

**CURRICULUM FRAMEWORK AND SYLLABUS**  
**FOR OUTCOME BASED EDUCATION IN**  
**Master of Computer Applications (M.C.A) Degree Program**  
**FOR THE STUDENTS ADMITTED FROM THE**  
**ACADEMIC YEAR 2014-2015 ONWARDS**



**THIAGARAJAR COLLEGE OF ENGINEERING**  
(A Government Aided ISO 9001-2000 certified  
Autonomous Institution affiliated to Anna University)

MADURAI – 625 015, TAMILNADU

Phone: 0452 – 2482240, 41  
Fax: 0452 2483427  
Web: [www.tce.edu](http://www.tce.edu)

**CURRICULUM AND DETAILED SYLLABI**  
**FOR**  
**Master of Computer Applications (M.C.A) Degree Program**

**FOR THE STUDENTS ADMITTED FROM THE**  
**ACADEMIC YEAR 2014-2015 ONWARDS**

**THIAGARAJAR COLLEGE OF ENGINEERING**  
(A Government Aided ISO 9001-2000 certified  
Autonomous Institution affiliated to Anna University)

MADURAI – 625 015, TAMILNADU

Phone: 0452 – 2482240, 41  
Fax: 0452 2483427  
Web: [www.tce.edu](http://www.tce.edu)

# **THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI 625 015**

## **DEPARTMENT OF COMPUTER APPLICATIONS**

### **VISION**

“Be the very pinnacle of academic and research excellence in Computer Applications”

### **MISSION**

**As a Department, We are committed to**

- Achieve academic excellence in Computer Applications through innovative teaching and learning processes.
- To prepare the students to be professionally competent to face the challenges in the industry.
- Promote inter-disciplinary research among the faculty and the students to create state of art research facilities.
- To promote quality and ethics among the students.
- Motivate the students to acquire entrepreneurial skills to become global leaders.

### **Programme Educational Objectives (PEO)**

Post graduates of MCA program will be

- PEO1:** Utilizing strong technical aptitude and domain knowledge to develop smart software solutions for the upliftment of society.
- PEO2:** Applying research and entrepreneurial skills augmented with a rich set of communication, teamwork and leadership skills to excel in their profession.
- PEO3:** Showing continuous improvement in their professional career through life-long learning, appreciating human values and ethics.

## **Graduate Attributes for MCA Programme (GA)**

### **1. Computational Knowledge:**

Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

### **2. Problem Analysis:**

Identify, formulate, research literature, and solve *complex* computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

### **3. Design /Development of Solutions:**

Design and evaluate solutions for *complex* computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

### **4. Conduct Investigations of Complex Computing 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.

### **5. Modern Tool Usage:**

Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to *complex* computing activities, with an understanding of the limitations.

### **6. Professional Ethics:**

Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

### **7. Life-long Learning:**

Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

### **8. Project management and finance:**

Demonstrate knowledge and understanding of the computing 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.

**9. Communication Efficacy:**

Communicate effectively with the computing community, and with society at large, about *complex* computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

**10. Societal and Environmental Concern:**

Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

**11. Individual and Team Work:**

Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

**12. Innovation and Entrepreneurship**

Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

## **Programme Outcomes (PO) for Master of Computer Applications**

On completion of MCA programme, the students are expected to

- PO1:** Apply knowledge of computing fundamentals along with appropriate mathematical techniques in application and system software development in various arena. (GA :1)
- PO2:** Analyze computational systems and user requirements, evaluate existing solutions, design and develop better solutions in computer based systems from the perspective of public health and safety. (GA :3)
- PO3:** Identify research problems, analyze the existing literature and draw significantly better conclusions by designing suitable experiments, analyzing and interpreting the result data. (GA :2,4)
- PO4:** Select and use modern tools and techniques in different computer applications including programming, data mining, software design and testing, mobile applications, and networking. (GA :5)
- PO5:** Prepare themselves for updating knowledge continuously based on their chosen professional career through life long independent learning committed to ethical and social responsibilities pertaining to the professional community. (GA :6,7)
- PO6:** Assess societal, environmental, health, safety, legal and cultural issues prevailing in local and global scenarios relevant to professional practices and be aware of the consequential responsibilities. (GA :10)
- PO7:** Demonstrate the skill of functioning effectively as an individual and as a member/ leader in diverse teams and multi disciplinary projects giving significant contributions in terms of computing and management issues. (GA :8,11)
- PO8:** Communicate to professional and non professional community by making comprehensible presentations, writing effective reports, designing documentation and providing unambiguous instructions. (GA :9)
- PO9:** Think innovatively and convert challenges into opportunities as an employer in the professional field, eventually providing solutions for the betterment of the society. (GA :12)

