to BJT, its input-output and transfer characteristics, SCR characteristics, FET, MOSFET and CMOS characteristics. Basic logic gates - NAND, NOR as Universal building block.	
UNIT V – NEW ENGINEERING MATERIALS	
Dielectric materials: Definition – Dielectric Breakdown – Dielectric loss – Internal field – Claussius Mossotti relation. Superconducting materials: Introduction – Properties-Meissner effect – Type I & Type II superconductors – BCS theory-Applications. Nano materials: Introduction – Synthesis of nano materials – Top down and Bottom up approach- Ball milling- PVD method- Applications. Smart materials: Shape memory alloys-Biomaterials (properties and applications)	
TEXT BOOKS	
1.	Optics by Subramaniam N &BrijLal, S Chand & Co. Pvt. Ltd., New Delhi, [unit 1]
2.	Modern Physics by R Murugeshan, Kiruthiga, Sivaprasath S Chand [all units]
3.	Quantum Mechanics by Sathyaprakash, PragatiPrakashan, Meerut. [unit 2]
4.	Applied Engineering Physics – Rajendran & Marikani (Tata McGraw Hill) [unit 3,5] 2009
5.	Engineering Physics I & II – G.Senthilkumar, VRB publications [unit 2,3] 2012
6.	Applied Physics for Engineers – K.Venkatramanan, R.Raja, M.Sundarrajan (Scitech) [3,5] 2014
7.	Principles of Electronics by V.K.Mehta, (S.Chand) [unit 5]
8.	Principles of Electronics by V.K.Mehta, (S.Chand) [unit 5]
REFERENCE BOOKS	
1.	Fundamentals of Optics by Jenkins A Francis and White E Harvey, McGRaw Hill Inc., New Delhi,
2.	Quantum Mechanics by V. Devanathan, Narosa, Chennai.

3.	Engineering Physics by M.N.Avadhanulu, S.Chand& Company Ltd.
4.	Concepts of Modern Physics by Arthur Beisser, McGraw Hill, 7th edition.
5.	Optics byR.Agarwal, S.Chand publishers.
6.	Basic Electronics by B.L.Theraja, S.Chand publishers.
7.	Fundamentals of Physics, 6th Edition, D. Halliday, R. Resnick and J. Walker, John Wiley and Sons, New York.
PREPARED BY	
Dept. of Physics	

Course Title	**PROGRAMMING FOR PROBLEM SOLVING**	L	T	P	C
Course Code		3	1	0	3

PRE-REQUISITES

Basic Knowledge of Computer Science

OBJECTIVES

•	The course is designed to provide complete knowledge of C
•	To Provide Students an exposure to gain the knowledge
•	To Ensure That Students begin To learn the concepts of basic programming
•	To design a creative solution for real world problems.
•	To develop awareness of learning the basic concepts and creating algorithms.

COURSE OUTCOMES

On the successful completion of the course students will be able to

CO1	Makes students gain a broad perspective about the uses of computers in the engineering industry.
CO2	Develops a basic understanding of computers, the concept of algorithm and algorithmic thinking.
CO3	Develops the ability to analyze a problem, develop an algorithm to solve it.
CO4	Develops the use of the C programming language to implement various algorithms, and develops the basic concepts and terminology of programming in general.
CO5	Introduces the features of data structures in this C Programming language

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S												M	L	
CO 02		M											M		L
CO 03					S								M	L	
CO 04				S								L	M		
CO 05	L				S						L		L		

UNIT– I	**COMPUTER BASICS**	**9**

Introduction to components of computer system - Generation of programming languages - Types of Computers - Organization of Computers - Types of memory , Number systems - Idea of Algorithm -Pseudo code - Flow Chart with examples.

UNIT-II	**DATA TYPE & CONTROL STRUCTURES**	**9**

Introduction to C - Character set, Constants, Variables, Data Types – Operators –Arithmetic expressions and precedence – Decision Making statement - Looping statements.

UNIT-III	**ARRAY, STORAGE CLASS, FUNCTIONS**	**9**

Arrays and its types - Basic searching–Linear and Binary, Basic sorting, Storage class, Functions–Parameter passing in functions - call by value - call by reference – Passing array to functions-Recursive function.	
UNIT-IV STRUCTURE, UNION, STRINGS AND POINTER 9	
Structure, array of structures, Union, array of union, String operations. Dynamic Memory Allocation, Introduction to Pointer, basic programs for Pointer arithmetic	
UNIT-V FILE HANDLING, ,PREPROCESSORAND COMMAND LINE **ARGUMENTS 9**	
Introduction to File –Reading File content to display in console, writing console content to file, read the content from file to the writing to another file, overwriting and appending file, random access file handing, Preprocessor directives, basics programs for Command line arguments.	
TOTAL LECTURE HOUR: 45hrs	
TEXT BOOKS	
1.	Byron Gottfried, Schaum's Outline of Programming with C,McGraw-Hill, Fourthedition,2018.
2.	Balagurusamy.E, "Programming in ANSIC", TataMcGrawHill, Eigthedition,2019.
3.	Fundamentals of Computing and Programming V.RameshBabu, R.Samyuktha, M.Muniratham by VRB Publishers 2012 edition.
REFERENCES	
1.	LetUs'C'-YashawantKanetkar,(Unit2to5),BPB publications,19thEdition,2022.
2.	Ashok N Kamthane,"ComputerProgramming",Pearsoneducation,2011.
WEB SOURCE REFERENCES	
1.	https://www.it.iitb.ac.in/lakshya/workshopContent.html?workshopid=FHf3Ht5njLvVww7Tz3f8xg
2.	https://nptel.ac.in/courses/106104074
PREPARED BY	
Mr.E.Sankar, & Dr.M.Thirunavukkarasu, Assistant Professors/CSE	

Course Title	ENVIRONMENTAL SCIENCEANDENGINEERING	L	T	P	C
Course Code		2	0	0	2

OBJECTIVES

- To familiarize the students with basic concepts of environment
- To understand their role and responsibility of an individual in the environmental conservation.

Sl.No	Course Outcome	Bloom's Level
1.	Understand the individual responsibility towards environment	K1,K2,K3, K4,K5
2.	Create Eco-centrism approach towards sustainable society	K1,K2,K3,K4
3.	Enable the learners to understand, think and evolve strategies for management and conservation of environment for sustaining life on earth.	K1,K2,K3, K4, K5
4.	Develop a new solution towards various Environmental problems	K1,K2,K3,K4
5.	Understand the current environmental trends of India and the world and about environmental legislation	K1,K2,K3,K4

POs and COs MAPPING TABLES

	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO01	✓	✓	✓									
CO02	✓		✓	✓								
CO03	✓	✓	✓									
CO04	✓	✓		✓		✓						
CO05	✓	✓						✓	✓			

UNIT – I   INTRODUCTION TO ENVIRONMENT AND ENVIRONMENTAL STUDIES

Introduction to environment – components –nature of environment - need of awareness – reasons for environmental problems – anthropocentric and eco centric views.
Environmental studies - multidisciplinary nature – scope and aim – sustainable development- principles – RRR concept-Indian environmental movements – environmental calendar.

UNIT – II   ECO SYSTEM AND BIO DIVERSITY

Ecosystem – structure – functions – simplified ecosystem models (food chain and food webs and their types, energy flow) - forest – grassland – pond –ecosystems – ecological succession - ecological pyramids – Bio-geochemical cycles of water – oxygen-carbon- phosphorous and sulphur.
Biodiversity – definition – types – species – genetic and ecosystem diversities- values of biodiversity – threats to biodiversity – conservation of biodiversity – endemism – biodiversity hotspots – Indian biodiversity– endemic species of India – IUCN lists -red- green and blue data books.

UNIT – III   NATURAL RESOURCES

Natural resources – definition – types – forest resources – uses –deforestation- reasons - effects –water resources – dams – effects of dams - food resources – modern agriculture– ill

effects -energy resources- types – hydel –nuclear – solar –wind and biomass energy - world scenario – Indian scenario.

Population and environment – reasons for over exploitation of resources – population – demography – population curves – population explosion – effects – consumerism – effects – urbanization – reasons and effects- role of an individual.

UNIT – IV   ENVIRONMENTAL POLLUTION

Pollution – definition – types – air pollution – causes and effects – effects of CO_2 – CO – NOx –SOx – particulates – control of air pollution – water pollution – causes – effects – remedies – soil pollution – solid waste management – e waste – ill effects of e-waste – proper recycling- Noise pollution – reasons – effects – control – nuclear pollution – cases – effects and control – thermal pollution causes – effects and remedies.

Legal provisions for protecting environment – article 48 A – 51 A (g) – Environment act 1986 – Air act 1981 – Water act 1974 – wild life protection act – Forest act 1980- problems in implementation–reasons.

UNIT – V   SOCIAL ISSUES AND ENVIRONMENTAL ETHICS

Present environmental scenario – greenhouse effect – climate change – The Kyoto Protocol – ozone layer depletion-The Montreal Protocol - acid rain – causes – effects - disparity among the nations – The Copenhagen UNFCCC summit – carbon currency- virtual water- genetically modified organisms, Disaster management.

Environmental ethics – introduction – people getting affected - resettlement and rehabilitation – issues involved –Sardhar Sarovar project – Tawa Matsya sang - Melting icebergs of Arctic

TEXT BOOK

1.	Anubha Kaushik and C.P. Kaushik, "Prospects of Environmental Science", New Age International publishers, 2013.

REFERENCES

1.	Environmental Studies, N. Nandini, N. Sunith a and Sucharita Tandon, Sapna Book House, 2007.
2.	Text book of Environmental Science, Ragavan Nambiar, Scitech Publications, 2009.
3.	Text book of Environmental Chemistry and Pollution Control, S.S.Dara, S.Chand and Co., 2002.
4.	Environmental Chemistry, Colin Baird, W.H.Freeman and company, New York,1999.
5.	Environmental Chemistry, Gary W. VanLoon and Stephen J.Duffy, Oxford University Press, 2000.
6.	New Trends in Green Chemistry, V.K. Ahluwalia and M. Kidwai, Anamaya Publishers, 2006.

PREPARED BY

Dept. of Chemistry

Course Title	**ENGINEERING PHYSICS LAB**	L	T	P	C
Course Code		0	0	3	2

OBJECTIVES

Engineering Physics laboratory course provides real time experience in handling equipment's and measurement techniques. Basic objective of the course is to learn the experimental procedure and execution expertise in engineering practices.

COURSE OUTCOMES

- Demonstrate the procedural preparation skill to conduct the experiment
- Ability to perform the experiment and tabulate the observations made.
- Skill to obtain an expected experimental out-comes by different techniques and impart practical knowledge in real time solution.
- Interpretation of experimental results and conclusions.
- Understand principle, concept, working and applications of new theory and articulation of the relevant theory.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	x	-	-	x	-	-	x	x	x	x					
CO 02	x	-	-	x	-	-	x	x	x	x					
CO 03	x	-	-	x	-	-	x	x	x	x					
CO 04	x	-	-	x	-	-	x	x	x	x					
CO 05	x	-	-	x	-	-	x	x	x	x					

EXPERIMENTS

1.	Determination of radius of curvature of convex lens by Newton's rings experiment.
2.	Determination of the wavelength of spectral lines using plane diffraction grating by minimum deviation method.
3.	Determination of numerical aperture and acceptance angle of an optical fiber.
4.	Determination of the number of lines in grating.
5.	Verification of truth tables of Basic Logic Gates.
6.	Verify NAND as Universal Building Block.
7.	Verify NOR as Universal Building Block.
8.	To study the V-I characteristics of Zener diode.

PREPARED BY

Dept. of Physics

Course Title	PROGRAMMING FOR PROBLEM SOLVING LAB	L	T	P	C
Course Code		0	0	4	2

PRE-REQUISITES

Basic Knowledge of Computer Science

OBJECTIVES

- The course aims to provide exposure to problem-solving through programming.
- To ensure that students begin to understand the fundamentals of Computer programming.
- To be able to effectively choose programming components to solve computing problems in real- world.
- To be able to formulate problems and implement in Computer programming.
- Learning the basic programming constructs they can easily switch over to any other language in future.

COURSE OUTCOMES

CO1	Know the basic concepts in problem solving
CO2	Demonstrate the algorithm and flow chart for the given problem
CO3	Design and develop the program to evaluate simple expressions and logical operations.
CO4	To be write creative solutions using C language
CO5	Design and develop solution store all world problems.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01					M	S		M					M		
CO 02								M	S	S	M		L		
CO 03					M					S			M	L	
CO 04								S	S	M		S	L		
CO 05								S					L		

LISTOFEXERCISE

1.	Basic programs in data types.
2.	Evaluate Expressions using library Function. a. пr2 b. (A+B+(2C/3A)+A2+2B) c. √S(S-A)(S-B)(S-C) d. LOG(x3+y3+z3)
3.	Problems in Decision making statements. i. Find the Biggest among 3 numbers. ii. Find Even or odd

	iii. Arithmetic operations using Switch-Case Statements.
4.	Problems in looping statements. i. Find the Sum of series using (i)For loop (ii)While loop ii. Generate the Fibonacci series iii. Check whether the number is prime or not.
5.	Find the Linear Search.
6.	Bubble sort and Insertion sort.
7.	Matrix Manipulation-Addition, Subtraction and Multiplication.
8.	String operations-string copy, string reverse, string concatenate.
9.	Swapping of numbers using call by value, call by reference.
10.	Find factorial using recursive functions.
11.	Numerical methods-Quadraticv Equation.
12.	Display the student information &marks using Structure & Unions.
13.	Demonstrate array of structures.
14.	Pointer Arithmetic and Array access using Pointers.
15.	Basic File Operations
WEB SOURCE REFERENCES	
1.	https://www.it.iitb.ac.in/lakshya/workshopContent.html?workshopid=FHf3Ht5njLvVww7Tz3f8xg
2.	https://nptel.ac.in/courses/106104074
PREPARED BY	
Mr.E.Sankar, & Dr.M.Thirunavukkarasu, Assistant Professors/CSE	

Course Title	WORKSHOP/MANUFACTURING PRACTICES	L	T	P	C
Course Code		1	0	4	2

PRE-REQUISITES

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

OUTCOMES

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

- Fabricate carpentry components and pipe connections including plumbing works.
- Use welding equipment's to join the structures.
- Carry out the basic machining operations
- Make the models using sheet metal works
- Illustrate the operations of smithy, foundry and fittings
- Carry out basic home electrical works and appliances
- Measure the electrical quantities

Lectures & videos: (10 hours) Detailed contents

1.	Manufacturing Methods- casting, forming, machining, joining, advanced Manufacturing methods (3 lectures).
2.	CNC machining, Additive manufacturing (1 lecture)
3.	Fitting operations & power tools (1 lecture)
4.	Electrical (1 lecture)
5.	Carpentry (1 lecture)
6.	Plastic molding, glass cutting (1 lecture)
7.	Metal casting (1 lecture)
8.	Welding (arc welding & gas welding), brazing (1 lecture)

LIST OF EXERCISE

Sl. NO	Manufacturing/ Fabrication lab	Experiment Name
1.	Machine Shop	Turning and facing practice
		Step turning
		Drilling practice
		Preparation of bottle using blow molding machine
		Preparation of given glass profile using diamond glass cutter
		Sheet metal jobs
2.	Fitting Shop	V- fitting
		Square fitting
3.	Carpentry Shop	Planning practice

		Half lap T- joint
		Half lap cross joint
4.	Welding Shop	Straight bead welding
		Butt joint – Gas welding process
		Lap joint - Arc welding process
5.	Smithy Shop	Fabrication of square rod
6.	Casting	Preparation of green sand mold using a gland piece pattern
7.	Electrical Lab	Two lamps in series controlled by one-way switch
		Two lamps in parallel controlled by one-way switch
8.	Civil work	Simple Plumbing exercises

TEXT BOOKS

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

2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2018.

3. Gowri P. Hariharan and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008.

REFERENCES

1. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.

2. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House 2017.

PREPARED BY

Dept. of Mech.

III - SEMESTER

Course Title		MATHEMATICS- III (Differential Calculus)	L	T	P	C
Course Code			4	1	0	4

COURSE OUTCOMES

The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	✓	✓	✓	✓	✓										
CO 02	✓	✓		✓	✓										
CO 03	✓	✓	✓	✓	✓										
CO 04	✓	✓	✓	✓	✓										
CO 05	✓	✓	✓	✓	✓										

UNIT - I   MULTIVARIABLE CALCULUS (INTEGRATION)

Multiple Integration - Double and Triple integrals (Cartesian) - Change of order of integration in double integrals. Integration of vectors - Line integral - Surface integral - Volume integral.

UNIT - II   ORDINARY DIFFERENTIAL EQUATIONS

Exact, linear, and Bernoulli's equations - Operator D — Rules for finding complementary function — Rules for finding particular integral - Second order linear differential equations with variable coefficients - Cauchy - Euler equation.

UNIT—III   SERIES SOLUTION AND SPECIAL FUNCTIONS

Validity of series solution - Series solution when x=0 is an ordinary point - Frobenius method (Series solution when x=0 is a regular singularity) - Bessel's equation Recurrence formulae for Jn(x) - Generating function for Jn(x) - Equations reducible to Bessel's equation — Orthogonality of Bessel functions

UNIT - IV   PARTIAL DIFFERENTIAL EQUATIONS

First-order partial differential equations - Solutions of first-order linear and non-linear PDEs - Solution to homogenous and non-homogenous linear partial differential equations - Second and higher order by complementary function and particular integral method.

UNIT - V   APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Method of separation of variables — Vibration of a stretched string: Wave equation — Solution of Wave equation - D'A1embert's solution of wave equation — One-dimensional heat flow — Solution of the heat equation.

TEXT BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

2.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
3.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4.	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill
PREPARED BY	
Dept. of Mathematics	

Course Title	DIGITAL ELECTRONICS	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic Electronics.

OBJECTIVES

The course should enable the students to:

- Study various number systems – simple problems.
- To simplify the mathematical expressions using Boolean functions – simple problems.
- Study implementation of combinational circuits.
- Study the design of synchronous and registers.
- Expose the students to various memory devices and to Design the Digital circuits using HDL programming.

COURSE OUTCOMES

The students should be able to:

1.	Understand the basic number system
2.	Understand the basic Boolean algebra.
3.	Understand the basics of combinational
4.	Know about Flip flops, registers and counter their designing.
5.	Understanding the concepts of VHDL programming for designing Digital circuits.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	L	M	M	H				M							
CO 02	L	M	M	H			L	M							
CO 03	L	M	L	H				L	L						
CO 04	L	H	M	M		M		L	M	M					
CO 05	L	M	M	M		M		M	M						

UNIT - I   NUMBER SYSTEMS

Number systems: Decimal, Binary, Octal, Hexadecimal - Codes: ASCII code, Gray Code, BCD code - Complements - Error Detection and Error Correction.

UNIT – II   BOOLEAN ALGEBRA

Truth Table - theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, K-map (upto 4 Variables), Don't care conditions - Minimization and Quine-McCluskey method of minimization.

UNIT – III   COMBINATIONAL CIRCUITS

Digital logic gates - Design procedure - Universal Gates – Adder – Subtractor - Encoder – Decoder – Multiplexer – Demultiplexer.

UNIT - IV	**SYNCHRONOUS SEQUENTIAL CIRCUITS AND REGISTERS**

SEQUENTIAL CIRCUITS: Flip flop – SR Flip flop – D Flip flop - JK Flip flop - Master Slave Flip Flop.

REGISTERS AND COUNTERS: Registers– Shift Register – Ripple Counter – Synchronous Counter.

UNIT- V	**LOGIC FAMILIES AND PROGRAMMABLE LOGIC DEVICES**

HDL Programming: Introduction to HDL Programming, HDL for Combinational Circuits, HDL for sequential logic circuits.

Programmable Logic Devices: Programmable Logic Array (PLA)-Programmable Array Logic (PAL) - PROM.

TEXT BOOKS

1.	W.H. Gothmann, "Digital Electronics - An Introduction, Theory and Practice",Prentice Hall of India, 2nd Edition 2000
2.	M. Morris Mano, "Digital Design", 6th Edition, Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2018.
3.	Frank Vahid "VHDL for Digital Design-With RTL design, VHDL & Verilog"- John Wiley & Sons, 2010
4.	R. P. Jain—Modern Digital Electronics, 5/e ,Tata McGraw Hill, 2022

REFERENCES

1.	Anand Kumar, "Switching Theory and Logic Design" – PHI, 3rd Edition 2016.
2.	A. P. Godse , D. A. Godse ,", Digital IC applications", Technical Publications. 2007.
3.	D.J. Comer, "Digital Logic and State Machine Design" Oxford University Press Inc , 3rd Edition, 2012
4.	T.L. Floyd & Jain, "Digital Fundamentals", Pearson Education, 11 Edition, 2017
5.	John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
6.	Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2019.

PREPARED BY

Dept. of EIE

Course Title	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic Knowledge on Programming.

OBJECTIVES

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques
- To understand basic concepts about stacks, queues, lists, trees and graphs.
- To enable them to write algorithms for solving problems with the help of fundamental data structures

COURSE OUTCOMES

On the successful completion of the course students will be able to

1.	For a given algorithm analyze the algorithms to determine the time and computation complexity and justify the correctness.
2.	Implement it For a given Search problem (Linear Search and Binary Search).
3.	For a given problem of Stacks, Queues and linked list to implement it and analyze the same to determine the time and computation complexity.
4.	Write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity
5.	Implement Graph search and traversal algorithms and determine the time and computation complexity.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	S	S							M			M	L	
CO 02		S			S		M						M	L	
CO 03		S		S		S		M	L				M	L	
CO 04		M		S		S		S	L				M		
CO 05		L		S		S	M		M				L		

UNIT-I   INTRODUCTION   9

Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis

UNIT-II   STACKS AND QUEUES   9

ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation–corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

UNIT-III	LINKED LISTS	9

Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

UNIT-IV	TREES & GRAPH	9

Trees - Basic Tree Terminologies, Different types of Trees: Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree: definitions, algorithms and analysis. Graph - Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

UNIT-V	SORTING AND HASHING	9

Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOK

1.	"Fundamentals of Data Structures" ,Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press

REFERENCES

1.	Hand book of Data Structures and Applications ,Dinesh P Mehta,SartajSahni, CRC Press, 2018
2.	Algorithms, DataStructures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
3.	"How to Solve it by Computer",2nd Impression by R.G.Dromey, Pearson Education.