**PEO-PO Mapping:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
PEO1									
PEO2									
PEO3									

**PO-GA MAPPING:**

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
PO1												
PO2												
PO3												
PO4												
PO5												
PO6												
PO7												
PO8												
PO9												

**Credit Distribution:**

S. NO.	Category of courses	Credits	Percentage of Credits to Total Credits
1	Basic Sciences	8	6.5%
2	Humanities and Social Sciences	8	6.5%
3	Programme Core- Theory	64	51.5%
4	Programme Core - Practicals	17	13.7%
5	Programme Elective	15	12.1%
6	Project	12	9.7%
<b>Total Credits</b>		<b>124</b>	<b>100%</b>

**Basic Science(BS) AND Humanities & Social Sciences(HSS) Courses:**

Semester	Name of the Course	Category	Credits
1	Mathematical Foundations of Computer Science	BS	4
2	Operations Research	BS	4
<b>BS Total Credits</b>			<b>8</b>
2	Accounting and Financial Management	HSS	4
3	Organizational Behaviour	HSS	4
<b>HSS Total Credits</b>			<b>8</b>

**Programme Core , Elective & Practical Courses:**

Sem	No. of Core Courses	credits	No. of Elective Courses	credits	No. of Practical Courses	credits
1	4	16	-	-	2	4
2	3	12	-	-	3	5
3	4	16	-	-	2	2
4	2	8	3	9	2	3
5	3	12	2	6	2	3
6	-	-	-	-	1	12
<b>Total Credits for Core courses</b>		<b>64</b>	<b>Total Credits for Elective courses</b>	<b>15</b>	<b>Total Credits for Practical courses</b>	<b>29</b>



**Thiagarajar College of Engineering, Madurai – 625 015**  
**Department of Computer Applications**  
**Scheduling of Courses**

Sem- ester	Theory					Theory cum Practical	Practical			Credits
1 <sup>st</sup> (24)	14CA110 Mathematical Foundations of Computer Science 3:1	14CA120 Programming in C 3:1	14CA130 Computer Organization and Architecture 4:0	14CA140 Data Structures 3:1	14CA150 Database Management Systems 4:0	-	14CA170 Data Structures using C Programming Laboratory 0:2	14CA180 RDBMS Laboratory 0:2		24
2 <sup>nd</sup> (25)	14CA210 Operations Research 3:1	14CA220 Object Oriented Programming using C++ 3:1	14CA230 Design and Analysis of Algorithms 3:1	14CA240 Operating Systems 4:0	14CA250 Accounting and Financial Management 3:1	-	14CA270 C++ Programming Laboratory 0:1	14CA280 Client/Server Applications Laboratory 0:2	14CA290 Professional Communication 1:1	25
3 <sup>rd</sup> (22)	14CA310 Organizational Behaviour 4:0	14CA320 Internet and Java Programming 4:0	14CA330 Computer Networks 3:1	14CA340 Software Engineering 3:1	14CA350 Data Warehousing and Data Mining 3:1	-	14CA370 Internet and Java Programming Laboratory 0:1	14CA380 Data Warehousing and Data Mining Laboratory 0:1		22
4 <sup>th</sup> (20)	14CA410 Electronic Commerce and Electronic Business 4:0	14CA420 Object Oriented Analysis and Design 3:1	14CAPX0 Elective I 3:0	14CAPX0 Elective II 3:0	14CAPX0 Elective III 3:0	-	14CA470 Web Technologies Laboratory 0:2	14CA480 Software Engineering Laboratory 0:1		20
5 <sup>th</sup> (21)	14CA510 Mobile Applications 4:0	14CA520 Business Processes 4:0	14CA530 Software Quality and Testing 3:1	14CAPX0 Elective IV 3:0	14CAPX0 Elective V 3:0	-	14CA570 COBOL Programming Laboratory 0:2	14CA580 Applications Development Laboratory 0:1		21
6 <sup>th</sup> (12)						-	14CA610 Project 0:12			12
Total Credits										124

Additional One Credit Courses –

1. 14CAP10 – Big Data Analytics
2. 14CAP20 – Software Testing Tools and Practices

BOS meeting approved: 19-11-2014

Approved in 49th Academic Council Meeting on 04-12-2014

**THIAGARAJAR COLLEGE OF ENGINEERING: MADURAI – 625 015****Master of Computer Applications (M.C.A) Degree Program****COURSES OF STUDY****(For the candidates admitted from 2014-2015 onwards)****FIRST SEMESTER**