WEB SOURCE REFERENCES

1.	https://nptel.ac.in/courses/106102064

PREPARED BY

Mr.E.Sankar, & Dr.M.Thirunavukkarasu, Assistant Professors/CSE

Course Title	OBJECT ORIENTED PROGRAMMING USING C++	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic Knowledge in Programming

OBJECTIVES

•	Introduce standard tools and techniques for software development
•	Automated build process, and an appropriate framework for automated unit.
•	To understand the concept of OOP as well as the purpose and usage principles of Inheritance, polymorphism, encapsulation and method overloading
•	To identify classes, objects, members of a class and the relationships among them needed for a specific problem.

COURSE OUTCOMES

After completing the Course, students will learn:

1.	Articulate the principles of object-oriented simple abstract data types, control flow and design implementations, using abstraction functions to document them
2.	Outline the essential features of object-oriented programming such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity using class and object.
3.	Apply the object using constructors and destructors and using the concept of polymorphism to implement compile time polymorphism in programs by using overloading methods and operators.
4.	Use the concept of inheritance to reduce the length of code and evaluate the usefulness.
5.	Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	S											M	L	L
CO 02	L	M		S								M	M		
CO 03		M	S										L		
CO 04			M	S							S		L		
CO 05				M	S								L		

UNIT-I	INTRODUCTION	9

Introduction to object oriented programming, Concepts of object oriented programming. C++ programming basics- Data types, Manipulators, Cin, Cout, Type conversion, arithmetic operators, Loops and decisions. Class and objects: Basics of class and objects, access specifiers, member functions defined inside and outside the class.

UNIT-II	CONSTRUCTORS & DESTRUCTORS AND ARRAY OF OBJECTS	9

Constructors and its types, destructors, object as function arguments, Returning objects from Functions, inline functions, static data and member function. Arrays: Defining &accessing Array elements, arrays as class member data, array of Objects.

UNIT-III	POLYMORPHISM	9

Friend functions Friend Classes. Operator Overloading: Overloading Unary Operators, Operator Arguments, Return Values, Overloading Binary Operators–Arithmetic operators, Concatenating Strings, Multiple overloading Comparison operators, Arithmetic Assignment Operators, Overloading the assignment operator.

UNIT-IV	INHERITANCE	9

Derived class and base class, Types of inheritance, derived class constructors, overriding member functions, Public and private inheritance, Class Hierarchies. Memory management - new and delete operator, string class using new. Pointers- Pointers to Objects Referring to Members, Array of pointers to objects.

UNIT-V	VIRTUAL FUNCTION, TEMPLATES AND FEW ADVANCED TOPICS	9

Virtual Functions, Pure virtual functions, Late Binding, Abstract Classes, Abstract base class, Virtual base classes, the this pointer. Templates- function templates, class template. File Handling – Introduction to graphics. Generic types and collections –Namespace, error handling, exception handling, signal handling and STL.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	Object Oriented Programming in C++-Robert Lafore, Galgotia Publication PvtLtd, Third Edition.
2.	The Compete Reference C++, Herbert Schlitz, Fifth Edition, 2015.

REFERENCES

1.	Let us C++-Yaswant Kanitkar (for templates), BPB Publication
2.	C++ and Object Oriented Programming Paradigm, PHI
3.	C++:HowtoProgram,9thEdition,DeitelandDeitel,PHI
4.	Object Oriented Programming in C++- E.Balaguruswamy, Tata Mcgraw Hill, 2013

WEB SOURCE REFERENCES

1.	https://www.cse.iitb.ac.in/~cs101/2011.1/
2.	https://onlinecourses.nptel.ac.in/noc21_cs02/preview

PREPARED BY

Mr.E.Sankar, & Dr.M.Thirunavukkarasu, Assistant Professors/CSE

Course Title	PYTHON PROGRAMMING		L	T	P	C
Course Code			3	0	0	3

PRE-REQUISITES

Basic computer skill and knowledge in programming language.

OBJECTIVES

- Learn the syntax and semantics of the python programming language.
- Illustrate the process of structuring the data using lists, tuples and dictionaries.
- Appraise the need for working with various documents like Excel, PDF, Word and others.
- Demonstrate the use of built-in functions to navigate the file system.
- Implement the object oriented programming concepts in Python.

COURSE OUTCOMES

At the end of the course the student will be able to:

1.	Demonstrate proficiency in handling loops and creation of functions.
2.	Identify the methods to create and manipulate lists, tuples and dictionaries.
3.	Develop programs for string processing.
4.	Demonstrate various file organization and its operation.
5.	Interpret the concepts of object oriented programming as used in Python.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	M	S	-	M	-	-	-	-	-	-	M	S	-	-
CO 02	S	S	S	-	M	-	-	-	-	-	-	M	S	-	-
CO 03	S	S	S	-	M	-	-	-	-	-	-	M	S	-	-
CO 04	S	M	M	-	M	-	-	-	-	-	-	M	S	-	-
CO 05	S	S	S	-	S	-	-	-	-	-	-	M	S	-	-

UNIT - I   BASICS

Entering expressions into the interactive shell, the integer, floating-point, and string data types, string concatenation and replication, storing values in variables, your first program, dissecting your program, flow control: Boolean values, comparison operators, Boolean operators, mixing Boolean and comparison operators, elements of flow control, program execution, flow control statements, importing modules, ending a program early with sys.exit(), functions: def statements with parameters, return values and return statements, the none value, keyword arguments and print(), local and global scope.

UNIT – II   LISTS, TUPLES AND DICTIONARIES

Lists: the list data type, working with lists, augmented assignment operators, methods,

example program: magic 8 ball with a list, list-like types: strings and tuples, references, dictionaries and structuring data: the dictionary data type, pretty printing, using data structures to model real-world things.

UNIT - III   STRINGS

Manipulating strings: working with strings, useful string methods, project: password locker, project: adding bullets to wiki mark-up, reading and writing files: files and file paths, the os.path module, the file reading/writing process, saving variables with the shelve module, saving variables with the print.format() function, project: generating random quiz files, project: multi clipboard.

UNIT - IV   FILES, MODULES AND PACKAGES

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; illustrative programs: word count, copy file, voter's age validation, marks range validation (0-100).

UNIT – V   OBJECT-ORIENTED CONCEPTS

Classes and objects: programmer-defined types, attributes, rectangles, instances as return values, objects are mutable, copying, classes and functions: time, pure functions, modifiers, prototyping versus planning, classes and methods: object-oriented features, printing objects, the init method, the __str__ method, operator overloading, type-based dispatch, polymorphism, interface and implementation.

TOTAL LECTURE HOUR:

TEXT BOOKS

| 1. | Al Sweigart, "Automate the Boring Stuff with Python", 2nd Edition, No Starch Press, 2019. |
| 2. | Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2016. |

WEB SOURCE REFERENCES

1.	https://www.learnbyexample.org/python/
2.	https://www.learnpython.org/
3.	https://pythontutor.com/visualize.html#mode=edit

PREPARED BY

Dr. M. Gayathri, Assistant Professor/CSE

Course Title	DIGITAL ELECTRONICS LAB	L	T	P	C
Course Code		0	0	3	2

PRE-REQUISITES

Comfortable programming in Basic Electronics

OBJECTIVES

- Understand the Diode operation and switching characteristics.
- Understand the Operation of BJT, FET, MOSFET metal semiconductor rectifying and ohmic contacts,
- Study various number systems and to simplify the mathematical expressions using Boolean functions - simple problems.
- Study implementation of combinational circuits.

COURSE OUTCOMES

After successfully completing this course a student will

1.	Develop basic knowledge on the behavior and the characteristics of semiconductor junction
2.	Acquire knowledge on the applications of BJT, FET, MOSFET.
3.	Understand the basic number system and Boolean algebra.
4.	Understand the basics of combinational & sequential circuits.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	L			M					L	M					
CO 02	L			H			L	M	L						
CO 03	M			H			M		M						
CO 04	H	H	M	M				L	M	M					

LIST OF EXPERIMENTS

1.	Implementation of Boolean functions, Adder / Sub-tractor Circuits.
2.	Implementation of Multiplexer/ De-multiplexer Circuits.
3.	Implementation of Encoder and Decoder.
4.	Implementation of Code converters (Gray to Binary, Binary to Gray, Excess-3 to BCD and BCD to Excess-3).
5.	Study of flip-flops - JK, RS, D ,T FF and Master Slave FF.
6.	Shift registers – SISO, PIPO, PISO and SIPO.
7.	V-I characteristics of PN & Zener diode.
8.	Characteristics BJT (CB,CE and CC mode)
9.	Characteristics of JFET, SCR

10.	Characteristics of UJT
11.	Characteristics of DIAC
12.	Characteristics of TRAIC
PREPARED BY	
Dept. of EIE	

Course Title	DATA STRUCTURES AND ALGORITHMS LAB	L	T	P	C
Course Code		0	0	3	2

PRE-REQUISITES

Basic Knowledge on C Programming.

OBJECTIVES

The students will be trained to:

- Be familiar with c programming.
- Learn to implement Linear and Nonlinear data structures.
- Learn to implement sorting and searching algorithms.
- Strong in pointers concept

COURSE OUTCOMES

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

1.	Design and implement C programs for implementing stacks, queues, linked lists.
2.	Apply good programming design methods for program development.
3.	Apply the different data structures for implementing solutions to practical problems.
4.	Develop searching and sorting programs.
5.	Understanding tree traversal and tree operations

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01		S	S		S				L	M			M	M	M
CO 02		S			S	S		M		M			M		
CO 03	S	S				S	S	M	L		M		M		L
CO 04				S		S		S	L				M		
CO 05	S	S	S	M		M		M	L				M	L	

LIST OF PROGRAMS

TEXT BOOKS

1.	Linear and Binary Search algorithms
2.	Implementation of Stack
3.	Implement application of Stack
4.	Implementation of Queue
5.	Implementation of Singly Linked List.
6.	Implementation of Doubly linked list.

7.	Perform Traversals on a Binary Tree.
8.	Implement Graph Search algorithms.
9.	Sort the Given Numbers using. a. Selection Sort. b. Heap Sort. c. Quick Sort. d. Merge Sort.
10.	Implement Hashing

WEB SOURCE REFERENCES

1.	https://nptel.ac.in/courses/106102064

PREPARED BY

Mr.E.Sankar, & Dr.M.Thirunavukkarasu, Assistant Professors/CSE

Course Title	OBJECT ORIENTED PROGRAMMING USING C++ LAB	L	T	P	C
Course Code		0	0	3	2

PRE-REQUISITES

Basic Knowledge on Programming

OBJECTIVES

The students will be trained to:

- Be Familiar With Programming
- Learn To Implement The Concepts Of Object Oriented Programming.
- Learn To Implement Templates Of C++.
- Implementing Generic Functionality Classes

COURSE OUTCOMES

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

1.	Design, implement C++ programs and Understand the features of C++ supporting object oriented programming
2.	Understand the relative merits of C++ as an object oriented programming language
3.	Understand how to apply the major object-oriented concepts to implement object, friend function, constructor, overloading.
4.	Creating object based programs in C++, encapsulation, inheritance and polymorphism
5.	Understand advanced features of C++ specifically stream I/O, templates and operator overloading

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	M	S					M					S		
CO 02		M	S			L		S	M	S			M		
CO 03			M	S		L	S		S		M		M	M	L
CO 04		S		M	S					L	S	S	L	L	
CO 05	S			L		M			M		S		M		

LIST OF PROGRAMS

1.	Illustrate class & objects.
2.	Implement member function defined inside and outside the class.
3.	To demonstrate the concept of function overloading applied to the member functions.
4.	Implement passing object as function arguments and return object from function
5.	To demonstrate the use of constructor with its types and destructor

6.	Illustrate the use of static data member and static member function
7.	Illustrate the use of array of objects
8.	Illustrate the memory management operator
9.	Illustrate the use of friend class and friend function
10.	To Implement the use of unary operator overloading
11.	To implement the use of Binary operator overloading
12.	To implement the assignment and comparison of two strings using binary operator overloading
13.	To implement the use of single private and public inheritance
14.	To implement the use of multiple inheritance
15.	To implement the use of multi-level inheritance
16.	To demonstrate the use of this pointer & inline function
17.	To implement the Pure Virtual Function
18.	To implement the use of class template
19.	To implement the use of function template
20.	To implement File handling
21.	Program to implement exception handling in C++
22.	Program to implement user defined namespace in C++
23.	Program to implement signal (interrupts)handling in C++
24.	Simple programs using C++STL
25.	Web Programming with C++
26.	Simple programs using graphics concepts in C++

WEB SOURCE REFERENCES

1.	https://www.cse.iitb.ac.in/~cs101/2011.1/
2.	https://onlinecourses.nptel.ac.in/noc21_cs02/preview

PREPARED BY

Mr.E.Sankar, & Dr.M.Thirunavukkarasu, Assistant Professors/CSE

Course Title	PYTHON PROGRAMMING LAB	L	T	P	C
Course Code					

PRE-REQUISITES

Basic Computer Skill, Basics in C.

OBJECTIVES

- Learn the syntax and semantics of the Python programming language.
- Illustrate the process of structuring the data using lists, tuples and dictionaries.
- Demonstrate the use of file operations and searching pattern.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Appraise the need for working with various documents like Excel, PDF, Word and others file formats.

COURSE OUTCOMES

At the end of the course the student will be able to:

1.	Understand Python syntax and semantics and be fluent in the use of Python flow control and Functions
2.	Develop, run and manipulate Python programs using Core data structures like Lists, Dictionaries, and use of Strings Handling methods.
3.	Develop, run and manipulate Python programs using File Operations and searching pattern using regular expressions.
4.	Interpret the concepts of object oriented programming using Python.
5.	Determine the need for scraping websites and working with CSV, JSON and other file formats.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	M	S	-	M	-	-	-	-	-	-	M	S	-	-
CO 02	S	S	S	-	M	-	-	-	-	-	-	M	S	-	-
CO 03	S	S	S	-	M	-	-	-	-	-	-	M	S	-	-
CO 04	S	M	M	-	M	-	-	-	-	-	-	M	S	-	-
CO 05	S	S	S	-	S	-	-	-	-	-	-	M	S	-	-

LIST OF PROGRAMS

1.	**Calculation of Test Average:** Write a python program to find the best of two test average marks out of three test's marks accepted from the user.
2.	**Palindrome Check & Digit Occurrence Count:** Develop a Python program to check whether a given number is palindrome or not and also count the number of occurrences of each digit in the input number.
3.	**Fibonacci sequence:** Defined as a function F as Fn = Fn-1 + Fn-2. Write a Python program which accepts a value for N (where N >0) as input and pass this value to the

	function. Display suitable error message if the condition for input value is not followed.
4.	**Binary to Decimal & Octal to Hexadecimal Conversion:** Develop a python program to convert binary to decimal, octal to hexadecimal using functions.
5.	**Sentence Statistics:** Write a Python program that accepts a sentence and find the number of words, digits, uppercase letters and lowercase letters.
6.	**String Similarity:** Write a Python program to find the string similarity between two given strings.
7.	**Insertion Sort & Merge Sort on lists:** Write a python program to implement insertion sort and merge sort using lists.
8.	**Check Phone Number:** Write a function called isphonenumber () to recognize a pattern 415-555-4242 without using regular expression and also write the code to recognize the same pattern using regular expression.
9.	**Search Phone Number & Email:** Develop a python program that could search the text in a file for phone numbers (+919900889977) and email addresses (sample@gmail.com)
10.	**File Operations:** Write a python program to accept a file name from the user and perform the following operations 1. Display the first N line of the file 2. Find the frequency of occurrence of the word accepted from the user in the file
11.	**Zip operation on a folder:** Develop a program to backing up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
12.	**Inheritance:** By using the concept of inheritance write a python program to find the area of triangle, circle and rectangle.
13.	**Employee Details:** Write a python program by creating a class called Employee to store the details of Name, Employee_ID, Department and Salary, and implement a method to update salary of employees belonging to a given department.
14.	**Polymorphism and Inheritance:** Write a python program to find the whether the given input is palindrome or not (for both string and integer) using the concept of polymorphism and inheritance.
15.	**Spreadsheet Operations:** Demonstrate python program to read the data from the spreadsheet and write the data in to the spreadsheet
16.	**Merge selected pages from Multiple PDFs to a new PDF:** Write a python program to combine select pages from many PDFs
17.	**Fetch weather data from the JSON:** Write a python program to fetch current weather data from the JSON file
REFERENCES	
1.	https://moodle.sit.ac.in/blog/python-programming-laboratory-21csl46/
PREPARED BY	
Dr. M. Gayathri, & Dr.R.Prema , Assistant Professors/CSE	

IV - SEMESTER

Course Title	DISCRETE MATHEMATICS	L	T	P	C
Course Code		4	1	0	4

OBJECTIVES

- To familiarize with sets and relations.
- To learn counting techniques
- To familiarize with logic
- To familiarize with algebraic structures and Boolean algebra
- To understand graph networks and its applications

OUTCOMES

For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives. For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference and classify its algebraic structure. Students can evaluate Boolean functions, simplify expressions using the properties of Boolean algebra and develop the given problem as graph networks and solve with techniques of graph theory.

After the successful completion of the course students will be able to

Sl.No	Course Outcome	Bloom's Level
1.	Express a given logical sentence in terms of predicates, quantifiers, and logical connectives	Understanding and Applying
2.	derive the solution for a given a problem using deductive logic and prove the solution based on logical inference and classify its algebraic structure	Understanding and Applying
3.	Evaluate Boolean functions, simplify expressions using the properties of Boolean algebra	Understanding and Applying
4.	Develop the given problem as graph networks and solve with techniques of graph theory.	Understanding and Applying

POs and COs MAPPING TABLES

	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO01	S	S	S	S	L	M	S	L	M	M	L	S
CO02	S	S	S	S	S	M	L	L	M	M	S	S
CO03	S	S	M	M	S	M	L	L	M	M	L	S
CO04	S	S	M	M	S	M	L	L	M	M	L	S

UNIT - I	SETS, RELATION AND FUNCTION

Finite and infinite sets, Countable and uncountable sets, Size of a set, Set operations, Ordered pairs and Cartesian products, Relations, Types of relations, Some operations on relations, Properties of relations, Equivalence classes, Partition of a set, Matrix representation of a relation, Representation of relations by graphs, Hasse diagrams for partial ordering relation.

UNIT - II	COMBINATORICS AND PROOF TECHNIQUES

Basic counting techniques-Inclusion and Exclusion, Pigeon-hole principle, Permutation and Combination. Principles of mathematical induction: The Well-Ordering principle, Recursive definition, The Division algorithm: Prime numbers, The Greatest common divisor: Euclidean algorithm.

UNIT – III	PROPOSITIONAL LOGIC
Basic connectives and truth tables, Logical equivalence: The laws of logic, Logical implication, Rules of inference, The use of quantifiers. Proof techniques: Some terminology, Proof methods, and Strategies, Forward proof, Proof by contradiction, Proof by contraposition.	

UNIT – IV	ALGEBRAIC STRUCTURES AND MORPHISM
Algebraic structures with one binary operation, Semigroups, Monoids, Groups, Congruence relation and Quotient structures, Permutation groups, Substructures, Normal subgroups, Algebraic structures with two binary operations, Rings, Integral domain, and Fields. Boolean algebra and Boolean ring, Identities of boolean algebra, Duality, Representation of boolean function, Disjunctive and Conjunctive normal form	

UNIT - V	GRAPHS AND TREES
Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub graph, Isomorphism, Eulerian and Hamiltonian walks, Graph coloring, Coloring maps, and Planar graphs, Coloring vertices, Coloring edges, List Coloring, Perfect graph, definition properties, and Example, rooted trees, trees and sorting, weighted trees, and prefix codes, Shortest distances by Prim's and Kruskal's algorithm.	

TEXT BOOKS	
1.	Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2.	Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3.	C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.
4.	J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill
5.	Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press.
6.	Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
7.	Veerarajan, Discrete Mathematics, Tata McGraw – Hill.

PREPARED BY
Dept of Mathematics

Course Title	COMPUTER SYSTEM ARCHITECTURE	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic knowledge about computer hardware and its functionalities.

OBJECTIVES

•	To explain the basic sub systems of a computer, their organization, structure and operation.
•	To illustrate the concept of programs as sequences of machine instructions.
•	To understand the design and implementation of the ALU units.
•	To demonstrate different ways of communicating with I/O devices
•	To describe memory hierarchy and concept of virtual memory.

COURSE OUTCOMES

The student will be able to

1.	Understand basics of computer organization, concepts of program as sequences and operation of computers.
2.	Understand the basic processing unit and its architecture.
3.	Design arithmetic and logical operations with integer and floating-point operands.
4.	Understand different ways of communication with I/O devices and standard I/O interfaces.
5.	Understand the basics of memory systems and its type's.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M	L	-	-	-	-	-	-	-	-	-	L	-	-	M
CO 02	M	L	L	-	-	-	-	-	-	-	-	L	-	-	M
CO 03	M	L	L	-	-	-	-	-	-	-	-	L	-	-	M
CO 04	M	L	L	-	-	-	-	-	-	-	-	L	-	-	M
CO 05	M	L	L	-	-	-	-	-	-	-	-	L	-	-	M

UNIT – I   BASIC COMPUTER ORGANIZATION AND DESIGN

Instruction Code, Operation Code, Stored Program Concept, Registers and memory of Basic Computer, Common Bus System for Basic Computer, Instruction Format, Instruction Set Completeness, Control Unit of Basic Computer, Control Timing Signals. Instruction Cycle of Basic computer, Determining Type of Instruction, Memory Reference Instructions, Input-Output Instructions, Program Interrupt & Interrupt Cycle, description and Flowchart of Basic Computer.

UNIT - II   CENTRAL PROCESSING UNIT

General register organization, Stack organization, Instruction format, Addressing Modes,

Data transfer and manipulation, program control, RISC, CISC architectures.

UNIT – III	**COMPUTER ARITHMETIC**

Addition and subtraction, Multiplication and division algorithm, Floating point arithmetic operations, decimal arithmetic unit.

UNIT- IV	**INPUT OUTPUT ORGANIZATION**

Input-Output Interface: I/O Bus and Interface Modules, I/O vs. Memory Bus, Isolated vs. Memory-Mapped I/O, Asynchronous Data Transfer: Strobe, Handshaking, Modes of Transfer: Programmed I/O, Interrupt-Initiated I/O, Direct memory Access, Priority Interrupt: Polling, Daisy-Chaining, Parallel Priority Interrupt, Direct Memory Access, Input-Output Processor, DMA vs. IOP

UNIT – V	**MEMORY ORGANIZATION**

Memory Hierarchy, Main Memory, RAM and ROM Chips, Memory address Map, Memory Connection to CPU, Auxiliary Memory (Magnetic Disk, Magnetic Tape), Associative Memory: Hardware Organization, Match Logic, Read Operation, Write Operation, Cache Memory: Locality of Reference, Hit & Miss Ratio, Mapping, Write Policies, virtual memory

TEXT BOOK	
1.	M. Morris Mano, "Computer System Architecture", Prentice-Hall of India, Pvt. Ltd., Third edition(Revised), 2017

REFERENCES	
1.	William Stallings, "Computer Organization and Architecture", Prentice-Hall of India, Pvt. Ltd., Eighth edition, 2006.
2.	Vincent P. Heuring and Harry F. Jordan, "Computer System Design and Architecture", Prentice-Hall of India, Pvt. Ltd., Second edition, 2003.

PREPARED BY
Dr. M. Gayathri, Assistant Professor, CSE

Course Title	MICROPROCESSOR AND MICROCONTROLLER	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic knowledge in Digital Electronics

OBJECTIVES

The objective of the course is to impart knowledge on:

- The architecture of 8085, 8086, ARM and 8051
- The addressing modes & instruction set of 8085,8086, ARM and 8051
- The need and use of Interrupt structure
- Simple programs and commonly used peripheral/interfacing ICs.

COURSE OUTCOMES

After completion of the course the students are expected to be able to:

1.	Understand block diagram, interrupt structure of 8086 and other processor configurations
2.	Interface ICs like 8255 PPI, 8279 Display and Keyboard Interface, Programmable Interrupt controller and DAM Controller
3.	Develop simple programs with Basic Arithmetic Functions, String functions and Array
4.	Understand block diagram of 8051, Memory organization, counters and interrupt structure in 8051
5.	Develop simple programs in Arithmetic Function, Interfacing with motor and display devices
6.	Understand the block diagram and fundamentals of ARM processor, Thumb Instruction set.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	H	H	M					M		M					
CO 02	M	H	M	H			L								
CO 03				H	M										
CO 04	H	H	M				M	M	M						
CO 05			H	M	M		L	L		M					
CO 06	M	H	H					H	H	M					

UNIT - I   INTRODUCTION TO MICROPROCESSOR

Introduction to 8086 Microprocessor, Architecture, Addressing Modes, Instruction Set, Interrupts and Simple programs: String Operations, Manipulations, Sorting of Array. Numeric Data Processor 8087 and I/O Processors 8089- Architecture

UNIT - II	CONFIGURATION AND INTERFACING WITH MICROPROCESSOR

Coprocessor Configuration-Loosely Coupled, Closely Coupled.
8255 – Programmable Peripheral Interface, Pin details, Architecture, Modes of operation.
8279 – Display and Keyboard Interface
Programmable Interrupt Controller, DMA Controller, Memory Mapped, I/O Mapped

UNIT – III	INTRODUCTION TO MICROCONTROLLER 8051

Features of Microcontroller, Internal Block Diagram of 8051, Memory organization, Timer and Counters, I/O ports, Interrupt Structure

UNIT - IV	PROGRAMMING IN MICROCONTROLLER 8051

Addressing modes of 8051, Instruction set of 8051, Counter and Timer Programming in 8051, Serial Communication, Interrupt Programming, Keyboard and Display devices interfacing, Sensor Interfacing, Stepper motor

UNIT – V	ADVANCED PROCESSORS

ARM Processor Fundamentals, ARM Instruction Set, THUMB Instruction Set, Exception and Interrupt Handling, Writing and Optimizing ARM Assembly Code.
Pentium Processor Architecture and Functional Description, RISC Processor, Risc Addressing Modes

TEXT BOOKS

1.	Mathur S, " Microprocessor 8086: Architecture, Programming and Interfacing", Fourth Edition, 2004
2.	Krishna Kant, " Microprocessors and Microcontrollers Architecture, Programming and System Design 8085,8086, 8051, 8096", Third Edition, 1998
3.	Barry B. Brey, "The Intel Microprocessors, Architecture, Programming and Interfacing", Eighth Edition, 2000
4.	Muhammad Ali Mazidi and Janice GillispieMazidi, "The 8051 Microcontroller and Embedded Systems using Assembly and C", Second Edition, 1998
5.	Kenneth J. Ayala, "The 8051 Microcontroller Architecture, Programming and Applications", Third Edition, 2000
6.	Andrew Sloss, Dominic Symes and Chris Wright, "ARM System Developer's Guide, Designing and Optimizing System Software", First Edition, 2000

REFERENCES

1.	K. Bhurchandi and A.K. Ray, "Advanced Microprocessor and Peripherals",Third Edition, 2013
2.	Ajit Pal, "Microcontrollers: Principles and Applications", 2011 I.Scott Mackenzie and Raphel C.W. Phan, "The 8051 Microcontroller", Fourth Edition, 2002
3.	Patrick Stakem, "The architecture and applications of the ARM Microprocessors", 2000
4.	William Hohl, "ARM Assembly Language: Fundamentals and Techniques", Second Edition, 2003

PREPARED BY

Dept. of EIE

Course Title	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
Course Code		3	0	0	3

PREAMBLE

Algorithm design and analysis provide the theoretical backbone of computer science. On Completion of this course student will be able to:

- Determine the asymptotic time complexity of algorithms
- Write rigorous correctness proofs for algorithms
- Use different paradigms of problem solving to illustrate efficient ways of solving a given problem

PRE-REQUISITE

Basic knowledge in Problem Solving for Programming and data structure.

OBJECTIVES

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations

COURSE OUTCOMES

After completion of the course the students are expected to be able to:

1.	Identify the problem and its complexity using frameworks like recurrences and amortized analysis. (Understand)
2.	Analyze algorithm design techniques like greedy algorithm, dynamic programming, branch and bound and back tracking to solve problems. (Analyze)
3.	Apply graph algorithms to solve problems and analyze their efficiency. (Apply)
4.	Determine the significance of NP complete problems and approximation algorithms.
5.	Analyze Approximation algorithms Randomized algorithms. (Analyze)

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	M	L	-	-	-	-	L	M	M	-	M			
CO 02	S	S	M	L	-	-	-	L	M	M	-	M			
CO 03	S	M	L	-	-	-	-	L	M	M	-	M			
CO 04	S	S	M	L	-	-	-	L	M	M	-	M			
CO 05	S	S	M	L	-	-	-	L	M	M	-	M			

UNIT-I   INTRODUCTION

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds–best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT –II   FUNDAMENTAL ALGORITHMIC STRATEGIES

Greedy Programming- Fractional Knapsack Problem, Dynamic Programming- Principle of optimality- Multi stage graph , travelling salesman problem   Branch and Bound- 0/1 Knapsack Problem and Backtracking- N Queen problem- Graph Coloring

UNIT -III   GRAPH ALGORITHMS

Single-Source Shortest Paths, The Bellman-Ford algorithm, Dijkstra's algorithm All-Pairs Shortest Paths- The Floyd-Warshall algorithm Transitive closure, Minimum Spanning Tree, Topological sorting ,Network Flow Algorithm.

UNIT -IV   NP-HARD AND NP-COMPLETE PROBLEMS

Tractable and Intractable Problems: Computability of Algorithms, Computability classes– P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

UNIT - V   ADVANCED TOPICS

Approximation algorithms- The vertex-cover problem, The subset-sum problem Randomized algorithms, Class of problems beyond NP–P SPACE

TEXT BOOKS

1.	Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein "Introduction to Algorithms" ,4thEdition,MITPress/McGraw-Hill.
2.	Ellis Horowitz, SartajSahni, Sanguthevar Rajasekaran "Computer Algorithms/C++" Orient Blackswan, 2nd Edition, 2019.

REFERENCES

1.	Jon Kleinberg and Éva Tardos "Algorithm Design",1stEdition, Pearson.
2.	Michael T Goodrich and Roberto Tamassia ,"Algorithm Design: Foundations, Analysis, and Internet Examples", Second Edition, , Wiley

PREPARED BY

Dr.M.Thirunavukkarasu, Assistant Professor/CSE

Course Title	OPERATING SYSTEMS	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic Knowledge about Computer Hardware

OBJECTIVES

- To understand the basics and functions of operating systems, processes and threads
- To analyze scheduling algorithms and process synchronization.
- To understand the concept of deadlocks.
- To analyze various memory management schemes.
- To understand the basics of virtual machines, I/O and file systems management.

COURSE OUTCOMES

The end of course the student will be able to:

1.	Analyze the various scheduling algorithms and process synchronization.
2.	Understand the deadlock prevention and avoidance algorithms.
3.	Analyze the various memory management schemes.
4.	Understand the functionality of file systems, I/O systems
5.	Understand the concept of Virtualization

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	-	-	-	S	-	-	-	-	-	-	-	-	-	S	-
CO 02	S	-	-	-	-	-	-	-	-	-	-	-	S	-	-
CO 03	-	-	M	M	-	-	-	-	-	-	-	-	S	-	-
CO 04	S	-	-	-	M	-	-	-	-	-	-	-	M	-	-
CO 05	-	-	-	-	S	-	-	-	-	-	-	L	M	-	-

UNIT – I   INTRODUCTION   9

Operating System Overview - Objectives and Functions - Evolution of Operating System - Operating System Zoo - Computing Environments - Operating System Structures –- Operating System Services - User Operating System Interface - System Calls – System Programs - Design and Implementation - Structuring methods.

UNIT – II   PROCESS MANAGEMENT   9

Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication; CPU Scheduling - Scheduling criteria - Scheduling algorithms: Threads - Multithread Models – Threading issues; Process Synchronization - The Critical-Section problem - Synchronization hardware – Semaphores – Mutex - Classical problems of synchronization – Monitors

UNIT – III DEAD LOCK AND MEMORY MANAGEMENT	9
Deadlock - Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock. Main Memory - Swapping - Contiguous Memory Allocation – Paging - Structure of the Page Table - Segmentation, Segmentation with paging	
UNIT – IV VIRTUAL MEMORY AND VIRTUAL MACHINES	**9**
Virtual Memory - Demand Paging – Copy on Write - Page Replacement - Allocation of Frames –Thrashing. Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components	
UNIT – V STORAGE MANAGEMENT AND FILE SYSTEM	**9**
Mass Storage system – Disk Structure - Disk Scheduling and Management; File-System Interface - File concept - Access methods - Directory Structure - Directory organization - File system mounting - File Sharing and Protection; File System Implementation - File System Structure - Directory implementation - Allocation Methods - Free Space Management; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem.	

TOTAL LECTURE HOUR: 45hrs	
TEXT BOOKS	
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating Systems Concepts"‖, 10th Edition, John Wiley and Sons Inc., 2018.
2.	Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition, 2022 New Delhi
REFERENCES	
1.	Ramaz Elmasri, A. Gil Carrick, David Levine, " Operating Systems – A Spiral Approach", Tata McGraw Hill Edition, 2010.
2.	William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition, Prentice Hall, 2018.
3.	Achyut S.Godbole, Atul Kahate, "Operating Systems", McGraw Hill Education, 2016.
PREPARED BY	
Mr.V.Balu, Assistant Professor/CSE	

Course Title	**COMPUTER ARCHITECTURE LAB**	**L**	**T**	**P**	**C**
Course Code		0	0	3	2

PRE-REQUISITES

Fundamentals of Programming Knowledge

OBJECTIVES

The objective of this lab is

- To Understand various components of PC.
- Study and design various Logic Gates.
- Design Multiplexer/Demultiplexer, Encoder/Decoder, Synchronous/Asynchronous Counter.
- Design Shift registers, Code Converters, BCD adder and Comparator.
- Design of Simple ALU operations.

COURSE OUTCOMES

The end of course the student will be able to:

1.	Understand various hardware components on the computer system and Dismantling and assembling of PC.
2.	Implement Logical Gates, Multiplexer/Demultiplexer, Encoder/Decoder and Synchronous / Asynchronous Counter.
3.	Implement Shift register – Right/ Left/Serial/Parallel.
4.	Implement Shift registers, code converters, BCD adder and comparator.
5.	Implement ALU for both Integer and Floating point numbers.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S											M	S		
CO 02	M		S		S									S	
CO 03					S									S	
CO 04	M				S									S	
CO 05	M				S									S	

SOFTWARE REQUIRED Synthesis tool: Xilinx ISE. Simulation tool: ModelSim Simulator (with support Verilog code)

LIST OF EXERCISES

1.	Recognize various components of PC.
2.	Dismantling and assembling of PC.
3.	To Simulate AND, OR, NOT, NAND, NOR Gates.

4.	To Simulate Encoder/Decoder.
5.	To Simulate Asynchronous Counter/ Synchronous counter (UP / Down / UP Down). a. To Design and simulate shift registers – Right / Left /Serial /Parallel (SISO, SIPO, PIPO, PISO).
6.	To design and Simulate BCD Adders.
7.	To design and Simulate Comparators.
8.	To design and simulate Memory for Write and Read instruction.
9.	To design and simulate ALU unit for Booth Multiplication Algorithm.
10.	To design and simulate ALU unit for Division algorithm.

REFERENCES

1.	"Verilog HDL: A guide to Digital Design and Synthesis" - Samir Palnitkar , SunSoft Press 1996.

WEB REFERENCES

1.	http://download.xilinx.com/direct/ise9_tutorials/ise9tut.pdf
2.	http://web.stanford.edu/class/ee183/handouts_win2003/Modelsim_short_tutorial.pdf
3.	http://bertrand.granado.free.fr/Sysprog/SysProg/Cours_files/modelsim_tut.pdf

PREPARED BY

Dr.M.Gayathri, Assistant Professor/CSE

Course Title	MICROPROCESSOR AND MICROCONTROLLER LAB	L	T	P	C
Course Code		0	0	3	2

PRE-REQUISITES

Basic knowledge of Digital Electronics, Computer Orgnization, Microprocessors and Microcontrollers

OBJECTIVES

- The Architecture of 8086 & 8051 and ARM.
- The addressing modes & instruction set of 8086 & 8051.
- The need & use of Interrupt structure.
- Simple programing Skills.
- Commonly used peripheral / interfacing ICs.

COURSE OUTCOMES

After completion of the course the students are expected to be able to:

1.	Understand the functional block diagram, Timing Diagram, Interrupt structure and Multiprocessor configurations of 8086Microprocessor.
2.	Develop the Programming skills using Loop structure with counting & Indexing, Look up table, Subroutine instructions stack.
3.	Interface ICs 8255 PPI, 8259 PIC, 8257 DMA, 8251 USART, 8279 Key board display controller and 8253 Timer/ Counter, A/D and D/A converter.
4.	Comprehend the Functional block diagram ,Instruction format and addressing modes, Interrupt structure ,I/O Ports and Serial communication of 8051 Microcontroller.
5.	Develop the programming skills in square, triangular and sine wave form generation and stepper motor control.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M				M										
CO 02	H	M	M	H	M		H	H		H					
CO 03		H	M				M		M						
CO 04	H	M		M				H		M					
CO 05	M	H		L	L				L						

LIST OF EXPERIMENTS

EXPERIMENTS IN MICRPROCESSOR 8086:

1.	Write a ALP to perform basic arithmetic operation in various addressing modes on two 16 bit Numbers.
2.	Write a ALP to determine sum of elements in an array.
3.	Write a ALP to search for a given number, Smallest and Largest Number in an array

4.	Write a ALP to Sort the given array (Ascending and Descending)
5.	Write a ALP to study the BSR and I/O modes of 8255with 8086 microprocessor.
6.	Generation of Square, Triangular and Saw tooth waveform using DAC interfaced with 8086 microprocessor.
7.	Write a ALP to control the speed and direction of Stepper motor.
EXPERIMENTS IN MICROCONTROLLER 8051:	
8.	Write a microcontroller program to perform basic arithmetic operation on two 8 bit numbers.
9.	Write a ALP to study the various modes of 8255 with Microcontroller.
10.	Write a ALP to generate square and Sawtooth waveform using DAC interfaced with 8086 microprocessor
11.	Write a ALP to interface Seven Segment Display.
12.	Write a ALP to interface 16 x 2 LCD Display with Microcontroller 8051 using Keil μVision
EXPERIMENTS IN ARM PROCESSOR:	
1.	Study of ARM evaluation system.
2.	Study and analyze the Interfacing DAC and Interfacing LCD
3.	Study and analyze the Interfacing Stepper motor and Temperature Sensor.
PREPARED BY	
Dept. of EIE	

Course Title	DESIGN AND ANALYSIS OF ALGORITHMS LAB	L	T	P	C
Course Code		0	0	3	2

PRE-REQUISITES

Basic knowledge of Computer Programming.

OBJECTIVES

- To implement various problems related to different algorithmic techniques
- To study the space and time complexity of the implemented algorithms
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations

COURSE OUTCOMES

After completion of the course the students are expected to be able to:

1.	Implement various algorithms and gain the knowledge of problem solving
2.	Learn the different techniques used in development of algorithm with examples
3.	Apply graph algorithms to solve problems and analyze their efficiency. (Apply)
4.	Determine the significance of NP complete problems and approximation algorithms.
5.	Analyze Approximation algorithms Randomized algorithms. (Analyze)

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	S	S		S				L	M					
CO 02		S	S		S	S		L		M	L				
CO 03	S	M	L	-	-	-	-	L	M	M	-	M			
CO 04	S	S	M	L	-	-	-	L	M	M	-	M			
CO 05	S	S	M	L	-	-	-	L	M	M	-	M			

LIST OF PROGRAMS

1.	Implement Tower of Hanoi.
2.	Implement nth Fibonacci term using recursion & iteration.
3.	Implement Bin Packing
4.	Implement Fractional Knapsack using greedy method
5.	Implement Travelling Salesman Problem
6.	Implement Minimum Spanning Tree
7.	Implement Shortest path algorithm

8.	Implement Network Flow algorithm
9.	Implement Approximation algorithms
10.	Implement Randomized algorithm
PREPARED BY	
Dr.M.Thirunavukkarasu, Assistant Professor/CSE	

Course Title	OPERATING SYSTEMS LAB			L	T	P	C
Course Code				0	0	3	2

PRE-REQUISITES

Basic Knowledge any Programming Language

OBJECTIVES

The objective of this lab is to teach students about

- Various Linux operating systems commands
- Shell Programming
- Implement various CPU scheduling algorithm
- implement various memory allocation methods.
- Installation of Guest OS

COURSE OUTCOMES

The end of course the student will be able to:

1.	Understand the various Linux commands
2.	Simulation of CPU Scheduling Algorithms. (FCFS, RR, SJF)
3.	Simulation of Banker's Algorithm for Deadlock Avoidance
4.	Implement various memory allocation methods.
5.	Install a Guest OS in Virtual Box / VMware

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S												M		
CO 02		S	M											S	
CO 03			S	M										S	
CO 04				S										M	
CO 05					S								S		M

LIST OF EXERCISES

1.	Installation of windows Operating System
2.	Practice the following Linux commands a. File and Directory Related Commands b. Process and Status Information Commands c. Text Related Commands d. File Permission Commands
3.	Execute a Shell Program a. To find the whether a Number is even or odd

	b. To find the biggest of two numbers c. To find the biggest of three numbers d. To find the factorial of a Number e. To display Fibonacci Series
4.	Practice the Linux Pipes and Filters commands a. Grep, b. Sed c. Awk commands
5.	Implement System Calls using C a. Stat() b. Wait() c. Getpid() d. Opendir(), readdir() e. Open(), Read(), Write()
6.	Implement Process Management a. Fork() b. Exec()
7.	Implement various CPU Scheduling algorithm using C a. FIFO b. Round Robin c. SJF
8.	Write C programs to avoid Deadlock using Banker's Algorithm
9.	Write C programs to implement the following Memory Allocation Methods a. First Fit b. Worst Fit c. Best Fit
10.	Install any guest operating system like Linux using VMware.
PREPARED BY	
Mr.V.Balu, Assistant Professor/CSE	

V - SEMESTER

Course Title	AUTOMATA THEORY	L	T	P	C
Course Code		4	1	0	4

PRE-REQUISITES

Basic knowledge of Mathematics, Set theory, Mathematical induction principles.

OBJECTIVES

- The objective of the course is to impart knowledge on Automata Theory

OUTCOMES

After completion of the subject the students are expected to be able to

Sl.No	Course Outcome	Bloom's Level
1.	Design of digital circuits.	K1, K2, K5
2.	Design of Lexical analyzer	K1, K2, K3
3.	Designing software for identifying the words, phrases and other patterns in large bodies of text.	K2, K4, K5
4.	To write software for processing the natural language.	K1, K3, K5
5.	To apply In Artificial Intelligence and knowledge engineering, in game theory and games, computer graphics, linguistics etc.,	K3, K4, K5

POs and COs MAPPING TABLES

	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO01					✓		✓				✓	
CO02	✓			✓	✓	✓	✓	✓			✓	✓
CO03		✓		✓	✓		✓			✓		
CO04	✓				✓	✓		✓		✓		✓
CO05	✓	✓		✓	✓	✓		✓		✓		

UNIT – I   FINITE AUTOMATA

An informal picture of finite automata - Deterministic finite automata – Non- deterministic finite automata – An application: Text search – Finite automata with epsilon transitions

UNIT- II   REGULAR EXPRESSIONS AND LANGUAGES

Regular expressions – Finite automata and regular expressions – Applications of regular expressions: Regular expressions in UNIX, Lexical analysis, Finding patterns in a text – Algebraic laws for regular expressions

UNIT – III   CONTEXT FREE GRAMMARS AND LANGUAGES

Context free grammars – Parse trees – Applications of context free grammars: Parsers, The YACC parser generator, Markup languages, XML and document type definitions – Ambiguity in grammars and languages.

UNIT – IV   PUSHDOWN AUTOMATA

Pushdown automaton – The languages of a Pushdown automaton – Equivalence of Pushdown automaton and Context free grammars – Deterministic pushdown automata.

UNIT – V   INTRODUCTION TO TURING MACHINES

Problems that computers cannot solve – The Turing machine – Programming techniques for

Turing machines – Extensions to the basic Turing machine – Restricted Turing machines – Turing machines and computers

Note: The second edition of the prescribed text book differs drastically in treatment (Application oriented) from the first edition (Theory oriented). Hence the treatment of the second edition is to be followed. Questions are to be set on problem solving and not on the theoretical aspects.

TEXT BOOK

| 1. | Hopcroft E.John, Motwani Rajeev, Ullman D. Jeffrey, Introduction to Automata theory, Languages and Computation, Second Edition, Pearson Education 2001 |

REFERENCES

1.	Anderson, A.James, Automata theory with Modern Applications, Cambridge University Press, 2006
2.	Carlos Martín-Vide, Victor Mitrana, Grammars and Automata for String Processing,Taylor & Francis, CRC Press, 2004
3.	Linz Peter, An Introduction To Formal Languages And Automata, Jones & Bartlett Publishers, 2011

PREPARED BY

Dept. of Mathematics

Course Title	COMPUTER NETWORKS	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basics of Computer and Digital Circuits.