FIRST SEMESTER						
Course code	Name of the Course	Category	No. of Hours / Week			credits
			L	T	P	
THEORY						
14CA110	Mathematical Foundations of Computer Science	BS	3	1	-	4
14CA120	Programming in C	PC	3	1	-	4
14CA130	Computer Organization and Architecture	PC	4	-	-	4
14CA140	Data Structures	PC	3	1	-	4
14CA150	Database Management Systems	PC	4	-	-	4
PRACTICAL						
14CA170	Data Structures using C Programming Laboratory	PC	-	-	4	2
14CA180	RDBMS Laboratory	PC	-	-	4	2
Total			17	3	8	24

**SECOND SEMESTER**

SECOND SEMESTER

Course code	Name of the Course	Category	No. of Hours / Week			credits
			L	T	P	
THEORY						
14CA210	Operations Research	BS	3	1	-	4
14CA220	Object Oriented Programming using C++	PC	3	1	-	4
14CA230	Design and Analysis of Algorithms	PC	3	1	-	4
14CA240	Operating Systems	PC	4	-	-	4
14CA250	Accounting and Financial Management	HSS	3	1	-	4
PRACTICAL						
14CA270	C++ Programming Laboratory	PC	-	-	2	1
14CA280	Client/Server Applications Laboratory	PC	-	-	4	2
14CA290	Professional Communication	HSS	1	1	-	2
Total			18	5	6	25

**THIRD SEMESTER**

Course code	Name of the Course	Category	No. of Hours / Week			credits
			L	T	P	
THEORY						
14CA310	Organizational Behaviour	HSS	4	-	-	4
14CA320	Internet and Java Programming	PC	4	-	-	4
14CA330	Computer Networks	PC	3	1	-	4
14CA340	Software Engineering	PC	3	1	-	4
14CA350	Data Warehousing and Data Mining	PC	3	1	-	4
PRACTICAL						
14CA370	Internet and Java Programming Laboratory	PC	-	-	2	1
14CA380	Data warehousing and Data Mining Laboratory	PC	-	-	2	1
Total			17	3	4	22

**FOURTH SEMESTER**

Course code	Name of the Course	Category	No. of Hours / Week			credits
			L	T	P	
THEORY						
14CA410	Electronic Commerce and Electronic Business	PC	4	-	-	4
14CA420	Object Oriented Analysis and Design	PC	3	1	-	4
14CAPX0	Elective I	PE	3	-	-	3
14CAPX0	Elective II	PE	3	-	-	3
14CAPX0	Elective III	PE	3	-	-	3
PRACTICAL						
14CA470	Web Technologies Laboratory	PC	-	-	4	2
14CA480	Software Engineering Laboratory	PC	-	-	2	1
Total			16	1	6	20

**FIFTH SEMESTER**

FIFTH SEMESTER						
Course code	Name of the Course	Category	No. of Hours / Week			credits
			L	T	P	
THEORY						
14CA510	Mobile Applications	PC	4	-	-	4
14CA520	Business Processes	PC	4	-	-	4
14CA530	Software Quality and Testing	PC	3	1	-	4
14CAPX0	Elective IV	PE	3	-	-	3
14CAPX0	Elective V	PE	3	-	-	3
PRACTICAL						
14CA570	COBOL Programming Laboratory	PC	-	-	4	2
14CA580	Applications Development Laboratory	PC	-	-	2	1
Total			17	1	6	21

**SIXTH SEMESTER**

Course code	Name of the Course	Category	No. of Hours / Week			credits
			L	T	P	
			PRACTICAL			
14CA610	Project	PC	-	-	24	12
Total			24			12

BS : Basic Science  
PC : Programme Core  
PE : Programme Elective  
HSS : Humanities and Social Science

L : Lecture  
T : Tutorial  
P : Practical

**Note:**

1 Hour Lecture/week is equivalent to 1 credit  
1 Hour Tutorial/week is equivalent to 1 credit  
2 Hour Practical/week is equivalent to 1 credit