OBJECTIVES

- To develop an understanding of modern network architectures from a design and performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
- To provide an opportunity to do network programming
- To provide a WLAN measurement idea.

COURSE OUTCOMES

1.	Explain the functions of the different layer of the OSI Protocol.
2.	Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3.	For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
4.	For a given problem related TCP/IP protocol developed the network programming.
5.	Configure various application layer components and tools.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	L												M		
CO 02		S											L		L
CO 03			S							M			L		M
CO 04				M							L		L		
CO 05					S				S				L	M	

UNIT- I	INTRODUCTION & PHYSICAL LAYER	9

Data communication Components: Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media

UNIT- II	DATA LINK LAYER	9

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

UNIT- III	NETWORK LAYER	9

Switching, Logical addressing – IPV4, IPV6; Address mapping –ARP, RARP and BOOTP, Forwarding and Unicast Routing protocols. Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing.

UNIT- IV	TRANSPORT LAYER	9

Process to Process Communication, User Datagram Protocol(UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT- V	APPLICATION LAYER& CASE STUDY	9

Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, HTTPS, TFTP, SNMP, Bluetooth, Firewalls.(Case study): LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Wireless networks:- wifi : 802.11, Wireless Sensor Networks

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	Data Communication and Networking, 5th Edition, Behrouz A. Forouzan, McGraw-Hill.2017
2.	Data and Computer Communication, 10th Edition, William Stallings, Pearson Prentice Hall India. 2014

REFERENCES

1.	Computer Networks, 6th Edition, Andrew S. Tanenbaum, Nickfeamster, David J Wetherall, Pearson Prentice Hall India.2022
2.	Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
3.	TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

WEB SOURCE REFERENCES

1.	https://archive.nptel.ac.in/courses/106/105/106105081/
2.	https://www.tutorialspoint.com/data_communication_computer_network/dcn_useful_resources.htm

PREPARED BY

Mr.E.Sankar, & Dr.M.Thirunavukkarasu, Assistant Professors/CSE

Course Title	PROGRAMMING IN JAVA	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic Object Oriented Programming skills.

OBJECTIVES

•	To understand the concept and principles of OOP as well as the purpose and usage of Exception Handling,
•	Design and implement a Collection classes and integration with real time applications
•	To develop programs using the Java Collection API as well as the Java standard class library.
•	To learn and understand how to connect java with any databases for development of n tier architectures software solutions
•	To Learn and Understand the concept of GUI programming with AWT and SWING concepts

COURSE OUTCOMES

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

1.	Apply the concepts and Purpose of Object oriented Programming concepts for developing and Implementing required software.
2.	Apply the principles of Collections classes and file concepts to implements various software applications
3.	Implement the applications by using java API concepts, to discover errors of Java programs for collaborative programming/editing.
4.	Design and Implementation of Connecting java with Databases to provide the solutions to the customers in N-Tier business software.
5.	Design and Implements the concept of GUI based software applications using appropriate GUI API.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01							L				M		S		
CO 02	L	M			L										
CO 03			S									L		M	
CO 04			M												
CO 05				S							L				S

UNIT – I   JAVA FUNDAMENTALS   9

Introduction to Java: Fundamentals of OOPS-Java Evolution, Java Vs C++-JVM- Java Basics: Java Tokens, Constants, Data Types & Variables, Operators, Expressions : Conditional and Unconditional Expressions - String Handling: String Basics, String Operations, Character Extraction, String Buffer, Arrays, Classes, objects and Methods, Final, Static - Inheritance and Its Types, Exception Handling.

UNIT – II	INHERITANCE, PACKAGES & INTERFACE	9

Inheritance: Inheritance Syntax and types – Multiple Inheritance, Preventing inheritance-Interfaces: Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interfaces - Packages: Creating and Accessing Packages, Mechanisms of Using Packages, Hiding Classes, Import command, Roles of Accesses specifier in Implements and Extending class.

UNIT – III	MULTITHREADING, I/O & NETWORKING	9

Multithread Programming: Fundamental Concepts, Thread Creations, Thread Life Cycle, Thread Priorities and Thread Scheduling - Managing I/O Files: Concepts of I/O Streams, Stream classes, character Streams, Byte Streams, File Streams- Exploring java.net: InetAddress, Server Socket, socket, Datagram Packet, Datagram Socket, and Multicast Socket

UNIT – IV	COLLECTIONS, APPLET & AWT	9

Exploring java.Util: collections, Enumerations, iterations, String Tokenizer, Bitset, Date, Calendar, Gregorian Calendar, Time Zone, Currency-Applet Programming: AWT: Abstract windows toolkits, components, Containers, panels, Layouts managers, Handling Events: Listener, Interfaces and Adapter classed for various components- Applet Fundamentals-Java Application Vs Java Applets, Applet life Cycle, Building the Applet code, Running the Applet.

UNIT - V	SWING & JDBC	9

Exploring javax.swing: JComponents, containers, Panels, Layout Managers, Basic Components, Advanced Components-components- JDBC principles' N-Tier Architectures, Database Drivers, JDBC-ODBC Drivers Exploring java.sql-connection, Driver Manager, Statement, Resultset, Callable statement, prepared Statement, Resultset Metadata & Database Meta Data.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS	
1.	Herbert Schildt, "Java The Complete Reference", 12th Edition, Tata McGraw Hill, 2022. ISBN:9781260463415
2.	JAVA : A Beginner's Guide Ninth Edition November 2022
3.	James Jaworski, "Java Unleashed", 4th revised edition, SAMS Tech media Publications, Digitized-2010.

REFERENCES	
1.	Kogent Solution Inc ,Java 6 Programming Black Book, New Ed, Dream tech Press, 2007
2.	Campione, Walrath and Huml, "The Java Tutorial", Addison Wesley, 2001.
3.	Elliotte Rusty Harold ,Java Network Programming, fourth Edition, O'Reilly Media, Inc.", 2013, (for Java.net package in Unit -III)
4.	Java Database Programming Bible, John O' Donahue, illustrated Edition, Wiley, 2002 (for Unit -V)
5.	Fundamentals of Java Programming , Authors: Ogihara, Mitsunori (2018)- ISBN 978-3-319-89491-1

WEB SOURCE REFERENCES	
1.	https://onlinecourses.nptel.ac.in/noc22_cs47/preview
2.	https://www.iitk.ac.in/esc101/share/downloads/javanotes5.pdf

PREPARED BY

Dr V Geetha, & Dr.C.K.Gomathy, Assistant Professors/CSE

Course Title	**DATABASE MANAGEMENT SYSTEMS**	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Fundamentals of Computer Knowledge

OBJECTIVES

- To understand the different database models and language queries to access databases.
- To understand the SQL Query Processing through relational algebra and calculus
- To understand the normalization forms in building an effective database tables
- To protect the data and the database from unauthorized access and manipulation.

COURSE OUTCOMES

On successful completion of the course the students will be able to:

1.	Understand database concepts, E R model and relational model
2.	Understand the structures of SQL and query language, processing. Apply the SQL and PL/SQL programming with SQL tables ,Views and Embedded SQL
3.	Understand Functional Dependency, apply various normalization techniques.
4.	Familiar with the basic issues of transaction processing and concurrency control.
5.	Understand the principles of storage structure and understand advanced storage mechanism.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S		M										S	M	
CO 02	M	S									M		M		
CO 03			S	S			M						M		
CO 04			S		S			M					M	M	
CO 05	L					M	M				M	S			

UNIT- I   INTRODUCTION   9

File Systems Organization - Sequential - Purpose of Database System- Database System Terminologies-Database characteristics-DBMS Architecture - Data models – Types of data models – Components of DBMS-Relationship model - Extended ER model. LOGICAL DATABASE DESIGN: Relational DBMS - Codd's rules.

UNIT- II   SQL   9

Relational algebra - Relational calculus -Tuple relational calculus - Domain relational calculus -Integrity constraints. Data types - Database Objects- SQL Commands-DDL, DML, DCL and TCL - Aggregate operations, Joins .Query Processing and Optimization Embedded SQL- Introduction to Views. Queries on view.PL/SQL Introduction .PL/SQL Triggers and Cursor.

UNIT – III   NORMALIZATION AND TRANSACTION PROCESSING   9

Schema Refinement - Functional dependencies - Normalization - Decomposition - Armstrong's axioms - 3NF, BCNF, 4NF - Multivalued dependencies. Denormalization. Introduction Transaction processing- Properties of Transaction- Serializability Concurrency Control – Recovery -Locking Mechanisms- Two Phase Commit Protocol -Deadlock.

UNIT – IV	STORAGE MEDIA	9

Overview of Physical Storage Media – Magnetic Disks – RAID Levels –File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B tree Index Files – Static Hashing – Dynamic Hashing.

UNIT – V	DATABASE SECURITY	9

Data Classification-Threats and risks – Database access Control – Types of Privileges – SQL injection Statistical Databases. Introduction to Temporal–Spatial - Multimedia -Object-oriented-XML- Mobile and Web databases.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, McGraw Hill, 2021.
2.	Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2017

REFERENCES

1.	Raghu Ramakrishnan ,Johannes Gehrke "Database Management Systems", 3rd illustrated Edition , WCB, McGraw Hill, 2003
2.	C.J. Date, "An introduction to Database Systems", 8th Edition, Pearson Education,2006.
3.	SQI, PL/SQL The Programing Language of ORACLE :4th Edition By Ivan Bayross - 2010.

WEB SOURCE REFERENCES

1.	https://archive.nptel.ac.in/courses/106/105/106105175/
2.	https://iiht-kharghar.com/database-management/

PREPARED BY

Dr.M.Saraswathi, Assistant Professor/CSE

Course Title	COMPUTER NETWORKS LAB		L	T	P	C
Course Code			0	0	3	2

PRE-REQUISITES

Basic Concepts Of Programming

OBJECTIVES

- To learn and use of network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To learn and use of simulation tools.
- To use simulation tools to analyze the performance of various network protocols

COURSE OUTCOMES

1.	Implement various protocols using TCP and UDP.
2.	Compare the performance of different transport layer protocols.
3.	Use simulation tools to analyze the performance of various network protocols.
4.	Analyze various routing algorithms
5.	Implement error correction codes

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M														
CO 02		M													
CO 03			S		S						L				
CO 04				S											
CO 05										M					

LIST OF EXPERIMENTS

1.	Learn to use commands like tcpdump, netstat, ifconfig, nslookup and trace route. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2.	Write a program to identify your machine's host name and IPaddress.
3.	Write a HTTP web client program to download a webpage using TCP sockets.
4.	Applications using TCP sockets like: a. Echo client and echo server b. Chat c. File Transfer
5.	Write a code simulating ARP /RARP protocols.
6.	Study of Network simulator (NS2,and NS3) and Simulation of Congestion Control

	Algorithms using NS.
7.	Study of TCP/UDP performance using Simulation tool.
8.	Simulation of Distance Vector/ Link State Routing algorithm.
9.	Write a program to obtain local DNS server's host name and IP address.
10.	Write a code for error correction code (likeCRC).
11.	Writing Wireshark filter expressions for packet capture
12.	Analysis of RTP packet delay and loss using Writing Wireshark
13.	Use Wireshark to inspect packets on your network
14.	Create a Simple Network Using cisco Packet Tracer
15.	Study topology – benchmark LAN trainer kit
PREPARED BY	
Mr.E.Sankar, & Dr.M.Thirunavukkarasu, Assistant Professors/CSE	

Course Title	JAVA PROGRAMMING LAB	L	T	P	C
Course Code		0	0	3	2

PRE-REQUISITES

Basic of Object Oriented Programming Skills

OBJECTIVES

•	To Train the students to implement concept of OOP (Inheritance, polymorphism, encapsulation and method overloading)
•	To analyze and implement the collection classes needed for a specific problem by the students
•	Train the students to create and demonstrate Java application programs using OOP practices (e.g., interfaces and APIs)
•	Train the students to identify the Java API for the Networking and APPLET Programming,
•	Train the student to create the N-Tier Architecture based business applications and solutions for right companies through connecting java with any databases.

COURSE OUTCOMES

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

1.	Use an appropriate concepts of Object oriented concepts and Exceptional handling
2.	Design and Implement the concept of package and Interface concepts for API development
3.	Use the file reading and writing concepts to implements various software applications.
4.	Design and implementation of Threading concepts and its emerging needs.
5.	Design and Implementation of Connecting java with Databases to provide the solutions to the customers

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S		M						L				S		
CO 02		M										L			
CO 03	L		S								M			L	
CO 04			M					S							
CO 05			L	S								M			S

LIST OF PROGRAMS

1.	**Simple Java Applications** a. For understanding reference to an instance of a Class(object), methods b. Handling Arrays, Control statements and operators. c. Handling Strings in java.
2.	**Package Creation** a. Developing User defined packages in java

3.	**Interface**	
	a.	Developing user-defined interfaces and implementation.
	b.	Use of predefined Interfaces.
4.	**Inheritance**	
	a.	Handling inheritance in java
5.	**Threading**	
	a.	Creation of thread in java applications.
	b.	Multithreading
6.	**Exception Handling Mechanisms**	
	a.	Handling pre-defined exceptions
	b.	Handling user-defined exceptions
7.	File operations in java	
8.	**Applets Concepts Based Exercise**	
	a.	Handling simple applet programs.
	b.	Creation of color Palette.
9.	**Swings**	
	a.	Handling Layouts in java
	b.	Handling swing controls.
10.	**Database Connectivity**	
	a.	Handling backend connectivity for data retrieval
PREPARED BY		
Dr V Geetha, & Dr.C.K.Gomathy, Assistant Professors/CSE		

Course Title	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
Course Code		0	0	3	2

PRE-REQUISITES

Database Management System Concepts

OBJECTIVES

- Learn to create and use a database
- To understand DDL ,DML and TCL commands
- To demonstrate the use of various constraints
- To Perform PL/SQL Operations

COURSE OUTCOMES

On successful completion of the course the students will be able to:

1.	Understand SQL Commands.
2.	Understand various queries execution such as constraints, joins, aggregate functions
3.	Implement programs that use Views, sequence, save point
4.	Execute PL/SQL programs with procedure, Trigger and cursor.
5.	Design a database for real time systems

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S					M						L	S		
CO 02	M	S											M	S	
CO 03	M		S	M										S	
CO 04	M		S		S									S	
CO 05	M		S			M						M		S	M

LIST OF EXPERIMENTS

1.	Creation of a database and writing SQL queries to retrieve information from the Database.
2.	Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3.	Practicing DCL&TCL Commands
4.	Creating a database to set various constraints.
5.	Performing Queries using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.
6.	Queries using Aggregate functions, GROUP BY and HAVING .
7.	Creation of Views, Sequence, Indexes, save point.

8.	Normalization in Oracle (1NF, 2NF, 3NF, 4NF, 5NF) using Functional Dependencies.
9.	Creating relationship between the databases and performing join, sub queries
10.	PL/SQL programming: a) Write a PL/SQL block to satisfy some conditions by accepting input from the user. b) Write a PL/SQL block that handles all types of exceptions. c) Creation of Procedures and Function d) Creation of database triggers (Creation of insert trigger, delete trigger,update trigger) e) Creation of database with implicit and explicit cursor
11.	Database design using Oracle/ MySQL /SQL Forms/MS Access only backend process for the following a) Student Information system b) Hospital Management System. c) Railway Reservation System. d) Timetable Management System. e) Hotel Management System
PREPARED BY	
Dr.M.Saraswathi, Assistant Professor/CSE	

VI – SEMESTER

Course Title	COMPILER DESIGN	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Theory of formal languages, Computer Organization and Assembly language Programming

OBJECTIVES

- To introduce the major concept areas of language translation and compiler design.
- To extend the knowledge of parser by parsing LL parser and LR parser.
- To design the front end of the compiler, scanner, parser
- To design the back end of the compiler like intermediate code generator, object code generator and symbol table

COURSE OUTCOMES

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

1.	Explain the role of different phases of compilation with compile time error handling and represent language tokens using Regular expressions and learn to use the LEX tool.
2.	Apply different parsing algorithms to construct Parse tree or syntax tree with an understanding of Context free grammar and learn to use YACC tool.
3.	Design syntax directed translation schemes for a given context free grammar. Generate intermediate code for statements in high level language.
4.	Apply code optimization techniques to optimize intermediate code
5	Generate machine code for high level language program.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	M								S	S	L	M		
CO 02	L		M	S				L	S		S	L	M	S	
CO 03	S	M	M	S				L	S		M	M	M	S	
CO 04	L		M	M		M		L	S	S	M		M		
CO 05	L	M	M	M		M			S	S		L	M	S	

UNIT – I   INTRODUCTION TO COMPILING   9

Compilers Analysis of the source program –Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis –Role of Lexical Analyzer – Input Buffering –Specification of Tokens-Finite Automata-Regular expression to finite Automata- Minimization of NFA to DFA- LEX –Design of Lexical Analyzer.

UNIT – II   SYNTAX ANALYSIS   9

Role of the parser –Writing Grammars –Context Free Grammars – Top Down parsing – Recursive Descent Parsing – Predictive Parsing – Bottom up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser –Canonical LR Parser – LALR Parser – YACC- Design of a syntax Analyzer

UNIT – III	INTERMEDIATE CODE GENERATION	9

Syntax directed translation - Intermediate code generation- Postfix notation, Three address codes-quadruples, triples and indirect triples –Syntax trees-Declarations – Assignment Statements –Boolean Expressions – Flow of control statements– Switch Case Statements – Back patching – Procedure calls.

UNIT – IV	CODE OPTIMIZATION	6

Introduction – Principal Sources of Optimization –Loop optimization- Optimization of basic Blocks – DAG representation of Basic Blocks – Peephole Optimization- Basic Blocks and Flow Graphs –Basic Block-Next use Information-Flow Graphs- Representation of Flow Graphs-Loops

UNIT – V	RUN TIME ENVIRONMENTS AND CODE GENERATION	9

Runtime Environments: Storage Organization – Storage Allocation strategies – Access to non-local names – Parameter Passing

Code Generation: Issues in the design of code generator – The target Language – A simple Code generator – Generate code from DAGs

TOTAL LECTURE HOUR: 45hrs

TEXT BOOK

1.	Alfred V. Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman ,"Compilers: Principles, Techniques, and Tools",Pearson New International , 2013.

REFERENCES

1.	Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2015.
2.	J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw- Hill, 2003
3.	Raghavan V, "Principles of Compiler Design", Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2017.

WEB SOURCE REFERENCES

1.	www.cse.iitd.ernet.in/~sak/courses/cdp/slides.pdf
2.	http://nptel.ac.in/courses/106108052

PREPARED BY

Dr.C.Sunitha Ram, Assistant Professor/CSE

Course Title	SOFTWARE ENGINEERING		L	T	P	C
Course Code			3	0	0	3

PRE-REQUISITES

Basic concepts of computing knowledge

OBJECTIVES

•	Apply software engineering theory, principles, tools and processes, as well as the theory and principles of computer science
•	Design and experiment with software prototypes
•	Build solutions using different life-cycle approaches
•	Build architectures and in the organizational structures

COURSE OUTCOMES

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

1.	Basic knowledge and understanding of the analysis and design of complex systems.
2.	Ability to apply software engineering principles and techniques.
3.	Design and implement innovative features in a development process.
4.	Communicate effectively through software development.
5.	Contribute to society by behaving ethically and responsibly in software development.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S							L					S		
CO 02		M													
CO 03			S				M							M	
CO 04				M						S					
CO 05					S										S

UNIT – I INTRODUCTION 9

Introduction – Software engineering Paradigm – System engineering –Software characteristics -verification – validation- Software Cost Estimation Techniques- COCOMO- life cycle models-Water fall, Prototype, Evolutionary, Incremental, spiral, WINWIN Spiral, Agile

UNIT – II SOFTWARE REQUIRMENTS 9

System Analysis-Requirement analysis-Functional-Non-Functional-Analysis principles Prototyping-Software Requirement Specification – data dictionary-data modeling, functional modeling and behavioral Modeling.

UNIT – III SOFTWARE DESIGN 9

Design Process and Principles – Software design and types- Design concepts: Abstraction,

Refinement, Modularity and software architecture control hierarchy, structural partitioning and information hiding. Effective modular design: functional independence cohesion and coupling

UNIT – IV	SOFTWARE CONFIGURATION	9

Design Standards: -User interface design, Design for Real-time Systems: -analysis and simulation of real time Systems, Software Configuration System.

UNIT – V	SOFTWARE TESTING & MAINTENANCE	9

Software Testing Techniques: Software testing fundamentals-White Box Testing-Black box testing- Software Testing Strategies: A strategic approach to software testing- Unit testing-Integration testing validation testing-system testing, Software Maintenance.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	Roger Pressman.S., " Software Engineering : A Practitioner's Approach",McGraw Hill 7th edition.
2.	I Sommerville, " Software Engineering 10th edition: ", Addison Wesley, 2015

REFERENCES

1.	P fleeger, "Software Engineering ", 4th Edition, Pearson Education India, 2010.
2.	Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli " Fundamental of Software Engineering ", 2nd illustrated Edition, Prentice Hall of India,2003.
3.	Watts S.Humphrey,"A Discipline for Software Engineering", Pearson Education, 2007.

WEB SOURCE REFERENCES

1.	https://archive.nptel.ac.in/courses/106/105/106105182/
2.	https://cse.iitkgp.ac.in/~dsamanta/courses/se/index.html

PREPARED BY

Dr.C.K.Gomathy, & Dr V Geetha, Assistant Professors/CSE

Course Title	CYBER SECURITY	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Knowledge of Computer Networks and Security

OBJECTIVES

- Learn the foundations of Cyber security and threat landscape.
- Educate students to understand impact of cybercrime in society.
- To develop skills in cyber security mechanisms to ensure the protection of information technology assets.
- To expose students to governance, regulatory, legal, economic, environmental, social and ethical contexts of cyber security.
- To expose students to responsible use of online social media networks.

COURSE OUTCOMES

The end of course the students can able to

1.	Understand the concept of Cyber security and issues and challenges associated with it.
2.	Understand the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures
3.	Understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms
4.	Understand the basic concepts related to E-Commerce and digital payments. They will become familiar with various digital payment modes and related cyber security aspects, RBI guidelines and preventive measures against digital payment frauds.
5.	Understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M				S								M	M	
CO 02			S					L							L
CO 03		M					L			M					M
CO 04			S			M								M	
CO 05				M							M			L	

UNIT- I	INTRODUCTION	10

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security

UNIT -II	CYBERCRIME AND CYBER LAW	10

Classification of cybercrimes, Common cybercrimes- cybercrime targeting computers and mobiles, cybercrime against women and children, financial frauds, social engineering attacks, malware and ransom ware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cybercrime, IT Act 2000 and its amendments, Cybercrime and offences, Organizations dealing with Cybercrime and Cyber security in India, Case studies.