**Total credits to be earned for the award of degree: 124**

**THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI – 625 015**

**Master of Computer Applications (M.C.A) Degree Program**

**SCHEME OF EXAMINATIONS**

**(For the candidates admitted from 2014-2015 onwards)**

**FIRST SEMESTER**

S.No.	Sub. Code	Name of the Course	Duration of Terminal Exam. in Hrs.	Marks			Minimum Pass	Marks for
				Continuous Assessment *	Terminal Exam **	Max. Marks	Terminal Exam	Total
THEORY								
1	14CA110	Mathematical Foundations of Computer Science	3	50	50	100	25	50
2	14CA120	Programming in C	3	50	50	100	25	50
3	14CA130	Computer Organization and Architecture	3	50	50	100	25	50
4	14CA140	Data Structures	3	50	50	100	25	50
5	14CA150	Database Management Systems	3	50	50	100	25	50
PRACTICAL								
6	14CA170	Data Structures using C Programming Laboratory	3	50	50	100	25	50
7	14CA180	RDBMS Laboratory	3	50	50	100	25	50

## SECOND SEMESTER

S.No.	Sub. Code	Name of the Course	Duration of Terminal Exam. in Hrs.	Marks			Minimum Pass	Marks for
				Continuous Assessment *	Terminal Exam **	Max. Marks	Terminal Exam	Total
THEORY								
1	14CA210	Operations Research	3	50	50	100	25	50
2	14CA220	Object Oriented Programming using C++	3	50	50	100	25	50
3	14CA230	Design and Analysis of Algorithms	3	50	50	100	25	50
4	14CA240	Operating Systems	3	50	50	100	25	50
5	14CA250	Accounting and Financial Management	3	50	50	100	25	50
PRACTICAL								
6	14CA270	C++ Programming Laboratory	3	50	50	100	25	50
7	14CA280	Client/Server Applications Laboratory	3	50	50	100	25	50
8	14CA290	Professional Communication	3	50	50	100	25	50

### THIRD SEMESTER

S.No.	Sub. code	Name of the Course	Duration of Terminal Exam. in Hrs.	Marks			Minimum Pass	Marks for
				Continuous Assessment *	Terminal Exam **	Max. Marks	Terminal Exam	Total
THEORY								
1	14CA310	Organizational Behaviour	3	50	50	100	25	50
2	14CA320	Internet and Java Programming	3	50	50	100	25	50
3	14CA330	Computer Networks	3	50	50	100	25	50
4	14CA340	Software Engineering	3	50	50	100	25	50
5	14CA350	Data Warehousing and Data Mining	3	50	50	100	25	50
PRACTICAL								
6	14CA370	Internet and Java Programming Laboratory	3	50	50	100	25	50
7	14CA380	Data Warehousing and Data Mining Laboratory	3	50	50	100	25	50

### FOURTH SEMESTER

S.No.	Sub. code	Name of the Course	Duration of Terminal Exam. in Hrs.	Marks			Minimum Pass	Marks for
				Continuous Assessment *	Terminal Exam **	Max. Marks	Terminal Exam	Total
THEORY								
1	14CA410	Electronic Commerce and Electronic Business	3	50	50	100	25	50
2	14CA420	Object Oriented Analysis and Design	3	50	50	100	25	50
3	14CAPX0	Elective I	3	50	50	100	25	50
4	14CAPX0	Elective II	3	50	50	100	25	50
5	14CAPX0	Elective III	3	50	50	100	25	50
PRACTICAL								
6	14CA470	Web Technologies Laboratory	3	50	50	100	25	50
7	14CA480	Software Engineering Laboratory	3	50	50	100	25	50

### FIFTH SEMESTER

S.No.	Sub. code	Name of the Course	Duration of Terminal Exam. in Hrs.	Marks			Minimum Pass	Marks for
				Continuous Assessment *	Terminal Exam **	Max. Marks	Terminal Exam	Total
THEORY								
1	14CA510	Mobile Applications	3	50	50	100	25	50
2	14CA520	Business Processes	3	50	50	100	25	50
3	14CA530	Software Quality and Testing	3	50	50	100	25	50
4	14CAPX0	Elective IV	3	50	50	100	25	50
5	14CAPX0	Elective V	3	50	50	100	25	50
PRACTICAL								
6	14CA570	COBOL Programming Laboratory	3	50	50	100	25	50
7	14CA580	Applications Development Laboratory	3	50	50	100	25	50

### SIXTH SEMESTER

S.No.	Sub. code	Name of the Course	Duration of Terminal Exam. in Hrs.	Marks			Minimum Pass	Marks for
				Continuous Assessment *	Terminal Exam **	Max. Marks	Terminal Exam	Total
PRACTICAL								
1	14CA610	Project	3	150	150	300	75	150

\* Terminal Examination will be conducted for maximum marks of 100/300 and subsequently be reduced to 50/150 marks for the award of terminal examination marks



**LIST OF ELECTIVE COURSES OFFERED  
FOR THE IV SEMESTER M.C.A DEGREE PROGRAMME**

Sub. Code	Sub. Name	Category	No. of Hours / Week			Credits
			L	T	P	
THEORY						
14CAPA0	Component Based Technologies	PE	3	-	-	3
14CAPB0	Programming In C# Using .Net	PE	2	1	-	3
14CAPC0	Software Project Management	PE	2	1	-	3
14CAPD0	Information Retrieval	PE	3	-	-	3
14CAPE0	Wireless Ad Hoc Networks	PE	3	-	-	3
14CAPF0	Supply Chain Management	PE	3	-	-	3
14CAPG0	Managerial Economics	PE	3	-	-	3
14CAPH0	Software Architecture	PE	3	-	-	3
14CAPK0	Cloud Computing	PE	2	1	-	3

**LIST OF ELECTIVE COURSES OFFERED  
FOR THE V SEMESTER M.C.A DEGREE PROGRAMME**

Sub. Code	Sub. Name	Category	No. of Hours / Week			Credits
			L	T	P	
THEORY						
14CAPL0	Network Security	PE	2	1	-	3
14CAPM0	JAVA Technologies	PE	3	-	-	3
14CAPN0	Customer Relationship Management (CRM)	PE	3	-	-	3
14CAPQ0	Enterprise Resource Planning (ERP)	PE	3	-	-	3
14CAPR0	Business Process Re-engineering (BPR)	PE	3	-	-	3
14CAPS0	Soft Computing	PE	2	1	-	3

<b>14CA110</b>	<b>MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE</b>	Category	L	T	P	Credit
		BS	3	1	0	4

### Preamble

A Computer Application student needs to have some basic mathematical tools and techniques to understand various designing concepts, storage methods, concepts in digital principles, managing databases etc. The main objective of this course is to introduce the basic terminology used in advanced courses in Computer application. This emphasizes the development of rigorous logical thinking for solving different kinds of problems that occur in computer applications. Based on this the course aims at giving adequate exposure in the theory and applications of Set theory, Propositional logic, Predicate logic, Lattices and Boolean Algebra, Automata theory which helps the learner to use them eventually in practical applications of computer science. These topics support the advanced courses in computer science such as digital principles, artificial intelligence, compiler and design, DBMS, Design of Software etc.

### Prerequisite

Higher Secondary Level, Degree Level –Set Theory, Logic Theory

### Course Outcomes

On the successful completion of the course, students will be able to		
<b>CO1:</b> Prove implication problems using truth table method, replacement process, Analyzation method, truth table technique, rules of inference method		<b>Apply</b>
<b>CO2:</b> Obtain PCNF and PDNF of given logical expression		<b>Apply</b>
<b>CO3:</b> Check the validity of the verbal or symbolic arguments using rules of inference		<b>Apply</b>
<b>CO4:</b> Construct verbal arguments with predicates in symbolic form and also to validate them		<b>Apply</b>
<b>CO5:</b> Represent the given relation in matrix, digraph and vice versa		<b>Understand</b>
<b>CO6:</b> Verify a given function is bijective or not, and also to find composition of functions		<b>Apply</b>
<b>CO7:</b> Design Karnaugh map to get simplified form of a Boolean function		<b>Apply</b>
<b>CO8:</b> Check whether the given grammar is regular or not using pumping lemma		<b>Apply</b>

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	S	S	M	L	M	S	S
CO2	S	S	S	M	M	L	M	M	S
CO3	S	S	S	M	M	L	L	M	S
CO4	S	S	S	M	M	L	L	M	S
CO5	S	S	S	M	M	L	S	M	L
CO6	S	S	S	S	M	L	L	M	S
CO7	S	S	S	S	M	L	L	M	S
CO8	S	S	S	S	M	L	L	M	S

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	10	10	10	10
Understand	30	30	20	20
Apply	60	60	70	70
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions**

**Prove implication problems using truth table method, replacement process, Analyzation method, truth table technique, rules of inference method (CO1):**

1. Prove the following implication by analyzation method.  
 $(PVQ) \wedge (P \rightarrow R) \wedge (Q \rightarrow S) \Rightarrow S \vee R$
2. Show that  $(QV(P \wedge \neg q) \vee (\neg P \wedge \neg Q))$  is a tautology using replacement process.
3. Verify the following implication by truth table.  
 $(P \rightarrow (Q \rightarrow R)) \Rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$
4. Show the implication using CP rule if necessary.  $\neg PVQ, \neg QVR, R \rightarrow S \Rightarrow P \rightarrow S$ .