UNIT- III	SOCIAL MEDIA OVERVIEW AND SECURITY	10

Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.

UNIT- IV	E - COMMERCE AND DIGITAL PAYMENTS	10

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act,2007,

UNIT-V	DIGITAL DEVICES SECURITY, TOOLS AND TECHNOLOGIES FOR CYBER SECURITY	5

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions

TOTAL LECTURE HOUR: 45hrs

REFERENCES

1.	Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010.
2.	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
3.	Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)
4.	Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
5.	Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
6.	Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
7.	Fundamentals of Network Security by E. Maiwald, McGraw Hill.

PREPARED BY

Dr.D.Thamaraiselvi, Assistant Professor/CSE

Course Title	COMPILER DESIGN LAB		L	T	P	C
Course Code			0	0	3	2

PRE-REQUISITES

C and C++ programming.

OBJECTIVES

•	To understand the implementation of lexical analyzer, parser and other compiler design aspects.
•	To write codes for top down and bottom up parsers and verify them for correctness.
•	To understand Linux Utility LEX and YACC tools

COURSE OUTCOMES

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

1.	To apply the knowledge of lex tool & yacc tool to develop program for solving a scanner & parser.
2.	To apply the knowledge of patterns, tokens & regular expressions in programming for solving a problem
3.	To develop program to implement symbol table.
4.	To learn the new code optimization techniques and apply it to improve the performance of a program in terms of speed & space.
5.	To develop program for intermediate code generation.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	M		M	M				S	S	S	S	L	S	S
CO 02	L		M	S						S	S	L	S	S	
CO 03		M		S				S			M	M	L	S	
CO 04	L			M						S	L		L	S	
CO 05	L	M							S	S		L	L	S	

LIST OF PROGRAMS

C or C++ or Python or Java Programs

1.	Check whether a string belongs to a given grammar or not
2.	Check if Expression is correctly Parenthesized or not
3.	Find whether given string is Keyword or not
4.	Test whether a given identifier is valid or not
5.	Simulate lexical analyzer for validating operators
6.	Count Letters, digits, whitespaces and other chars in a given string

7.	Implement Shift Reduce Parser
8.	Find number of lines, blank space, word and characters using file operations
9.	Generation of tokens for given lexeme
10.	Implementation of symbol table
11.	Implement Recursive descent parser
12.	Generate Code from Three Address Code

LEX programs

1.	Separation of Tokens
2.	Categorize vowels and consonants in given word
3.	Count the number of lines, spaces and tabs
4.	Check the given number is valid integer or float
5.	Check the valid mobile number
6.	Find the small , capital letter and digit from the input text
7.	Removal of whitespace in given sentence
8.	Find whether given number is even or odd

YACC programs

1.	Implement Calculator
2.	Evaluate postfix expression
3.	Convert infix to postfix for given expression
4.	Convert infix to prefix for given expression

TEXT BOOK

1.	Alfred Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", Second Edition, Pearson Education Asia, 2006.

REFERENCES

1.	Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2015.
2.	C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Second Edition Benjamin Cummings, 2008.

WEB SOURCE REFERENCES

1.	https://www.geeksforgeeks.org/what-is-lex-in-compiler-design/
2.	https://www.geeksforgeeks.org/introduction-to-yacc/

PREPARED BY

Dr.C.Sunitha Ram, Assistant Professor/CSE

Course Title	WEB DEVELOPMENT LAB		L	T	P	C
Course Code			1	0	2	3

PRE-REQUISITES

Basic knowledge on computer network

OBJECTIVES

- To develop an ability to design and implement static and dynamic website
- Study about Basic HTML Tags with help of CSS Styling and client side Event handling using VB Script & java Script
- Handling Cookies and Sessions using PHP, SERVLETS and JSP
- Understand, analyse and build web applications using PHP
- Study about Cookies, Sessions and Database Handling with ASP, Servlet, JSP and PHP Technologies

COURSE OUTCOMES

After completion of the course, the students are expected to be able to:

1.	Understand, analyze and apply the role of languages like HTML, CSS, XML, JavaScript, PHP, SERVLETS, JSP and protocols in the workings of the web and web applications
2.	Have good web designing and web programming ability.
3.	Several commercial and non-commercial web application frameworks have been created that enforce the pattern.
4.	The frameworks vary in their interpretations, mainly in the way that the MVC responsibilities are divided between the client and server.
5.	Use request and response objects provided to a servlet to read parameters and to produce an HTML response.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S					M								M	
CO 02			M			S		M					S		
CO 03					S				L		M				S
CO 04			M						S				M		
CO 05				S				M						M	

LIST OF EXERCISES

Using Web Designing IDE's Like Dreamweaver, Front page, Expression Web, Share point to design following exercises

1.	Create a simple webpage using HTML.
2.	Use frames to Include Images and Videos.
3.	Add a Cascading Style sheet for designing the web page.

4.	Design a dynamic web page with validation using JavaScript.
5.	Write an HTML code to create your Institute website, Department Website and Tutorial website for specific subject.
6.	Write an HTML program to design an entry form of student details and send it to store at database server like SQL, Oracle or MS Access
7.	Course registration using ASP & Sql server (use cookies, sessions to be part of excises)
Using Eclipse (PHP & J2EE) IDE to implement following exercises	
8.	Any Online Application using Servlet & Sql server (use cookies, sessions to be part of excises)
9.	Any Online Application using JSP & Sql server (use cookies, sessions to be part of excises)
10.	Library Automation using PHP & Sql server (use cookies, sessions to be part of excises)
WEB SOURCE REFERENCES	
1.	https://www.oreilly.com/library/view/learning-web-design/9781449337513/ch04.html
2.	https://www.geeksforgeeks.org/servlet-session-tracking/
3.	https://www.digitalocean.com/community/tutorials/java-session-management-servlet-httpsession-url-rewriting
4.	https://www.w3schools.com/
5.	https://www.edureka.co/blog/servlet-and-jsp-tutorial/
PREPARED BY	
Dr. R. Poorvadevi, Assistant Professor/CSE	

Course Title	COMPUTER VISION LAB	L	T	P	C
Course Code		0	0	3	2

PRE-REQUISITES

Basic Knowledge in any Programming Language

OBJECTIVES

- To introduce the fundamentals of image formation;
- To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition;
- To develop an appreciation for various issues in the design of computer vision and object recognition systems;
- To provide the student with programming experience from implementing computer vision and object recognition applications.

COURSE OUTCOMES

After completing the course learners will be able to:

1.	Identify basic concepts, terminology, theories, models and methods in the field of computer vision
2.	Describe known principles of human visual system
3.	Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition,
4.	Describe image Processing and text recognition operations.
5.	Suggest a design of a computer vision system for a specific problem

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S		S												
CO 02				S		M				S				S	
CO 03													L		M
CO 04		M									S				
CO 05								S						M	

LIST OF EXERCISE

1.	Basic Image Operations
2.	Write a program for image enhancement
3.	Write a program for image compression
4.	Write a program for color image processing
5.	Image segmentation
6.	Image morphology

7.	Image Restoration
8.	Edge detection
9.	Blurring 8 bit color versus monochrome
10.	Simple Operations for binary image processing
11.	Facial Landmark detection using Dlib
12.	Simple applications for image classification using Keras
13.	Text detection and recognition
Mini Project (Select One)	
1.	Take a hand written document, perform preprocessing and try to segment into characters
2.	Take an image, design fuzzy rules for content based image retrieval.
3.	Take an image; design a neural network for content based image retrieval.
4.	Face recognition
PREPARED BY	
Dr.R.Prema, Assistant Professor CSE	

Course Title	CREATIVE AND INNOVATIVE PROJECT	L	T	P	C
Course Code		0	0	0	3

PRE-REQUISITES

Basic Knowledge of systematic software development process

OBJECTIVES

This course explores the creative approaches of recent (and historic) innovations in business, industry, and education. Through a case study approach, this course cultivates intentional and systematic competencies in students in order to develop leaders capable of solving problems in academia or business settings. Students will draw insights from the most innovative and successful corporations to explore their approaches (Apple, IBM, and Microsoft). Students will also examine the role of failure in innovations throughout history using foundational creative-thinking concepts.

COURSE OUTCOMES

After completion of the course the students are able to:

The Innovation and Creativity course builds a foundation in creative thinking through the examination of innovation in educational and business settings. Students will develop skills for analyzing innovations throughout the course. Students pursuing the minor in Applied Creative Thinking must earn project skills in this course.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M												M		
CO 02		S						L							
CO 03			S			L					S		S		
CO 04				S								S			
CO 05					S							M			S

SYLLABUS

Develop effective creative projects that provide an Innovative solution to real-world problems based on inquiry such as

- Class discussion,
- Critical analysis,
- Integrative collaboration,
- Observing,
- Using technology,
- APP development.

Innovation Case Proposal Project

PREPARED BY

Dr.C.K.Gomathy, & Dr V Geetha, Assistant Professors/CSE

VII - SEMESTER

Course Title	**COMPUTATIONAL BIOLOGY**	L	T	P	C
Course Code		2	1	-	

PRE-REQUISITES

Knowledge and awareness of the basic principles of biology, Mathematics.

OBJECTIVES

•	Bioinformatics is the science of storing, extracting, organizing, analyzing, interpreting and using information.
•	Approaches to the discipline of bioinformatics incorporate expertise from the biological sciences, computer science and mathematics.
•	To study about health record maintenance needed for Medical industry.
•	To design for biological database, genetics, information technologies and computer science.

COURSE OUTCOMES

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

1.	Knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics
2.	Problem-solving skills, including the ability to develop new algorithms and analysis methods.
3.	To understand the intersection of life and information sciences
4.	To understand the core of shared concepts, language and skills.
5.	To speak the language of structure- function relationships, information theory and database queries

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M												S		
CO 02		S								L				L	
CO 03			M					S							
CO 04				S											M
CO 05				S										S	

UNIT- I	OVERVIEW OF MEDICAL INFORMATICS	9

Healthcare functions and information technology, Key Players in Health Information technology (HIT), Organizations involved with HIT. Public Health Informatics - Information systems in public health. Internet based consumer health information – telehealth and telemedicine.

UNIT - II	CLINICAL DECISION-SUPPORT SYSTEMS	9

The Nature of clinical decision making, types of decisions, the role of computers in decision support-examples of clinical decision-support systems.

UNIT – III	DATABASES IN BIOINFOMATICS	9
Biological databases- Types of databases- Examples of databases: GenBank(Genetic Sequence Databank)-NCBI(National Center for Biotechnology Information)- EMB(European Molecular Biological Laboratory)- Swiss Prot		
UNIT – IV	**ALGORITHMS IN COMPUTING BIOLOGY**	**9**
Decision tree algorithm, Bayesian network: Bayes Theorem, Random forest algorithm, Genetic Algorithm.		
UNIT - V	**BIOMEDICAL DATA**	**9**
Their acquisition, storage and use, Electronic health records (EHR), Information Retrieval from Digital Libraries-PubMed, Cleveland, GENECARD		

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	A Primer for Computational Biology by Shawn T.O'Neil,Oregon State University,2017.
2.	Bioinformatics Algorithms: An Active Learning Approach, by Phillip Compeau, Pavel Pevzner, Active Learning Publishers, 2014.

REFERENCES

1.	Biomedical Informatics: computer applications in Health care and Biomedicine (3rd ed), by Shortliffe EH, Ciminio JJ., 2000, New York Springer-Verlag, ISBN 0-387- 28986-0.

WEB SOURCE REFERENCES

1.	https://iitj.ac.in/department/index.php?dept=biology&cat=Laboratories&id=computational_biology_bioinformatics
2.	https://onlinecourses.nptel.ac.in/noc22_bt03/preview

PREPARED BY

Dr.C.K.Gomathy & Dr. V. Geetha, Assistant Professors/CSE

PROFESSIONAL ELECTIVES

Course Title	**INTERNET OF THINGS**	L	T	P	C
Course Code		3	0	0	3

PREAMBLE

This course aims at providing a basic understanding of Internet of Things, exemplifying the Application areas where Internet of Things can be applied and enables designing prototypes of Internet-connected products using appropriate tools.

PRE-REQUISITES

Basic knowledge in Networking, cloud computing and Programming

OBJECTIVES

Students will understand the concepts of Internet of Things and can able to build IoT applications.

COURSE OUTCOMES

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

1.	Describe the general IoT architecture and connected domains.
2.	Analyze the requirements to figure out the suitable communication technology and protocols required for an IoT application
3.	Develop an IoT management System using network management protocol.
4.	Design a step by step Model Specifications for an IoT System based on IoT – A Reference model.
5.	Develop an IoT application using Raspberry Pi for the given specification applying the IoT technologies.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	M	L	-								M			
CO 02	S	S	M	L	-	L	L	L	M	L		M			
CO 03	S	M	L	-	M	L	L	L	M	L		M			
CO 04	S	M	L	-	-	L	L	L	M	L		M			
CO 05	S	M	L	-	M	L	L	L	M	L		M			

UNIT- I INTRODUCTION TO IOT

Introduction, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, Types of Sensors, Types of Actuators, IoT Networking, IoT Levels and Deployment Templates, IoT and M2M, SDN and NFV for IoT. Wireless Protocol for IoT, Communication Technologies - NFC, Bluetooth, Wi-Fi, ZigBee, Z-wave, 6LoWPAN, HTTP, AMQP, Features & Functions of CoAP, MQTT, OAuth2, XMPP, CoAP vs HTTP.

UNIT-II IOT SYSTEM MANAGEMENT WITH NETCONF

Need for IoT System Management, SNMP, Network Operator Requirements, NETCONF, YANG, NETOPEER, Managing Home Intrusion Detection IoT System with NETCONF-YANG

UNIT-III	IOT PLATFORMS DESIGN METHODOLOGY

IoT Design Methodology – Purpose and Requirement Specification, Process Model Specification, Domain Model Specification, Information Model Specification, Service Specification, IoT Level Specification, Functional and Operational View Specification, Device and Component Integration, Application Development.

UNIT-IV	IOT PHYSICAL DEVICES AND ENDPOINT

Basic Building Block of an IoT Device, Exemplary Device: Raspberry Pi, about the board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python, Other IoT Devices- pcDuino, BeagleBone Black, Cubieboard.

UNIT-V	IOT PHYSICAL SERVER AND CLOUD

Cloud Storage Models and Communication API, WAMP, Xively Cloud, Designing RESTful Web API, AWS for IoT, SkyNet IoT Messaging platform. Case Studies: Home Automation, Smart city, Environment, Agriculture, Healthcare, IIoT, Multi-Tier Deployment.

TEXT BOOKS

1.	Sudip Misra, Anandarup Mukherjee, Arijit Roy," Introduction to IoT", Cambridge University Press,2022.
2.	Arshdeep Bahga, Vijay Madisetti, Internet of Things: A Hands on Approach, 2014
3.	Uckelmann, Dieter, Mark Harrison, and Florian Michahelles, Architecting the Internet of Things. Springer Science & Business Media, 2011.
4.	Jean-Philippe Vasseur, Adam Dunkels, Interconnecting Smart Objects with IP: The Next Internet, Morgan Kuffmann, 2010
5.	Jonathan L. Zittrain, The Future of the Internet, Yale University Press & Penguin UK 2008.
6.	Samuel Greengard, The Internet of Things (The MIT Press Essential Knowledge series), MIT Press, 2015

PREPARED BY

Dr.M.Thirunavukkarasu, Assistant Professor/CSE

Course Title	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic concepts of Object oriented and Software development.

OBJECTIVES

- To introduce the concept of Object-oriented design
- To be familiar with problems of complex systems, evolution of object-oriented model, classes, object-oriented methodology and it notations
- To provide the students with applications, case studies and CASE tools
- To learn different diagram techniques of recommender system

COURSE OUTCOMES

After completion of the course the students are able to:

1.	Use an rational rose framework and explore its capabilities
2.	Apply appropriate method of diagrammatic techniques.
3.	Design and implement innovative features in a development process.
4.	Design and implement are commander system.
5.	Examine the performance of UML with various diagrammatic presentations.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M												S		
CO 02		S			L									M	
CO 03			S								S				
CO 04				L				M	S						
CO 05					S					M					S

UNIT–I   INTRODUCTION   9

Object Orientation – System development – Review of objects - inheritance - Object relationship – Dynamic binding – OOSD life cycle – Process – Analysis – Design – prototyping–Implementation–Testing-Overview of Methodologies

UNIT–II   METHODOLOGY   9

Rambaugh methodology, OMT–Booch methodology, Jacobson methodology–patterns-Unified approach–Dynamic modeling.

UNIT–III   UNIFIED MODELLING LANGUAGE   9

Introduction - UML – Meta model - Analysis and design – Outline Development Process: Overview of the process-Inception - Elaboration-construction-refactoring-patterns transmission

UNIT–IV	DESIGN AXIOMS	9
OODesign axioms–Class visibility–refining attributes–Methods–Access layer–OODBMS–Table–class mapping view layer		
UNIT–V **UML DIAGRAMS**		**9**
Interaction diagram-package diagram-state diagram-activity diagram-deployment diagram – UML and programming		

TOTAL LECTURE HOUR: 45hrs

TEXT BOOK

1.	AliBahrami,"Object Oriented System Development",McGraw-Hill International Edition 2017.

REFERENCES

1.	Booch G.,"Object oriented analysis and design",Addison-Wesley Publishing Company 3rdedition.
2.	Rambaugh J,Blaha. M.Premeriani, W.,Eddy FandLoresen W., "Object Oriented Modeling and Design", PHI
3.	Martin Fowler, Kendall Scott,"UML Distilled",Addision Wesley
4.	Eriksson,"UMLToolKit", Addison Wesley.

WEB SOURCE REFERENCES

1.	https://nptel.ac.in/courses/106105151
2.	https://paris.utdallas.edu/reu/document/05-Slides/11-Mehra-Borazjany-OOAD-Part1.pdf

PREPARED BY

Dr.C.K.Gomathy & Dr V Geetha, Assistant Professors/CSE

Course Title	**ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic knowledge of Mathematical Logic and Linear Algebra and Calculus

OBJECTIVES

•	Introduce and define the meaning of Intelligence and explore various paradigms for knowledge encoding in computer systems.
•	Introduce subfields of AI such as NLP, Game Playing, Bayesian Models, etc.
•	Introduce the concept of learning patterns from data and develop a strong theoretical foundation for understanding state of the art Machine Learning algorithms.
•	Introduce the concept of AI Techniques
•	Introduce the research skills of AI

COURSE OUTCOMES

After completing the course, students will able to:

1.	Exhibit strong familiarity with a number of important AI techniques, including in particular search, knowledge representation, planning and constraint management.
2.	Interpret the modern view of AI as the study of agents that receive percepts from the environment and perform actions.
3.	Build awareness of AI facing major challenges and the complexity of typical problems with in the field.
4.	Assess critically the techniques presented and apply them to real world problems.
5.	Develop self-learning and research skills to tackle a topic of interest on his/her own or as part of a team.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M	M							S						M
CO 02	M	M			L				S		L		H		
CO 03	M	M							S						
CO 04	M	M							S		L			H	
CO 05								H							

UNIT–I   INTRODUCTION   9

Defining Artificial Intelligence, Defining AI techniques - State Space Search and Heuristic Search Techniques - Production systems and characteristics, Hill Climbing, Breadth first and depth first search, Best first search

UNIT–II   KNOWLEDGE REPRESENTATION   9

Representations and Mappings, Approaches to knowledge representation -Representing simple facts in logic, Computable functions and predicates, Procedural vs Declarative

knowledge, Logic Programming, Forward vs backward reasoning-Non-monotonic Reasoning, Logics for non-monotonic reasoning

| **UNIT–III** | **CLASSIFICATION** | **9** |

Idea of Machines learning from data, Classification of problem–Regression and Classification, Supervised and Unsupervised learning-Model representation for single variable, Single variable Cost Function, Gradient Decent for Linear Regression, Multivariable model representation, Multi variable cost function, Gradient Decentin practice, Normal Equation and non-in vertibility

| **UNIT–IV** | **OPTIMIZATION TECHNIQUES** | **9** |

Classification, Hypothesis Representation, Decision Boundary, Cost function, Advanced Optimization, Multi-classification(Onevs All),Problem of Over fitting, Regularization

| **UNIT–V** | **CASE STUDIES** |

Case Studies: Neural Networks-Support Vector Machines –Recommender Systems

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	Artificial Intelligence: A Modern Approach, Stuart Russel, Peter Norvig 2013
2.	Artificial Intelligence,2ndEdition,RichandKnight 2009
3.	Machine Learning, Tom M. Mitchell 2008
4.	Building Machine Learning Systems with Python, Richert & Coelho 2008

REFERENCES

1.	Artificial Intelligence by Elaine Rich, Kevin Knight and Nair ISBN-978-0-07- 008770-5,TMH, 2000
2.	Prolog Programming for A.I. by Bratko,T MH 2009
3.	Artificial Intelligence by Saroj Kausik ISBN:-978-81-315-1099-5,CengageLearning 2008
4.	Artificial Intelligence and Intelligent Systems by Padhy, Oxford University Press, 2009

WEB SOURCE REFERENCES

| 1. | https://nptel.ac.in/courses/106105077 |

PREPARED BY

Dr.R.Prema, Assistant Professor/ CSE

Course Title	DATA WAREHOUSING AND MINING	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Good knowledge in algorithms and data management.

OBJECTIVES

- To understand the principles of Data warehousing and Data mining.
- To be familiar with the Data warehouse architecture and its Implementation.
- To know the Architecture of a Data mining system.
- To understand the various Data pre-processing methods and association analysis.
- To perform classification and prediction of data.

COURSE OUTCOMES

The student will be able to:

1.	Understand the Data Warehouses, Operational Data Stores (ODS) and OLAP characteristics.
2.	Understand the data mining concept, application and their usage.
3.	Analyze the frequent patterns using association analysis algorithms like apriori, FP-growth etc.
4.	Understand the concept of classification, different classification algorithms and their applications.
5.	Understand the concept of clustering and different cluster analysis methods.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M	-	-	-	-	-	-	-	-	-	-	M	M	-	-
CO 02	M	-	-	-	-	-	-	-	-	-	-	M	M	-	-
CO 03	S	-	-	-	-	-	-	-	-	-	-	M	M	-	-
CO 04	M	L	-	-	-	-	-	-	-	-	-	M	M	-	-
CO 05	M	M	-	-	-	-	-	-	-	-	-	M	M	-	-

UNIT – I   WAREHOUSING & MODELING

Basic Concepts: Data Warehousing: A Multitier Architecture, Data Warehouse Models: Enterprise Warehouse, Data Mart and Virtual Warehouse, Extraction, Transformation And Loading, Data Cube: A Multidimensional Data Model, Stars, Snowflakes and Fact Constellations: Schemas for Multidimensional Data Models, Dimensions: The Role of Concept Hierarchies, Measures: Their Categorization and Computation, Typical OLAP Operations.