**Obtain PCNF and PDNF of given logical expression (CO2):**

1. Obtain CNF and DNF of  $\neg(PVQ) \leftrightarrow (P \wedge Q)$
2. Obtain PCNF and PDNF of  $(\neg P \rightarrow R) \wedge (Q \leftrightarrow P)$
3. Obtain principal disjunctive normal form of  $P \rightarrow ((P \rightarrow Q) \wedge \neg(\neg Q \vee \neg P))$  and hence obtain principal conjunctive normal form.

**Check the validity of the verbal or symbolic arguments using rules of inference (CO3):**

1. Show that the following system of premises is inconsistent.  
 If war is near, then the army would be mobilized. If the army has mobilized then labour costs are high. However the war is near and yet labour costs are not high.

2. Pick out free and bound variables, scope of the quantifier from the following expression  $(\forall x)[P(x) \rightarrow (\exists y)Q(x, y)]$  and also get free and bound occurrence of the variables involved in the expression.
3. Prove by indirect method the following implication:  
 $(\forall x)(P(x) \rightarrow Q(x)); (\exists y)P(y) \Rightarrow (\exists z)Q(z)$

**Construct verbal arguments with predicates in symbolic form and also to validate them (CO4):**

1. Verify the validity of the following arguments:  
 Everyone chooses between good and evil. Rishi has chosen not to do evil. If anyone chooses to do good or if he is forced to obey the laws then he has an excellent chance for happiness. Therefore, Rishi chances for happiness are excellent.
2. Show that from (i)  $(\exists x)(F(x) \wedge S(x)) \rightarrow (\forall y)(M(y) \rightarrow W(y))$ ;  
 (ii)  $(\exists y)(M(y) \wedge \neg W(y))$  the conclusion  $(\forall x)(F(x) \rightarrow \neg S(x))$
3. Verify the validity of the following inference:  
 If one person is more successful than another, then he has worked harder to deserve success. Kumar has not worked harder than Barath. Therefore, Kumar is not more successful than Barath.

**Represent the given relation in matrix, digraph and vice versa. (CO5):**

1. Let R denote a relation on the set of ordered pairs of integers such that  $\langle x, y \rangle R \langle u, v \rangle$  iff  $xv=yu$ . Show that R is an equivalence relation.
2. Given  $A = \{1, 2, 3, 4\}$  and  $R = \{(1, 2), (1, 1), (1, 3), (2, 4)\}$ ,  $S = \{(1, 4), (1, 3), (2, 3), (3, 1), (4, 1)\}$  are relations on A. Find  $S \circ R, R \circ S, M_R, M_S, M_{(R \circ S)^{-1}}$  and graph of R, S.
3. Discuss about all types of relations on the set  $A = \{1, 2, 3, 4\}$  where R is given by  $R = \{(1, 1), (2, 2), (2, 3), (3, 2), (3, 3)\}$ .

**Verify a given function is bijective or not, and also to find composition of functions.(CO6):**

1. Verify which of the following functions are bijective where  $f, g : R \rightarrow R$ ,  
 $f(x) = -5x$ ,  $g(x) = x^2 - 8$ , where  $f, g : R \rightarrow R$ , hence find  $f \circ g, g \circ f, f \circ f, g \circ g$
2. Let  $X = \{1, 2, 3, 4\}$  and a mapping  $f : X \rightarrow X$  be given by  
 $f = \{(1, 2), (2, 3), (3, 4), (4, 1)\}$ . Execute  $f^3, f^4$ .
3. Let  $f(x) = x + 2$ ,  $g(x) = x - 2$ ,  $h(x) = 3x$ , for  $x \in R$ , where R is the set of real numbers.
4. Find  $f \circ g, g \circ f, f \circ f, g \circ g$  and  $f \circ g \circ h$ .

**Design Karnaugh map to get simplified form of a Boolean function (CO7):**

1. Prove that  $D_{70}$  is a Lattice and also verify  $D_{70}$  as Distributive Lattice.
2. Simplify the Boolean function  $f(a, b, c, d) = \sum(0, 2, 6, 7, 8, 9, 13, 15)$  using Karnaugh map.
3. Discuss algebraically the equality  $\overline{a}\overline{b} + \overline{b}\overline{c} + \overline{c}\overline{a} = \overline{a}\overline{b} + \overline{b}\overline{c} + \overline{c}\overline{a}$  using basic laws of Boolean algebra.

**Check whether the given grammar is regular or not using pumping lemma. (CO8):**

1. Construct a DFA that accepts all the strings on  $\{0, 1\}$  except those containing the substring 101.
2. Define context free grammar and ambiguous grammar and hence identify the language generated by the grammar  $S \rightarrow aSb/ab$

3. Convert the following NFA to DFA.

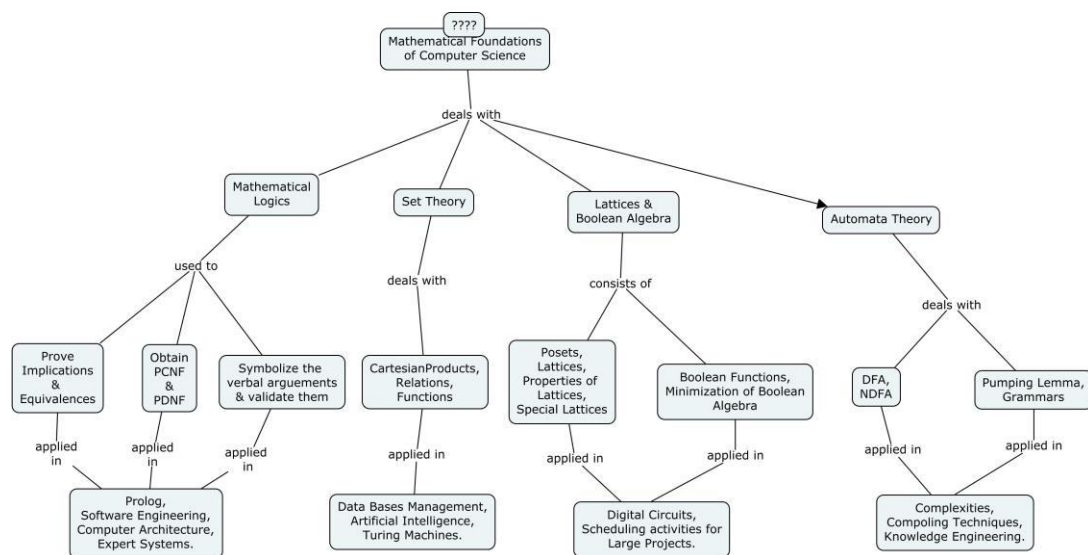
$\delta$	a	b
$S_0$	$\{S_0, S_1\}$	$\phi$
$S_1$	$\phi$	$\{S_2\}$
$S_2$	$\phi$	$\{S_2\}$

- (i) Draw transition diagram of NFA.  
(ii) Draw transition diagram of DFA with its state table.

4. Find whether the following languages are regular or not using pumping lemma:

(i)  $L = \{0^{2n} / n \geq 1\}$       (ii)  $L = \{1^{n^2} / n \geq 1\}$

### Concept Map



### Syllabus

#### Mathematical logic:

Introduction – statements and notation, connectives, Normal forms: Conjunctive Normal Forms - Disjunctive Normal Form - Principal Conjunctive Normal Forms - Principal Disjunctive Normal Form, The theory of inference for the statement calculus the predicate calculus, free and bound variables inference theory of the predicate calculus.

#### Set theory:

Overview of set theory, Relations, Functions.

#### Lattices and Boolean algebra:

Lattices as partially ordered sets, properties of lattices – some special lattice – Boolean algebra – definition and examples – Boolean functions – value of Boolean expression – minimization of Boolean functions.

#### Automata Theory:

Deterministic and Non-Deterministic finite Automaton, Finite Automata  $\epsilon$ -moves, Regular Expression, Finite Automata and Regular Expressions, Pumping Lemma (without proof) and its applications, Grammars and Languages, Ambiguity in grammar, Regular Grammar and Finite Automaton, Context free Grammar - Parse Tree, Application of Context free grammar.

### Reference Books

1. Trembly and Manohar, "Discrete mathematical structures with applications to Computer Science", Tata McGrawHill, 2002.
2. Kenneth H. Rosen, "Discrete mathematics and its applications", McGrawHill International Editions 1999.
3. Dr. M.K.Venkataraman.,Dr.N.Sridharan and N.Chandrasekaran, Discrete Mathematics,National Publishing Company,Chennai.of India(2004)
4. John E.Hopcraft,Rajeev Motwani,Jeffery D.Ullman, `` Introduction to Automata Theory, Languages and Computation “, Pearson Education, Asia,2001.
5. John C.Martin, `` Introduction to Languages and the theory of Computation”, Tata McGraw-Hill Publishing Company Limited,New Delhi.
6. [http://www.research.ibm.com/haifa/dept/svt/papers/Mathematical\\_Logic.pdf](http://www.research.ibm.com/haifa/dept/svt/papers/Mathematical_Logic.pdf)
7. Mathematical Logic and its Application to Computer Science - Lecture Notes EitanFarchi, Ben-Chaim, March 3, 2010