UNIT – II   DATA WAREHOUSE IMPLEMENTATION& DATA MINING

Efficient Data Cube computation: An overview, Indexing OLAP Data: Bitmap index and join

index, Efficient processing of OLAP Queries, OLAP server Architecture ROLAP versus MOLAP Versus HOLAP. : Introduction: What is data mining, Challenges, Data Mining Tasks, Data: Types of Data, Data Quality, Data Pre-processing, Measures of Similarity and dissimilarity.

UNIT - III   ASSOCIATION ANALYSIS

Association Analysis: Problem definition, Frequent item set generation, Rule generation. Alternative methods for generating frequent item sets, FPGrowth Algorithm, Evaluation of association patterns.

UNIT - IV   CLASSIFICATION

Decision trees induction, Method for comparing classifiers, Rule based classifiers, K-Nearest neighbor classifiers, Bayesian classifiers.

UNIT - V   CLUSTERING ANALYSIS

Overview, K-Means, Agglomerative hierarchical Clustering, DBSCAN, Cluster evaluation, Density-based clustering, Graph-based clustering, Scalable clustering algorithms.

TEXT BOOKS

| 1. | Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Pearson, First impression,2014. |
| 2. | Jiawei Han, Micheline Kamber, Jian Pei: Data Mining -Concepts and Techniques, 3rd Edition, Morgan Kaufmann Publisher, 2012 |

REFERENCES

| 1. | Sam Anahory, Dennis Murray: Data Warehousing in the Real World, Pearson, Tenth Impression, 2012. |
| 2. | Michael.J.Berry, Gordon.S.Linoff: Mastering Data Mining, Wiley Edition, second edition, 2012. |

PREPARED BY

Dr. M. Gayathri, Assistant Professor/CSE

Course Title	E-COMMERCE	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic Knowledge of Computer and Internet

OBJECTIVES

- To convey electronic products to customers.
- Increase the life span of electronic products that the company offers.
- To continually upgrade the company with up-to-date e-business applications.
- To Promote the product Sales via E-Marketing.

COURSE OUTCOMES

After completion of the course the students are able to:

1.	Comprehend the underlying economic mechanisms and driving forces of E-Commerce Understand the critical building blocks of E-Commerce
2.	Appraise the opportunities and potential to apply and synthesize a variety of E-Commerce concepts and solutions for organizations, customers, and business partners
3.	Formulate E-Commerce strategies that lever firms' core competencies, facilitate organizational transformation, and foster innovation
4.	Undertake planning, organizing, and implementing of E-Commerce initiatives to effectively respond to of dynamic market environments.
5.	Students can able to understand the multimedia concepts and digital environment so fe-commerce

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	S						L		S			S		
CO 02														S	
CO 03				M	L		S			S					
CO 04	S					L					M	L			
CO 05	M									S					M

UNIT – I   INTRODUCTION   9

Electronic Commerce Framework– The Anatomy of E-Commerce Applications. The Network Infrastructure for E-Commerce, The Internet as a Network Infrastructure.

UNIT–II   E- PAYMENT SYSTEM   9

Electronic Payment Systems, Inter organizational Commerce and EDI, EDI Implementation, MIME and Value–added Networks.

UNIT–III   E ADVERTISING AND MARKETING   9

Advertising and Marketing on the Internet, Computer Based Education and Training, Technological Components of Education on-Demand, Digital Copyrights..

UNIT–IV	DIGITAL LIBRARY	9
The Corporate Digital Library–Dimensions of Internal Electronics Commerce Systems, Making a Business case for a document Library, Types of Digital documents, Issues behind document Infrastructure, Corporate data ware houses.		
UNIT–V	**MOBILE COMPUTING**	**9**
Multimedia and Digital Video – Broadband Telecommunications–Mobile and Wireless Computing Fundamentals.		

TOTAL LECTURE HOUR: 45hrs

TEXT BOOK

1.	Kalakota & Whinston ,"Frontiers of Electronic Commerce", Pearson Education,2022.

REFERENCES

1.	Kamalesh K.Bajaj,"E-Commerce: The Cutting Edge & Business ",Second Edition, Tata McGraw-Hill, 2015.
2.	Brenda Kennan, "Managing your E-Commerce Business",PHI,2011.
3.	"Electronic Commerce from Vision to Fulfillment ",PHI, Elias M.Awad, Feb-2003.
4.	"Electronic Commerce–Framework, Technology and Application" ,TMH, Bharat Bhaskar, 2013.

PREPARED BY

Dr.C.K.Gomathy, & Dr. V. Geetha, Assistant Professors/CSE

Course Title	**BLOCKCHAIN TECHNOLOGY**	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Good in Programming, Basic Knowledge Of Computer Security, Cryptography, Networking, Concurrent Or Parallel Programming.

OBJECTIVES

This course is offered as an elective for the Graduate students of Computer Science and Engineering / Information Technology. This course is aimed at introducing Block chain concepts, use cases of Block chain, challenges and technical gaps in crypto currency domain.

COURSE OUTCOMES

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

1.	Familiarize the functional/operational aspects of crypto currency ECOSYSTEM
2.	Understand emerging abstract models for Block chain Technology. (CO2) Understand
3.	Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain (CO3) Evaluate

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S										M				
CO 02			M							L					
CO 03			M											M	

UNIT – I   INTRODUCTION TO BLOCK CHAIN BASICS

Introduction to Block chain Basics – History- Architecture – Conceptualization - Basic Crypto Primitives - Bit coin Basics - Distributed Consensus- Consensus in Bit coin Basics, PoW and Beyond, The Miners.

UNIT – II   BASICS OF PERMISSIONED BLOCKCHAIN

Basics of Permissioned Block chain – Consensus- RAFT Consensus, Byzantine General Problem, Practical Byzantine Fault Tolerance - Overview of Block chain for Enterprise –- Block chain Components and Concepts.

UNIT – III   HYPER LEDGER FABRIC DETAILS

Hyper ledger Fabric details – Transaction Flow - Membership and Identity Management – Hyper ledger Fabric Network Setup – Hyper ledger Composer – Application Development – Hyper ledger Composer – Network Administration

UNIT – IV   BLOCKCHAIN USE CASES

Block chain Use Cases : Block chain in Financial Service (Payments and Secure Trading, Compliance and Mortgage, Financial Trade) - Revolutionizing Global Trade – Supply Chain- Block chain in Other Industries - Block chain in Government (Advantages, Use Cases, Digital Identity) – Hyper ledger Indy, Tax Payments and Land Registry Records

UNIT – V   BLOCKCHAIN SECURITY

Block chain Security: Overview, Membership and Access control in Fabric, Privacy in Fabric

Side DBResearch Aspects: Consensus Scalability, Bit coin-NG, and Collective Signing, Byzcoin – Algor and, Cross Fault Tolerance, Secured Multi-Party Computation – Block chain for Science: Block chain for Big Data, Block chain and AI.

Qualitative Analysis and Demo (Not to be considered for evaluation)
Comparing Ecosystems – Ethereum- Ethereum development tools and Quorum – Corda Fabric Demo on IBM Block chain Cloud - Fabric Demo, deploy from scratch.

TEXT BOOKS	
1.	Mastering Bit coin: Unlocking Digital Crypto currencies, by Andreas Antonopoulos (Unit I)
2.	Block chain by Melanie Swa, O'Reilly (Units II,IV)
3.	Hyper ledger Fabric - https://www.hyperledger.org/projects/fabric (Unit IV)
4.	Zero to Block chain - An IBM Redbooks course, by Bob Dill, David Smits
5.	https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html (Unit V)

HANDS-ON BLOCKCHAIN WITH HYPERLEDGER	
1.	1Publisher:https://www.packtpub.com/big-data-and-business-intelligence /hands-block chain-hyper ledger
2.	Amazon (Kindle and Paperback):https://www.amazon.com/Hands-Blockchain- Hyper ledger-decentralized-applications/dp/1788994523
3.	Public github repository with code samples:
4.	https://github.com/HyperledgerHandsOn/trade-finance-logistics

WEB SOURCE REFERENCES	
1.	https://swayam.gov.in/nd1_noc19_cs63/preview

PREPARED BY
Mr.E.Sankar, & Dr.M.Thirunavukkarasu, Assistant Professor/CSE

Course Title	CLOUD COMPUTING	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic knowledge of computer networks and database concepts

OBJECTIVES

- Introducing cloud concepts
- Applications of cloud computing
- Virtualization and disaster recovery techniques
- Cloud security concepts
- Cloud computing advancements

COURSE OUTCOMES

At end of the course Student will be able to

1.	To explain the core concepts of the cloud computing paradigm.
2.	To apply the fundamental concepts in data centers
3.	To discuss virtualization and analyze various cloud programming models.
4.	To deploy applications over commercial cloud computing infrastructures.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M							L					S		
CO 02					S		L								S
CO 03		L			S									M	
CO 04			M		M										S
CO 05			S				M							M	

UNIT – I   CLOUD COMPUTING PRIMER   9

Cloud computing definition, characteristics, cloud architecture, cloud deployment models – private, public, hybrid and community cloud, cloud services – SaaS, PaaS, and IaaS, Drivers for building cloud infrastructure – a phased approach- virtualization and its benefits- cloud economics and challenges

UNIT – II   CLASSIC DATA CENTER (CDC)   8

Key elements of data center - application, DBMS, compute, storage and network, server clustering, RAID technology, intelligent storage system, DAS, FC-SAN – components, port type, addressing, and zoning, IP-SAN – iSCSI and FCIP, converged network - FCoE, NAS, object based and unified storage, backup-recovery and deduplication, local and remote replication, CDC monitoring and management.

UNIT – III VIRTUALIZED DATA CENTER (VDC) AND CLOUD STORAGE	**10**

Compute virtualization benefits - hypervisor types, virtual machine (VM) - resources, VM resource management, Storage virtualization benefits - storage for VMs, block and file level storage, Network virtualization - benefits, Cloud storage concepts - Distributed File Systems (HDFS, Ceph FS) Cloud Databases (HBase, MongoDB, Cassandra, DynamoDB)

UNIT – IV CLOUD MIGRATION AND CLOUD SECURITY CONCEPTS	**10**

VM migration, Considerations for choosing right application and cloud model, service provider specific considerations, cloud adoption phases, cloud security concepts, cloud security concerns and threats, security mechanisms in cloud at compute, storage, and network layer, Governance, Risk and compliance in Cloud

UNIT – V CLOUD TECHNOLOGIES AND ADVANCEMENTS	**8**

Hadoop – MapReduce – Virtual Box - Google App Engine – Programming Environment for Google App Engine - Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	Cloud Infrastructure and Services Student Guide - EMC Education Services
2.	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski: "Cloud Computing: Principles and Paradigms", Wiley, 2011

REFERENCES

1.	Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010
2.	Nikos Antonopoulos, Lee Gillam: "Cloud Computing: Principles, Systems and Applications", Springer, 2012
3.	Ronald L. Krutz, Russell Dean Vines: "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley-India, 2010
4.	Tim Mather, Subra Kumara swamy, Shahed Latif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O'Reilly Media, 2009.

WEB SOURCE REFERENCES

1.	https://www.zdnet.com/article/what-is-cloud-computing-everything-you-need-to-know-about-the-cloud/
2.	https://onlinelibrary.wiley.com/doi/book/10.1002/9780470940105
3.	https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/what-are-private-public-hybrid-clouds
4.	https://edisciplinas.usp.br/pluginfile.php/318402/course/section/93666/TR1599.pdf
5.	https://www.intel.com/content/dam/www/public/us/en/documents/guides/cloud-computing-private-cloud-infrastructure-as-a-service-guide.pdf
6.	https://www.everand.com/book/571961982/Handbook-of-Cloud-Computing-Basic-to-Advance-research-on-the-concepts-and-design-of-Cloud-Computing

PREPARED BY

Dr.R.Poorvadevi, Assistant Professor/CSE

Course Title	DIGITAL IMAGE PROCESSING	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic knowledge of Mathematical Logic and Linear Algebra and Calculus

OBJECTIVES

- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- To learn concepts of degradation function and restoration techniques.
- To study the image segmentation and representation techniques.
- To become familiar with image compression and recognition methods

COURSE OUTCOMES

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

1.	Demonstrate how digital images are acquired, stored and relationship between pixels
2.	Perform techniques to enhance of contrast and thereby improve the visual perception of contrast degraded imagery.
3.	Remove noise from real-world imagery using a variety of filtering techniques in both the spatial and frequency domain.
4.	Remove noise from real-world imagery using a variety of filtering techniques in both the spatial and frequency domain.
5.	Apply image processing techniques to imagery in order to detect structures such as points, lines and edges.

Detect/Extract regions of interest from an image using various segmentation, representation, Description techniques and employ morphological algorithm to clean up and cluster such regions for further analysis. Identify and apply these techniques to solve real-world image processing problems and propose solutions for the same.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	L	L	-	L	-	-	-	S	L	L	-	L			
CO 02	M	M	L	L	M	M	L	M	M	M	-	L	M		
CO 03	M	L	-	-	M	L	-	L	L	L	-	L			
CO 04	L	L	-	-	L	L	-	L	L	L	-	L		L	
CO 05	S	S	S	S	M	S	M	S	M	M	M	M			S

UNIT–I   IMAGING TECHNOLOGIES   9

Introduction to Image processing, it's need and applications-Image sensing and acquisition-CCD, CMOS, X-Ray, CT, MRI, Ultrasound, SAR, IR, Thermal-Imaging Components of an Image processing system.

UNIT–II	DIGITAL IMAGE MODEL	9

Illuminance and Reflectance: Image formats, Image Sampling and Quantization–Basic relationship between pixels-Connectivity and Distance measures.

Image Enhancement: Noise models -Gray level Transformations–Histogram processing–Fourier- Discrete cosine Transform –Spatial and Frequency domain filtering – smoothing, sharpening filters.

Coding Techniques:JPEG,MPEG-2

UNIT–III	SEGMENTATION	9

Thresholding–Threshold selection-Point, Line and Edge detection, Edge linking, Laplacian Mask based operations-Region based segmentation–Region growing–Region splitting& merging

UNIT–IV	REPRESENTATION AND DESCRIPTION	9

Chain codes–Boundary descriptors– Regional Descriptors –Texture–Morphology- dilation and erosion –opening and closing.

UNIT–V	REAL WORLD IMAGE ANALYSIS	9

License plate detection, CTimage analysis, Non-destructive testing, Remote sensing change detection, crack detection, Missing component detection.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1. Rafael. C. Gonzalez and Richard. E. Woods, "Digital Image Processing", Third Edition, Prentice Hall, 2014.

REFERENCES

1. Rafael. C. Gonzalez, Richard. E. Woods and Steven L. Eddins, "Digital Image Processing using MATLAB", 2nd Edition, Gates mark Publishing, 2009.

2. Al.Bovik, "The Essential Guide to Image Processing", Academic Press, 2009.

3. Anil K.Jain, "Fundamentals of Digital Image Processing", Pearson Education 2003.

4. William K. Pratt, "Digital Image Processing", Fourth Edition, John Wiley,2007.

5. www.imageprocessingplace.com.

6. https://www.coursera.org/course/images.

7. http://www.mathworks.com.

WEB SOURCE REFERENCES

1. https://archive.nptel.ac.in/courses/117/105/117105135/

PREPARED BY

Dr.R.Prema, Assistant Professor/CSE

Course Title	**BUSINESS INTELLIGENCE**	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Data Warehousing and Business Knowledge

OBJECTIVES

- To learn and use of Business Intelligence.
- To learn Analytical applications.
- To basics of data integration.
- To learn various Business Metrics.

COURSE OUTCOMES

At the end of the course learners will be able to

1.	Differentiate between Transaction Processing and Analytical applications
2.	Demonstrate the technology and processes associated with Business Intelligence framework
3.	Implement Data Warehouse methodology and project life cycle in real world applications
4.	Construct a business scenario, identify the metrics, indicators and make recommendations to achieve the business goal
5.	Design an enterprise dashboard as the key performance indicators to help in decision making.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	M	M	L	L		S				L	L	M		
CO 02	S	S	M			M		L	M	L		L	L		
CO 03	S	M	M	L	L	L	L	L		L		L	L	L	L
CO 04	M	L	M	S	M	L	L	L	L	L	L	L	L		L
CO 05	M	L	L	L	M	L	L	L		L		L	L		

UNIT - I   INTRODUCTION TO BUSINESS INTELLIGENCE   9

Introduction to Digital Data and Its Types- Structured, Semi-Structured and Unstructured, Introduction to OLTP and OLAP (MOLAP, ROLAP, HOLAP), BI Definitions and Concepts, BI Framework

UNIT- II   COMPONENTS OF BUSINESS INTELLIGENCE   9

Data Warehousing Concepts and Its Role in BI; BI Infrastructure Components - BI Process, BI Technology, BI Roles and Responsibilities, Business Applications of BI, BI Best Practices.

UNIT- III   BASICS OF DATA INTEGRATION   9

Concepts of Data Integration , Needs and Advantages of using Data Integration ,

Introduction to Common Data Integration Approaches ; Meta Data - Types and Sources , Introduction to Data Quality, Data Profiling Concepts and Applications, Introduction to ETL using Kettle

UNIT- IV	INTRODUCTION TO MULTI-DIMENSIONAL DATA MODELING	9

Dimension Modeling , Multidimensional Data Model ,ER Modeling vs. Multi-Dimensional Modeling ,Concepts of Dimensions, Facts, Cubes, Attribute, Hierarchies, Star and Snowflakes Schema. Introduction to Business Metrics and KPIs, Creating Cubes using Microsoft Excel.

UNIT- V	BASICS OF ENTERPRISE REPORTING	9

A Typical Enterprise, Malcolm Bridge - Quality Performance Framework, Balanced Scorecard, Enterprise Dashboard, Balanced Scorecard vs. Enterprise Dashboard, Enterprise Reporting using MS Access / MS Excel, Best Practices in the Design of Enterprise Dashboards.

TOTAL LECTURE HOUR: 45hrs

REFERENCES	
1.	RN Prasad and Seema Acharya, "Fundamentals of Business Analytics", Wiley India, 2011.
2.	David Loshin, "Business Intelligence", Elsevier Science and Technology, Second Edition, 2012.
3.	Mike Biere, "Business Intelligence for the Enterprise", Pearson, 2010.

PREPARED BY

Mr. E.Sankar, Assistant Professor/CSE

Course Title	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Knowledge of computer networks & Algorithms

OBJECTIVES

- To understand the fundamentals of cryptography
- To acquire knowledge on standard algorithms
- To enhance the knowledge of the students with concepts of computer network security.
- To learn about the concepts, issues, principles of security related properties and validation
- To obtain knowledge on system level security.

COURSE OUTCOMES

The end of course, the students can able to

1.	Understand about network Attacks, security Mechanisms.
2.	Acquire the knowledge of Public key cryptography
3.	Gain the knowledge in types of Authentication and algorithms used in network security
4.	Understand about the E-mail security
5.	Gain the knowledge in system level security.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M				S							M	L		
CO 02			S					L						S	
CO 03		M					L		M						M
CO 04			S			M			L				L		
CO 05				M							M			L	

UNIT- I   INTRODUCTION   10

Introduction to Network Security- Attacks- Services- Mechanism–Conventional Encryption Principle–Cipher Principles–Data Encryption Standard–Block Cipher Design Principles and Modes of Operation - Triple DES – Placement of Encryption Function–Traffic Confidentiality–Key Distribution.

UNIT– II   PUBLIC KEY CRYPTOGRAPHY   10

Introduction to Public Key Cryptography–RSA-Diffie-Hellman key Exchange–Key Management-Session and Interchange keys, Key exchange and generation-PKI

UNIT–III   AUTHENTICATION AND HASH FUNCTIONS   10

Authentication requirements – Authentication functions – Message AuthenticationCodes–HashFunctions–SecurityofHashFunctionsandMACs–MD5messageDigestalgorithm - Secure Hash Algorithm – HMAC - Digital Signatures – Authentication Protocols–Digital Signature Standard

UNIT-IV	E-MAIL SECURITY	10

Authentication Applications: Kerberos– X.509Authentication Service– Electronic Mail Security–PGP–S/MIME-IP Security–Web Security.

UNIT-V	SYSTEM LEVEL SECURITY	5

Intrusion detection–password management–Viruses and related Threats–Virus Countermeasures –Firewall Design Principles–Trusted Systems.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	William Stallings, "Cryptography and Network Security–Principles and Practices", March 2017 7TH Edition.
2.	Forouzan, "Cryptography and Network Securiity",November 2015

REFERENCES

4.	Cryptography and Network Security - Dr.S.Bose, Dr.P.Vijaykumar -2016
5.	Introduction to Modern cryptography - Jonathan Katz, Yehuda Lindell - 2020

WEB SOURCE REFERENCES

1.	https://onlinecourses.nptel.ac.in

PREPARED BY

Dr.D.Thamaraiselvi, Assistant Professor/CSE

Course Title	MOBILE COMPUTING	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Knowledge of Computer Networks and communication

OBJECTIVES

- To Understand the basic concepts of mobile computing
- To Be familiar with the network protocol
- To Learn the basics of mobile telecommunication system
- To Be exposed to Ad-Hoc networks
- To Gain knowledge about Mobile cloud

COURSE OUTCOMES

The end of course, the students can able to

1.	Infer Knowledge about the basics of Mobile Telecommunication System
2.	Illustrate about the Architecture and functioning of GSM & GPRS
3.	Understand the concepts of Routing protocols and ad hoc networks
4.	Explore the Knowledge about the functioning of protocol layers in mobile networks.
5.	Understand concepts of wireless networks, sensor networks and Mobile cloud

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M				S							M	L		
CO 02			S					L						M	
CO 03		M					L			M					M
CO 04			S			M			L				L		
CO 05				M							M			M	

UNIT–I   WIRELESS COMMUNICATION FUNDAMENTALS   10

Introduction–Wireless transmission–Frequencies for radio transmission–Signals–Antennas –Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA –TDMA– CDMA– Cellular Wireless Networks

UNIT – II   TELE COMMUNICATION NETWORKS   10

Telecommunication systems – GSM – GPRS – DECT – UMTS – IMT-2000 – Satellite Networks -Basics – Parameters and Configurations – Capacity Allocation – FAMA and DAMA – Broadcast Systems–DAB- DVB.

UNIT –III   WIRLESS LAN   10

Wireless LAN–IEEE802.11-Architecture–services–MAC–Physical layer–IEEE 802.11a-802.11b

standards–HIPERLAN–Bluetooth, Wireless ATM-Architecture.	
UNIT–IV MOBILE NETWORK LAYER & TRANSPORT AND APPLICATION LAYERS 9	
Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics, Traditional TCP –Classical TCP improvements.	
UNIT–V MOBILE APPLICATION LAYER 6	
WAP, WAP2.0, Mobile Database, Mobile Cloud and Sensor Networks.	
TOTAL LECTURE HOUR: 45hrs	
TEXT BOOKS	
1.	Jochen Schiller, "Mobile Communications", PHI/Pearson Education - 2018 .
2.	William Stallings, "Wireless Communications and Networks", PHI/Pearson Education,2016.
3.	
REFERENCES	
1.	Kaveh Pahlavan, P Prasanth Krishnamoorthy, "Principles of Wireless Networks", First illustrated Edition, PHI/Pearson Education,2013.
2.	U we Hansmann, Lothar Merk, Martin S.Nicklons and Thomas Stober, "Principles of Mobile Computing", Second Edition, Dream tech Press,2006.
3.	Hazyszt of Wesolowshi, "Mobile Communication Systems", John Wiley and Sons Ltd, 2002.
4.	Vijay Kumar, "Mobile Database Systems",First illustrated Edition, John Wiley & Sons, 2006
WEB SOURCE REFERENCES	
1.	www.lumoslearning.com
PREPARED BY	
Dr.D.Thamaraiselvi, Assistant Professor/CSE	

Course Title	DATA ANALYTICS	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic knowledge of big data and mathematics.

OBJECTIVES

- Understand the Big Data Platform and its Use cases
- Provide an overview of Apache Hadoop
- Provide mining data streams Concepts
- Provide hands on Hadoop Eco System
- Apply analytics on Structured, Unstructured Data and exposure on R.

COURSE OUTCOMES

After learning the course, the student will be able to:

1.	Understand and apply big data concepts
2.	Apply appropriate techniques and tools to solve big data problems
3.	Describe frequent item set and clustering
4.	Explain mining data streams
5.	Use Framework, tools and technologies of data analytics

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M			M				L					M		
CO 02		L			M									S	
CO 03			S						M						M
CO 04			M			S								S	
CO 05				S			L								M

UNIT- I   INTRODUCTION TO BIG DATA   8

Introduction to BigData Platform, Traits of Big data, Challenges of Conventional Systems, Web Data, Evolution of Analytic Scalability, Analysis vs Reporting, Statistical Concepts: Sampling Distributions, Re-Sampling, Statistical Inference, Prediction Error.

UNIT- II   BASIC DATA ANALYSIS AND DATA ANALYTIC METHODS   8

Regression Modeling, Multivariate Analysis, Bayesian Modelling, Inference and Bayesian Networks, Support Vector and Kernel Methods, Analysis of Time Series: Linear Systems Analysis, Nonlinear Dynamics, Rule Induction.

UNIT –III   FREQUENT ITEM SETS AND CLUSTERING   9

Mining Frequent item sets: 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, Frequent Pattern based Clustering Methods.

UNIT –IV	MINING DATA STREAMS	10

Introduction to Streams Concepts: Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream: Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Oneness in a Window, Decaying Window, Real time Analytics Platform (RTAP), Real Time Sentiment Analysis, Stock Market Predictions.

UNIT –V	FRAMEWORK, TECHNOLOGIES, TOOLS AND VISUALIZATION	10

Map Reduce: Hadoop, Hive, MapR, Sharding, NoSQL Databases: S3, Hadoop Distributed File Systems, Visualizations: Visual Data Analysis Techniques, Interaction Techniques; Systems and Analytics Applications, Analytics using Statistical packages, Industry challenges and application of Analytics

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	Bart Baesens, "Analytics in a Big Data World: The Essential Guide to data Science and its Applications", Wiley publications, 2014.
2.	V.K. Jain, Big Data & Hadoop, Khanna Book Publishing Co., Delhi. (ISBN 978-93-82609-131)
3.	Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2003.

REFERENCES

1.	Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2020.
2.	Jeeva Jose, Beginner's Guide for Data Analysis using R Programming, Khanna Book Publishing House, 2019.
3.	Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", Wiley, 2012.
4.	Glenn J. Myatt, "Making Sense of Data", Wiley, 2006

WEB SOURCE REFERENCES

1.	https://www.studocu.com/in/document/kiet-group-of-institutions/btech/unit-2-part-1-unit-2-part-1/62692294
2.	https://www.researchgate.net/publication/321610199_Intelligent_Data_Analysis_An_Introduction
3.	https://pwskills.com/blog/data-analytics-syllabus/
4.	https://iimskills.com/data-analyst-course-syllabus/

PREPARED BY

Dr.R.Poorvadevi, Assistant Professor/CSE

Course Title	INFORMATION RETRIEVAL TECHNIQUES	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Data Structures and Algorithms, Design and Analysis of Algorithms

OBJECTIVES

- To understand the basics of Information Retrieval.
- To understand machine learning techniques for text classification and clustering.
- To understand various search engine system operations.
- To learn different techniques of recommender system.

COURSE OUTCOMES

1.	Use an open source search engine framework and explore its capabilities
2.	Apply appropriate method of classification or clustering.
3.	Design and implement innovative features in a search engine.
4.	Design and implement a recommender system.
5.	Examine the performance of IR system with various metrics like precision, recall and F-Measure

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M									M		L	L		L
CO 02		S				S		S						L	
CO 03			S											L	
CO 04				S					M		M		L		
CO 05						L							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 Preprocessing - 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 – Charactering the Web – Search Engines –Browsing – Meta searchers – Online IR Systems – Online Public Access Catalogs –Digital Libraries - Architectural Issues –Document Models, Representations and Access – Prototypes and Standards.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOK

1.	Ricardo Baeza-Yate, Berthier Ribeiro-Neto, "Modern Information Retrieval", Pearson Education Asia.

REFERENCES

1.	G.G. Chowdhury, "Introduction to Modern Information Retrieval", Neal-Schuman Publishers; 2nd edition, 2003.
2.	Daniel Jurafsky and James H. Martin, "Speech and Language Processing", Pearson Education, 2000
3.	David A. Grossman, Ophir Frieder, " Information Retrieval: Algorithms, and Heuristics", Academic Press, 2000
4.	Charles T. Meadow, Bert R. Boyce, Donald H. Kraft, "Text Information Retrieval Systems", Academic Press, 2000.

PREPARED BY

Mr.E.Sankar, Assistant Professor/CSE

Course Title	SOFT COMPUTING	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Problem solving and Artificial Intelligence

OBJECTIVES

•	To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy inference system.
•	To familiarize with neural networks and learning methods for neural networks.
•	To introduce basics of genetic algorithms and their applications in optimization and planning.
•	To develop skills thorough understanding of the theoretical and practical aspects of soft computing.

COURSE OUTCOMES

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

1.	Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning,
2.	Reveal different applications of models to solve engineering and other problems fuzzy inference systems, and fuzzy logic.
3.	Understand the fundamental theory and concepts of neural networks, Apply different neural network to pattern classification and regression problems.
4.	Evaluate genetic algorithms of soft computing to defend the best working solutions.
5.	Design hybrid system to revise the principles of soft computing in various applications.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	S	M	L					S	L	L		L	S	S
CO 02	L	M	S	S	L				S	L			L	S	S
CO 03	S	M	S	L					S				L	S	S
CO 04	S		L	S	M				S				L	S	S
CO 05	S		S	L					S				L	S	

UNIT–I   INTRODUCTION TO FUZZY LOGIC   9

Introduction to Fuzzy - Soft computing versus hard computing- crisp sets - fuzzy sets and its relations: Cartesian product of relation – classical relation, tolerance and equivalence relations, Set - theoretic Operations – Member Function Formulation and Parameterization- Applications of soft computing.

UNIT– II   FUZZY SYSTEMS   9

Fuzzification, Minmax Composition, Defuzzification Method, Fuzzy Classification, Fuzzy reasoning- Fuzzy inference systems - Fuzzy decision making Fuzzy Rule based systems, Predicate logic, Fuzzy Control Systems, Input Space Partitioning and Fuzzy Modeling.

UNIT–III	NEURAL NETWORKS	9
Neural Networks: Supervised-Unsupervised Learning model - Perceptrons – Back Propagation: Multilayer Perceptrons, Architecture – Competitive Learning Networks – Kohonen Self - Organizing Networks – Learning Vector Quantization – Hebbian Learning.		
UNIT– IV	GENETICALGORITHMS	9
Genetic Algorithm: History - Working Principle, Various Encoding methods, Fitness function, GA Operators- Reproduction, Crossover, Mutation, Convergence of GA, Bit wise operation in GA, Multi-level Optimization.		
UNIT–V	HYBRID SYSTEMS	9
Hybrid Systems: Sequential Hybrid Systems, Auxiliary Hybrid Systems, Embedded Hybrid Systems, Neuro-Fuzzy Hybrid Systems, Neuro-Genetic Hybrid Systems, Fuzzy-Genetic Hybrid Systems. A Brief Introduction - Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller		

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	Timothy J. Ross, "Fuzzy Logic with Engineering Applications" ,Third Edition, Wiley India Pvt. Limited, 2011.
2.	J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-FuzzyandSoft Computing", Pearson Education 2004.
3.	S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, 3rd edition 2018.

REFERENCES

1.	S.Rajasekaran and G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications", Prentice-Hall of India Pvt. Ltd., 2006.
2.	George J.Klir, UteSt.Clair, BoYuan, "Fuzzy Set Theory: Foundations and Applications" Prentice Hall, 1997.
3.	David E. Goldberg, "Genetic Algorithm in Search Optimization and Machine Learning" Pearson Education India, 2013.
4.	James A.Freeman, David M.Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.
5.	Simon Haykin, "Neural Networks Comprehensive Foundation" Second Edition, Pearson Education, 2005

WEB SOURCE REFERENCES

1.	https://archive.nptel.ac.in/courses/106/105/106105173/
2.	https://onlinecourses.nptel.ac.in/noc22_cs54/preview

PREPARED BY

Dr.C Sunitha Ram, AssistantProfessor/CSE

Course Title	SOFTWARE QUALITY ASSURANCE	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic Knowledge of Software engineering principles

OBJECTIVES

•	To present the concepts, techniques and metrics for quality assurance in software development
•	To develop a good understanding of issues, techniques needed for software industry.
•	To study about tools for software quality assurance metrics and measurement.
•	To gain a working knowledge of techniques for software quality standardization

COURSE OUTCOMES

After completion of the course the students are able to:

1.	Understand quality management processes
2.	Distinguish between the various activities of quality assurance
3.	Understand the quality planning and quality control.
4.	Understand the importance of standards in the quality management process
5.	To develop skills that will enable them to evaluate software of high quality

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S				M				L				L		
CO 02		M						L							
CO 03			S						S					M	
CO 04															S
CO 05								M					L		

UNIT- I	INTRODUCTION	9

The Role of SQA – SQA Plan – SQA considerations – SQA people – Quality Management – Software Configuration Management

UNIT – II	MANAGING SOFTWARE QUALITY	9

Managing Software Organizations – Managing Software Quality – Defect Prevention – Software Quality Assurance Management

UNIT – III	SQA METRICS	9

Software Quality – Total Quality Management (TQM) – Quality Metrics – Software Quality Metrics Analysis

UNIT – IV	SOFTWARE QUALITY PROGRAM	9

Software Quality Program Concepts – Establishment of a Software Quality Program – Software Quality Assurance Planning – An Overview – Purpose & Scope.

UNIT- V	SQA STANDARDIZATION	9

Software Standards–,ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM level 5.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOK

1.	Mordechai Ben-Menachem / Garry S Marliss, "Software Quality: Producing Practical, Consistent Software", BSP Publishing House, Pvt, Ltd., 2014.

REFERENCES

1.	Gordon G Schulmeyer, "Handbook of Software Quality Assurance", Fourth Edition, Artech House Publishers, 2008.
2.	Nina S Godbole, "Software Quality Assurance: Principles and Practice", Alpha Science International, Ltd, 2004.

WEB SOURCE REFERENCES

1.	https://synodus.com/blog/web-development/quality-assurance-in-web-development/

PREPARED BY

Dr.C.K.Gomathy & Dr V Geetha, AssistantProfessors/CSE

Course Title	**NATURAL LANGUAGE PROCESSSING**	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic knowledge of statistics and data science.

OBJECTIVES

- To learn the fundamentals of natural language processing
- To understand the use of CFG and PCFG in NLP
- To understand the role of semantics of sentences and pragmatics
- To apply the NLP techniques to IR applications
- Get the exposure on lexical resources

COURSE OUTCOMES

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

1.	To tag a given text with basic Language features
2.	To design an innovative application using NLP components
3.	To implement a rule based system to tackle morphology/syntax of a language
4.	To design a tag set to be used for statistical processing for real-time applications
5.	To compare and contrast the use of different statistical approaches for different types of NLP applications

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S												S		
CO 02		M					M							M	
CO 03				L					S						M
CO 04			S							M					S
CO 05		S			M									M	

UNIT- I	INTRODUCTION	9

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT- II	WORD LEVEL ANALYSIS	9

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT- III	SYNTACTIC ANALYSIS	9

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures.

UNIT - IV	SEMANTICS AND PRAGMATICS	9

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT - V	DISCOURSE ANALYSIS AND LEXICAL RESOURCES	9

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

TOTAL LECTURE HOUR: 45hrs

TEXT BOOKS

1.	Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2.	Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, OReilly Media, 2009.

REFERENCES

1.	Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systemsby Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta, Harshit Surana Published on June 17, 2020
2.	Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
3.	Richard M Reese, —Natural Language Processing with Java, OReilly Media, 2015.
4.	Nitin Indurkhya and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
5.	Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

WEB SOURCE REFERENCES

1.	https://www.goseeko.com/universities/other-university/bebtech-g/information-technology/level-4/semester/speech-natural-language-processing-2
2.	https://www.cs.ubc.ca/~carenini/TEACHING/CPSC503-14/LECTURES/05_markov-models+POStagging.pptx
3.	https://web.stanford.edu/~jurafsky/slp3/17.pdf
4.	https://oxfordre.com/linguistics/display/10.1093/acrefore&p=emailAGxia7P9CZuDc

PREPARED BY

Dr. R. Poorvadevi, Assistant Professor/CSE

Course Title	DATA SCIENCE FOR ENGINEERS	L	T	P	C
Course Code		3	0	0	3

OBJECTIVES

- Learn about the Data Evolution and understanding the data
- Understand the basic concepts of data science.
- Analyze the basic concepts of Bigdata.
- Understand the fundamental principles of R.
- Apply the statistical measures of R in real time environment

UNIT - I

Linear algebra for data science: algebraic view-vectors, matrices, product of matrix & vector, rank, null space, solution of over-determined set of equations and pseudo-inverse.
Linear algebra for data science: geometric view - vectors, distance, projections, eigen value decomposition.

UNIT - II

Statistics: descriptive statistics, notion of probability, distributions, mean, variance, covariance, and covariance matrix.

UNIT - III

Optimization: Typology of data Science problems and a solution framework. Univariate and multivariate linear regression Model assessment- cross validation.

UNIT - IV

Verifying assumptions used inline arregression, Assessing importance of different variables, subset selection.

UNIT - V

Introduction to classification and classification using logistics regression, Classification using various clustering techniques.

TOTAL LECTURE HOUR: 45hrs

TEXT BOOK

1.	Jeffrey S. Saltz, Jeffre M. Stanton, "An Introduction to DataScience", Sage Publications, 2018

REFERENCES

1.	Nina Zumal, John Mount (2014). Practical Data science in R, Managing Publication Company
2.	Bernard Kolman, Robert C. Busby and Sharon Ross (2004). Discrete Mathematical Structures, New Delhi: Prentice Hall
3.	Bhuvaneswari, T. Devi, (2016). Big Data Analytics: A Practitioner's Approach, Bharathiar University 4. V. Bhuvaneswari (2016). Data Analytics with R, Bharathiar University.
4.	https://nptel.ac.in/courses/106/106/106106179/

PREPARED BY

Course Title	PROFESSIONAL ETHICS AND CYBERLAW	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Knowledge of computer networks & Security

OBJECTIVES

- Infer the Knowledge of professional & Philosophical Ethics
- Understand the process of Securing Intellectual Property
- To gain the knowledge how to Recover the Evidence and Investigation
- Gain knowledge of Cyber Law provision related to all type cybercrimes
- Acquire the knowledge of Rights in cyber space and data protection.

COURSE OUTCOMES

The end of course, the students can able to

1.	Acquire the knowledge of cybercrime & its categories
2.	Gain the knowledge of cyber security
3.	Understand Cyber Forensic investigation & Evidence recovery
4.	Infer the knowledge of Privacy, Freedom & Rights in cyber space
5.	Acquire the knowledge of Intellectual property rights

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	M				S							M	M		
CO 02				S				L						L	
CO 03		M					L			M					L
CO 04			S			M			L				L		
CO 05				M							M			L	

UNIT – I	INTRODUCTION	9

Introduction to cybercrime - Category of Cybercrime , cybercrime against individual, institution and state, Hacking Digital Forgery cyber stalking /Harassment ,Cyber Pornography, identity theft & fraud, cyber terrorism, cyber defamation.

UNIT-II	CYBER SECURITY	9

Introduction to Cyber Security, Threats in cyberspace, Blended attacks, , incident prevention and detection, Formingan Incident Response Team, Reporting on Cybercrime, Financial Frauds.

UNIT – III	EVIDENCE RECOVERY	9

Introduction to Cyber Forensic Investigation, Digital Evidence Collection, Evidence

Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, and Recovering deleted evidences, Password Cracking.		
UNIT- IV	**PRIVACY AND FREEDOM OF EXPRESSION**	**9**
Privacy Protection and the Law-Information Privacy, Privacy Laws, Applications, Right to access in cyber space-access to internet, Right to data protection Workplace Monitoring, Surveillance; First Amendment Rights; Freedom Expressions: Social Networking Ethical Issues.		
UNIT-V	**INTELLECTUAL PROPERTY**	**9**
Intellectual Property – Copyright , Patents, Intellectual Property Issues -Plagiarism, Open Source Code, Competitive Intelligence, Trademark Infringement, and Cybersquatting.		
TOTAL LECTURE HOUR: 45hrs		
TEXT BOOKS		
1.	Computers, Ethics, And Social Values, Johnson and Nissenbaum,PrenticeHall-2011.	
2.	Cyber security operations Handbook, John Ritting house, William Hancock-2012.	
REFERENCES		
5.	Ethics in Information Technology, Sixth Edition, George W. Reynolds"	
6.	Ethics and Technology: Controversies, Questions, and Strategies for Ethical Computing, Fifth Edition, Herman T. Tavani, John Wiley and Sons, 2016	
7.	Ethics for Information Age, Eighth Edition, Michael J. euinn, pear	
WEB SOURCE REFERENCES		
1.	https://onlineethics.org/cases/ethics-and-professional	
2.	https://www.jblearning.com/catalog/productdetails/9781284184082	
PREPARED BY		
Dr.D.Thamaraiselvi, Assistant Professor/CSE		

OPEN ELECTIVES

Course Title	PLC AND DCS			L	T	P	C
Course Code				3	0	0	3

PRE-REQUISITES

Digital Electronics

OBJECTIVES

- To study the evolution and advantages of PLC.
- To understand the various PLC instructions.
- To study the used of PLC for some specific applications
- To understand the need of computer control in automation and SCADA.
- To study the distributed control system.

COURSE OUTCOMES

The end of course, the students can able to

1.	Understand the fundamental of PLC.
2.	Program a PLC with different logical languages.
3.	Various industrial applications of PLCs are studied.
4.	Able to understand the need of computers in Automation and SCADA.
5.	Understand the basics of distributed control systems.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	✓		✓		✓		✓								
CO 02	✓		✓		✓	✓									
CO 03	✓	✓				✓	✓								
CO 04	✓	✓	✓	✓			✓				✓	✓			
CO 05	✓	✓	✓		✓		✓				✓	✓			

UNIT- I   BASICS OF PLC

Definition and History of PLC, PLC advantage and disadvantages, Overall PLC systems, CPU And Programmer/Monitors-PLC input and output models–Architecture, PLC Programming Language, Types of PLC, Creating Ladder diagrams, Programming - On-Off inputs/ outputs, Programming of Gates, PLC Basic Functions .Connecting PLC to computer, PLC Troubleshooting and Maintenance.

UNIT- II   PLC PROGRAMMING

Programming of Timers – Introduction - ON delay, OFF delay, Retentive Timers – PLC Timer functions – Examples of timer function Industrial application. Programming Counters – up/down counter – Combining counter-Examples of counter function Industrial application. PLC Arithmetic Functions–PLC number Comparison function.

UNIT- III	PLC DATA HANDLING FUNCTIONS
PLC Program Control Instructions: Master Control Reset - Skip – Jump and Move Instruction. Sequencer instructions - Types of PLC Analog modules and systems, PLC analog signal processing – BCD or multi bit data processing– Case study of Tank level control system, bottle filling system and Sequential switching of Motors.	
UNIT – IV	SCADA BASICS
Computer Process interface for Data Acquisition and control – Computer control loops. Supervisory Control and Data Acquisition System (SCADA) - introduction and brief history of SCADA – SCADA Hardware and software - Remote terminal units- Master station.	
UNIT –V	DISTRIBUTED CONTROL SYSTEM
Elements of DCS –Evolution of DCS - Building blocks- Detailed descriptions and functions of field control units-LCUs and Redundancy concepts.	
TOTAL LECTURE HOUR	
TEXT BOOKS	

1.	Petrezeulla,"Programmable Logic Controllers", McGrawHill, 2019.
2.	Michael P. Lukas, "Distributed Control Systems: Their Evaluation and Design", Van No strand Reinhold Co., 1986.
3.	Stuart A. Boyer," SCADA supervisory control and data acquisition" ISA-The Instrumentation, Systems, and Automation Society, 2016.

REFERENCES	

1.	Hughes .T, "Programmable Logic Controllers", ISA Press, 1989.
2.	G.B.Clayton, "Data Converters", The MacMillian PressLtd.,1982.
3.	John W.Webb & Ronald A.Reis., "Programmable logic controllers- principles and applications",5th Edition–PHI Learning Pvt. LTd,NewDelhi-2010.
4.	Curtis D. Johnson," Process Control Instrumentation Technology", 8th edition Prentice Hall June2015

PREPARED BY	
Dept. of EIE	

Course Title	DISASTER MANAGEMENT	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Basic Knowledge of Management

OBJECTIVES

- To Provide Students An Exposure To Disasters, Their Significance And Types.
- To Ensure That Students Begin To Understand The Relationship Between Vulnerability, Disasters, Disaster Prevention And Risk Reduction
- To Gain A Preliminary Understanding Of Approaches Of Disaster Risk Reduction (DRR)
- To Enhance Awareness Of Institutional Processes In The Country
- To Develop Rudimentary Ability To Respond To Their Surroundings With Potential Disaster Response In Areas Where They Live, With Due Sensitivity.

COURSE OUTCOMES

The end of course, the students can able to

1.	Basic knowledge and understanding of the analysis and design of complex systems.
2.	Ability to apply software engineering principles and techniques.
3.	Design and implement innovative features in a development process.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01					M	S		M							
CO 02	L							M	S	S	S				
CO 03	L					M				S					
CO 04								S	S	M		M			
CO 05	L							S							

UNIT – I   INTRODUCTION TO DISASTERS

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types Of Disasters – Earthquake, Landslide, Flood, Drought, Fire Etc – Classification, Causes, Impacts Including Social, Economic, Political, Environmental, Health, Psychosocial, Etc.- Differential Impacts-In Terms Of Caste, Class, Gender, Age, Location, Disability – Global Trends In Disasters: Urban Disasters, Pandemics, Complex Emergencies, Climate Change- Dos And Don'ts During Various Types Of Disasters.

UNIT – II   APPROACHES TO DISASTER RISK REDUCTION (DRR)

Disaster Cycle – Phases, Culture Of Safety, Prevention, Mitigation And Preparedness Community Based DRR, Structural- Nonstructural Measures, Roles And Responsibilities Of- Community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, And Other Stakeholders- Institutional Processess And Framework At State And Central

Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories From Appropriate Agencies.

UNIT – III   INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT

Factors Affecting Vulnerabilities, Differential Impacts, Impact Of Development Projects Such As Dams, Embankments, Changes In Land-Use Etc.- Climate Change Adaptation- IPCC Scenario And Scenarios In The Context Of India – Relevance Of Indigenous Knowledge, Appropriate Technology And Local resources.

UNIT - IV   DISASTER RISK MANAGEMENT IN INDIA

Hazard And Vulnerability Profile Of India, Components Of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional Arrangements (Mitigation, Response And Preparedness, Disaster Management Act And Policy – Other Related Policies, Plans, Programmes And Legislation – Role Of GIS And Information Technology Components In Preparedness, Risk Assessment, Response And Recovery Phases Of Disaster – Disaster Damage Assessment.

UNIT - V   DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment Of Buildings And Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial And Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made Disasters: Case Studies, Space Based Inputs For Disaster Mitigation And Management And Field Works Related To Disaster Management.

TOTAL LECTURE HOUR:

TEXT BOOKS

1.	Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2.	Tushar Bhattacharya, "Disaster Science And Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
3.	Gupta Anil K, Sreeja S. Nair. Environmental Knowledge For Disaster Risk Management, NIDM, New Delhi, 2011
4.	Kapur Anu Vulnerable India: A Geographical Study Of Disasters, IIAS And Sage Publishers, New Delhi, 2010.

REFERENCES

1.	Govt. Of India: Disaster Management Act , Government Of India, New Delhi, 2005
2.	Government Of India, National Disaster Management Policy, 2009.

PREPARED BY

Dr.V.Geetha, Assistant Professor/CSE

Course Title	DIGITAL MARKETING	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

The aim of the Digital Marketing Course is to provide students with the knowledge about business advantages of the digital marketing and its importance for marketing success; to develop a digital marketing plan; to make SWOT analysis; to define a target group; to get introduced to various digital channels, their advantages and ways of integration.

OBJECTIVES

- To understand the concepts of digital marketing.
- To explicate the technology catalysis in delivering value.
- To understand online consumer behavior and concept of cyber branding.
- To distinguish the components of a web traffic plan and SEO.
- To develop Insights on how organizations can leverage the benefits of social media.

COURSE OUTCOMES

Students will be able to

1.	To identify the importance of the digital marketing for marketing success [REMEMBERING]
2.	To manage customer relationships across all digital channels and build better customer relationships [ANALYZE]
3.	To create a digital marketing plan, starting from the SWOT analysis and defining a target group, then identifying digital channels, their advantages and limitations, to perceiving ways of their integration taking into consideration the available budget. [CREATE]

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01				M			S								
CO 02							L			M					
CO 03	L					M						S			
CO 04															
CO 05															

UNIT - I   INTERNET IN THE DIGITAL ERA

Internet, Evolving Role of Internet ,Internet Changing the world, Use of world wide web, the internet and business - online Marketing Domains - The behavioral Internet - E- Marketing - Online advertising - sales and Trade Promotion –Digital marketing,-Digital Marketing Optimization - The need for digital engagement.

UNIT - II   CUSTOMER RELATIONSHIP MANAGEMENT IN A WEB WORLD

CRM – Needs – Goals - Benefits – CRM and the customer Life cycle - Electronic Customer

Relationship management - CRM Applications - Next generation CRM - A mobile App and a community
UNIT - III   BUSINESS DRIVERS IN THE VIRTUAL WORLD
Social Media - Social world - Social Media Analytics - Social Media Tools - The social web Business Opportunities in Social Media, Viral Marketing - Social Curation and Brands - Inbound Marketing.
UNIT - IV   ONLINE BRANDING, TRAFFIC BUILDING, INTERNET MARKETING METRICS
Cyber Branding - The digital brand ecosystem - Brand customer Centricity - Traffic Building: Internet traffic plan - Search Marketing methods for Traffic building - Traffic volume and quality - Search engine Marketing - Site optimization - Key word advertising Internet Marketing Metrics - SWOT Analysis.
UNIT - V   ONLINE TOOLS FOR MARKETING
Engagement marketing through Content Management - Online campaign management using Facebook, Twitter, Corporate Blogs - Sentiment Mining - Market influence Analytics in a Digital ecosystem - The contemporary digital Revolution-Online communities and co-creation -The future of Marketing
TOTAL LECTURE HOUR:
TEXT BOOK

1.	Vandana Ahuja,'Digital Marketing' Oxford University Press, 2016 edition

REFERENCES	
1.	Damian Ryan, Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation Paperback – Import, Kogan Page 2014
2.	Vandana Ahuja ,Digital Marketing Paperback Oxford University Press
3.	Hanlon Annmarie , Akins Joanna , Quickwin Digital Marketing: Answers to Your Top 100 Digital Marketing Questions Paperback PHI 2012.

PREPARED BY

Course Title	ECONOMIC POLICIES IN INDIA	L	T	P	C
Course Code		3	0	0	3

PRE-REQUISITES

Indian Economy with various policies

OBJECTIVES

- To understand the fundamentals of Indian Economy
- To acquire knowledge on various developmental strategies of economic policies
- To understand about infrastructure development.
- To enhance the knowledge of economic policy with industrial sector.

COURSE OUTCOMES

On successful completion of the course, the student will:

1.	Understand the knowledge about Indian economic policy
2.	Analyze about developmental strategies of India.
3.	Analyze and Understand about the concept of infrastructure development with economic policy.
4.	Analyze about Various industrial sector with its developmental growth.
5.	Understand the policies and issues involved in various economy of India.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S										M	M			
CO 02						S									
CO 03				M											
CO 04									S			M			
CO 05									S						

UNIT – I   FRAMEWORK OF INDIAN ECONOMY

Economic policy-An Introduction, Meaning and importance-National income: Trends and Structure of National Income - Demographic features and indicators of Economic Development and Growth, Rural and Urban migration.

UNIT - II   FRAMEWORK OF VARIOUS POLICIES

Growth of Indian Population policy–Poverty, inequality, Nature, policy and implications-Employment and unemployment–Nature, Central and State Government policies and Policies implications.

UNIT – III   DEVELOPMENT STRATEGIES ININDIA

Agriculture - Agricultural pricing, marketing & finance policies - Economic Reforms – Rationale of Economic Reforms, Liberalization, Privatization and Globalization of the

economy - Role of Public Sector – Redefining the role of public sector, Government policy towards Public sector, problems associated with privatization - Assessment of Economic Reforms.

UNIT– IV   THE ECONOMIC POLICY AND INFRASTRUCTURE DEVELOPMENT

Energy and Transport-Social Infrastructure-Education and Health-Issues and policies in financing infrastructure Development - Indian Financial System – Money Market and Monetary Policy–financial Sector Reforms–Review of Monetary Policy of R.B.I. ,Capital Market in India

UNIT - V   THE ECONOMIC POLICY AND INDUSTRIAL SECTOR

Industrial Sector in Pre–reforms Period, Growth and Pattern of Industrialization –Industrial Sector in Post–reform Period–Growth, Pattern and Small Scale Industries-Labour Market - Issues in Labour Market, Reforms & Approaches to Employment Generation.

TOTAL LECTURE HOUR:

TEXT BOOKS

1.	Dhingra Ishwar C(2006);Indian Economy, Sultan Chand & Sons, New Delhi.
2.	Datt, Ruddar and Sundaram, K.P.M.(2004);Indian Economy, S.Chand & Co.New Delhi.
3.	Jha Raghbendra(Ed)(2003); Indian Economic R eforms, Hampshire, U.K.

REFERENCES

1.	Government of India, Economic Survey(2004-05)
2.	Brahman and a PR and V.A.Panchmukhi(Eds) (2001), Development Experience in Indian Economy,
3.	Inter-State Perspectives, Bookwell, Delhi.

PREPARED BY

Ms.E.Padma, Assistant Professor/CSE

Course Title	**KNOWLEDGE MANAGEMENT**	**L**	**T**	**P**	**C**
Course Code		3	0	0	3

OBJECTIVES

- To familiarize the concepts of Knowledge Management.
- To understand the challenges of Knowledge Based Organizations and the HR mechanisms to manage them effectively.
- To identify the importance of the values of autonomy and accountability in Knowledge based organizations

COURSE OUTCOMES

The end of course, the students can able to

1.	Analyze personal and organizational situations in terms of theories of knowledge;
2.	Analyze the knowledge needs of an organizational situation
3.	Select and apply appropriate systems components and design a knowledge management system
4.	Critique different forms of knowledge in light of current research.
5	

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S	S													
CO 02		M	S												
CO 03			S		M						M				
CO 04				S	M			S							
CO 05															

UNIT - I

Introduction to Knowledge Management - Knowledge Society - Types of Knowledge – An Introduction to life in organizations-Concept and Characteristics of KBOs-Dimensions of HRM in KBOs-New Role and Challenges for HRM in the KBOs.

UNIT – II

Managing Knowledge for organizational effectiveness - Process and Methods- Concept of Intellectual Capital and Learning Orientation in the Organizations - Knowledge and Role related issues - Performance Appraisal in a KBO - Intellectual Property Rights(IPR).

UNIT – III

Managing Knowledge and Personnel & Organizational Health-Rewarding Knowledge-Management of Retention.

UNIT – IV

ICTs in KBOs-HRIS for KBOs-Concept, Mechanisms, and Software Orientation-Performance Management–Mechanisms.

UNIT – V	
Technologies to Manage Knowledge–Artificial Intelligence–Digital Libraries–Repositories–Knowledge Discovery–Creating Systems that Utilize Knowledge-Knowledge Process Outsourcing-Innovation Clusters.	
TOTAL LECTURE HOUR:	
TEXT BOOKS	
1.	Frances Horibe, Managing Knowledge Workers, John Wiley& Sons
2.	Ganesh Natarajan and Sandhya Shekhar,Knowledge Management-Enabling Business Growth ,Tata McGrawHill ,NewDelhi
3.	Fernandez & Leidner, Knowledge Management,PHILearning,NewDelhi,2008
4.	Mruthyunjaya ,Knowledge Management,PHILearning,NewDelhi,2011
PREPARED BY	
Mr.V.Balu, Assistant Professor/CSE	

Course Title	BUSINESS ANALYTICS	L	T	P	C
Course Code		3	0	0	3

OBJECTIVES

- Understand the role of business analytics within an organization.
- Analyse data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
- To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
- To become familiar with processes needed to develop, report, and analyze business data.
- Use decision-making tools/Operations research techniques.
- Manage business processes using analytical and management tools. problems from different industries such as manufacturing,
- Analyse and solve service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc

COURSE OUTCOMES

The end of course, the students can able to

1.	Students will demonstrate knowledge of data analytics.
2.	Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
3.	Students will demonstrate the ability to use technical skills in predicative and prescriptive modelling to support business decision-making.
4.	Students will demonstrate the ability to translate data into clear, actionable insights.

UNIT - I

Business analytics:: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics.
Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modeling, sampling and estimation methods overview.

UNIT - II

Trendiness and Regression Analysis: Modeling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

UNIT - III

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes.
Descriptive Analytics, predictive analytics, predicative Modeling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modeling, nonlinear Optimization.

UNIT - IV

Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting

Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality. Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.	

UNIT - V

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, Utility and Decision Making. The Value of Information

UNIT - VI

Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism

TOTAL LECTURE HOUR:

REFERENCES

1.	Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G.Schniederjans, Christopher M. Starkey, Pearson FT Press.
2.	Business Analytics by James Evans, persons Education.

PREPARED BY

Course Title	**ENTREPRENEURSHIP**	**L**	**T**	**P**	**C**
Course Code		3	0	0	3

PRE-REQUISITES

Entrepreneurs are the innovators that stimulate job growth, economic growth and development that allows any country to compete with and in the global economy. India, being far more developed and forward looking country than some of the third world countries, can provide lead to entrepreneurial development activities. The purpose of exposing the students to entrepreneurship is to motivate them to look at entrepreneurship as a viable, lucrative and preferred career. Entrepreneurs require a foundation in several key areas in order to be successful. This course will focus on multiple topics including: opportunities and challenges for new ventures, benefits /drawbacks of entrepreneurship, strategic management and forms of business ownership, marketing strategies, venture finance and human resource management.

OBJECTIVES

The students develop and can systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully.

COURSE OUTCOMES

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

1.	Have the ability to discern distinct entrepreneurial traits
2.	Know the parameters to assess opportunities and constraints for new business ideas.
3.	Understand the systematic process to select and screena business idea
4.	Design strategies for successful implementation of ideas
5.	Write a business plan

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01							M			L					
CO 02			S	S		M	M			S	M	S			
CO 03	L			L	L					M	S				
CO 04									M		S				
CO 05									L	M		M			

UNIT-I	INTRODUCTION TO ENTREPRENEURSHIP

Entrepreneurship: Meaning – Importance – Types of Entrepreneurs – Qualities of Successful Entrepreneur. Entrepreneurship and small scale industry – Role of entrepreneurship in economic development – Women entrepreneurs in India – Growth of Woman entrepreneurs – Problems of Women Entrepreneurs

UNIT– II	STRATEGIC MANAGEMENT AND ENTREPRENEUR

Importance of strategic management toa(small)business-understanding competitive advantages-steps in the strategic planning process; basic strategies-low-cost, differentiation, and focus - balanced scorecard in the planning process. Forms of Business Ownership Advantages and the disadvantages of the three major forms of ownership - the sole proprietorship - the partnership and the corporation. Types of franchising-trade name, product distribution, and pure-Major trends shaping franchising. Building the business plan-marketing considerations – Marketing concept and devolution-marketing process-guerilla marketing.

UNIT - III	FOUNDATIONS OF NEWVENTURE FINANCE

Understanding capital requirements; identifying the sources of finance; angel investing and venture finance; managing cash flow. Creating the Organization - structure and design-Forms of organization structure; factors contingent on organizational structure and design.

UNIT– IV	TECHNICAL ENTREPRENEUR AND THEE-ENTREPRENEUR

Process of creating and growing high potential ventures; basic approaches to launchane-commerce effort Entrepreneurship Concept and importance incorporate environment.

UNIT–V	CRAFTING A WINNING BUSINESS PLAN

Need and importance of business plan –elements of as old business plan.

TEXT BOOKS

1.	Essentials of Entrepreneurship and Small Business management (5thedition):Thomas W. Zimmerer, and Norman M. Scarborough. PHI

REFERENCES

1.	Entrepreneurship: Strategies and Resources,3rdEdition:MarcDollinger;PrenticeHall
2.	Bringing New Technology to Market-Kathleen R.Allen, Prentice Hall
3.	Entrepreneurship in Action,2nd edition-Mary Coulter; Prentice Hall.

ONLINE RESOURCES

1.	http://ediindia.ac.in/e-policy/[EntepreneurialPolicyIndia]
2.	http://en.wikipedia.org/wiki/List_of_venture_capital_companies_in_India [VentureCapital]
3.	indiavca.org/venture-capital-in-india.html[VentureCapital]
4.	www.indianangelnetwork.com/[AngelInvesting]
5.	www.startbizindia.in/angel_investors_india.php[ANGELINVESTING]
6.	http://www.mensxp.com/work-life/entrepreneurship/21253-51-most-successful-entrepreneurs-ofindia-p1.html[SuccessfulEntrepreneurs]
7.	Economictimes.indiatimes.com/…of…entrepreneurs/…/20912945.cms[Leadership]
8.	http://edition.cnn.com/2013/06/25/tech/innovation/frugal-innovation-india-inventors/[Innovation]
9.	www.bplans.com/[BUSINESSPLAN]
10.	www.entrepreneur.com/businessplan[BUSINESSPLAN]

PREPARED BY

Dr.M.Gayathri, Assistant Professor/CSE

	Course Title	**ORGANIZATIONAL BEHAVIOUR**	L	T	P	C
	Course Code		3	0	0	3

PRE-REQUISITES

Basic knowledge of general Management

OBJECTIVES

- To develop an understanding of the behavior of individuals and groups inside organizations.
- To enhance skills in understanding and appreciating individuals, interpersonal, and group process for increase defectiveness' both within and outside of organizations.
- To develop theoretical and practical insights and problem-solving capabilities for effectively managing the organizational processes

COURSE OUTCOMES

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

1.	Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
2.	Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
3.	Analyze the complexities associated with management of the group behavior in the organization.
4.	Toidentifytheprocessusedindevelopingcommunicationandresolvingconflicts
5.	Toidentifythevariousleadershipstylesandtheroleofleadersinadecisionmakingprocess
6.	To discuss the implementation of organizational change

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01			S							M	S				
CO 02		S							M						
CO 03				S											
CO 04						M	S			M					
CO 05									M		S				
CO 06			M									M			

UNIT – I   INTRODUCTION

Introduction to organization-organization and managers, manager' roles and skills need and importance of organizational behavior–Nature and scope–Organizational behavior models.

UNIT–II   INDIVIDUAL BEHAVIOR

Introduction to individual behaviour, values, attitudes, job satisfaction, personality, perception and individual decision making, learning, motivation at work, managing motions

and stress

UNIT–III	**GROUP BEHAVIOR**

Introduction to group behaviour, foundations of group behaviour, concept of group and group dynamics, types of groups, formal and informal groups, theories of group formation, group norms, group cohesiveness, group decision making, Interpersonal relations–Communication–Control.

UNIT– IV	**LEADERSHIP AND POWER**

Meaning–Importance–Leadership styles–Theories–Leaders Vs Managers–Sources of power–Power centers–Power and Politics.

UNIT–V	**ORGANIZATIONAL BEHAVIOR**

Foundations of organization structure, organization design, organization culture, organization change, managing across cultures, human resource management policies and practices, diversity at work.

TOTAL LECTURE HOUR:

TEXT BOOKS

1.	Stephen P. Robins, Organizational Behavior, PHI Learning/ Pearson Education, 11ᵗʰ edition,2008.

2.	FredLuthans, Organizational Behavior, McGraw Hill, 11ᵗʰ Edition,2001.

REFERENCES

1.	Schermerhorn, Hunt and Osborn, Organizational behavior,JohnWiley,9thEdition,2008.

PREPARED BY

Dr.M.Saraswathi, Assistant Professor/CSE

Course Title		HUMAN RESOURCE DEVELOPMENT	L	T	P	C
Course Code			3	0	0	3

OBJECTIVES

- To understand the evolution and functions of HRD
- To identify the content, process and the outcomes of HRD applications
- To evaluate and understand diversity issues and their impact on organizations

COURSE OUTCOMES

1.	Differentiate between human resource development (HRD)and other human resource management functions.
2.	Explain and apply significant concepts and theories underpinning HRD.
3.	Develop skills in identifying HRD needs and in designing, implementing and evaluating HRD programs.
4.	Explain the strategic importance of HRD in the success of organizations within the context of social and environmental pressure.

POs and COs MAPPING TABLES

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 01	PSO 02	PSO 03
CO 01	S														
CO 02	S														
CO 03				S	M						L				
CO 04						M	M								
CO 05															

UNIT - I

Human Resource Development – Evolution of HRD - Relationship with HRM – Human Resource Development Functions - Roles and Competencies of HRD Professionals - Challenges to Organization and HRD professionals – Employee Behaviour – External and Internal Influence – Motivation as Internal Influence – Learning and HRD – Learning Strategies and Styles

UNIT - II

Frame work of Human Resource Development - HRD Processes - Assessing HRD Needs - HRD Model - Designing Effective HRD Program - HRD Interventions- Creating HRD Programs - Implementing HRD programs - Training Methods - Self Paced/Computer Based/ Company Sponsored Training - On-the-Job and Off-the-Job - Brain Storming -CaseStudies-RolePlays-Simulations-T-Groups-TransactionalAnalysis.

UNIT - III

Evaluating HRD programs - Models and Frame Work of Evaluation - Assessing the Impact of HRD Programs - Human Resource Development Applications – Fundamental Concepts of Socialization-Realistic Job Review-Career Management and Development.

UNIT - IV

Management Development-Employee counseling and wellness services– Counseling as an HRD Activity - Counseling Programs - Issues in Employee Counseling – Employee Wellness and Health Promotion Programs –Organizational Strategies Based on Human Resources	
UNIT - V	
Work Force Reduction, Realignment and Retention-HR Performance and Bench Marking-Impact of Globalization on HRD- Diversity of Work Force – HRD programs for diverse employees-Expatriate & Repatriate support and development.	
TOTAL LECTURE HOUR:	
REFERENCES	
1.	Werner & Desimone, Human Resource Development,Cengage Learning, 2006
2.	William E. Blank, Handbook For Developing Competency Based Training Programmes, Prentice-Hall,NewJersey,1982.
3.	UdayKumar Haldar,Human Resource Development, Oxford UniversityPress,2009
4.	Srinivas Kandula, Strategic Human Resource Developmnet, PHI Learning,2001
PREPARED BY	
Mr.V.Balu, Assistant Professor/CSE	