### Course Contents and Lecture Schedule

Module No	Topics	No.of Lectures
<b>Module 1: Propositional and Predicate Calculus</b>		
1.1	Introduction – statements and notation, connectives	3
1.2	Normal forms: Conjunctive Normal Forms - Disjunctive Normal Form	2
1.3	Principal Conjunctive Normal Forms - Principal Disjunctive Normal Form	2
1.4	The theory of inference for the statement calculus	2
1.5	Free and bound variables	2
1.6	Inference theory of the predicate calculus	3
<b>Module II- Set Theory</b>		
2.1	An Overview of set theory	1
2.2	Relations	2
2.3	Functions	2
<b>Module III :Lattices and Boolean Algebra</b>		
3.1	Lattice as PO	1
3.2	Properties of lattices	1
3.3	Special Lattice	2
3.4	Boolean Algebra and its properties	1
3.5	Boolean Function	1
3.6	Value of Boolean Expression	1
3.7	Minimization of Boolean functions	2
<b>Module IV : Automata Theory</b>		
4.1	Deterministic and Non-Deterministic finite Automaton	2
4.2	Finite Automata $\epsilon$ -moves	1
4.3	Regular expressions	1
4.4	Finite Automata and Regular Expressions	1
4.5	Pumping Lemma (without proof) and its applications	2
4.6	Grammars and Languages, Ambiguity in grammar	1
4.7	Regular Grammar and Finite Automaton	1
4.8	Context free Grammar -Parse Tree	2
4.9	Application of Context free grammar	1
Total		40

**Course Designers:**

Dr. V. Mohan                      [vmohan@tce.edu](mailto:vmohan@tce.edu)  
Dr. M. Kameswari                [mkmat@tce.edu](mailto:mkmat@tce.edu)



**14CA120****PROGRAMMING IN C**

Category	L	T	P	Credit
PC	3	1	0	4

**Preamble**

This is a course offered in first semester for the students of Computer Applications. This course has four credits dedicated to provide the students a strong foundation on programming concepts and its application. It also enables the students to solve problems using programmable logic.

**Prerequisite**

Fundamental of Programming languages

**Course Outcomes**

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

- |   |                   |
|---|-------------------|
| <b>CO1:</b> Understand the reason why different constructs are available for iteration, such as "for" loops, "do...while" loops | <b>Understand</b> |
| <b>CO2:</b> Analyze the difference between iteration and recursion  | <b>Analyze</b>    |
| <b>CO3:</b> Analyze the difference between arrays and linked lists  | <b>Analyze</b>    |
| <b>CO4:</b> Apply C program for Data structure concept  | <b>Apply</b>      |
| <b>CO5:</b> Understand the Hardware interaction using Port I/O  | <b>Understand</b> |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	L	-	-	-	-	-	-	-	-
CO2	S	S	S	M	S	M	L	M	-
CO3	S	S	S	M	S	M	L	M	-
CO4	S	S	S	M	S	M	L	M	-
CO5	S	S	S	M	S	M	S	M	L

S-Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	10	10
Understand	20	20	20	20
Apply	50	50	50	50
Analyse	10	10	20	20
Evaluate	0	0	0	0
Create	0	0	0	0



**Course Level Assessment Questions**

Understand the reason why different constructs are available for iteration, such as "for" loops, "do...while" loops (CO1):

1. Differentiate between Structure and Union in C.
2. Explain how dynamic arrays are efficient compared to Static with example?
3. How is memory managed in C?
4. What are the advantages of using Command line Arguments?
5. How garbage collection is done in C?
6. Describe the operations of linked list with an example.

Analyze the difference between iteration and recursion (CO2):

1. Explain how recursive functions affect the run time efficiency?
2. Is there any advantage of using recursion over looping control structures? Give a Suitable example?
3. Analyze the factors that influence the execution times of a program?
4. Illustrate the limitation of array of pointers to strings using a sample?
5. Differentiate keywords BREAK and CONTINUE with an example?

Analyze the difference between arrays and linked lists (CO3):

1. Analysis the various types of linked list.
2. Analysis the usage of single dimension array.
3. Analysis the usage of two dimension array.

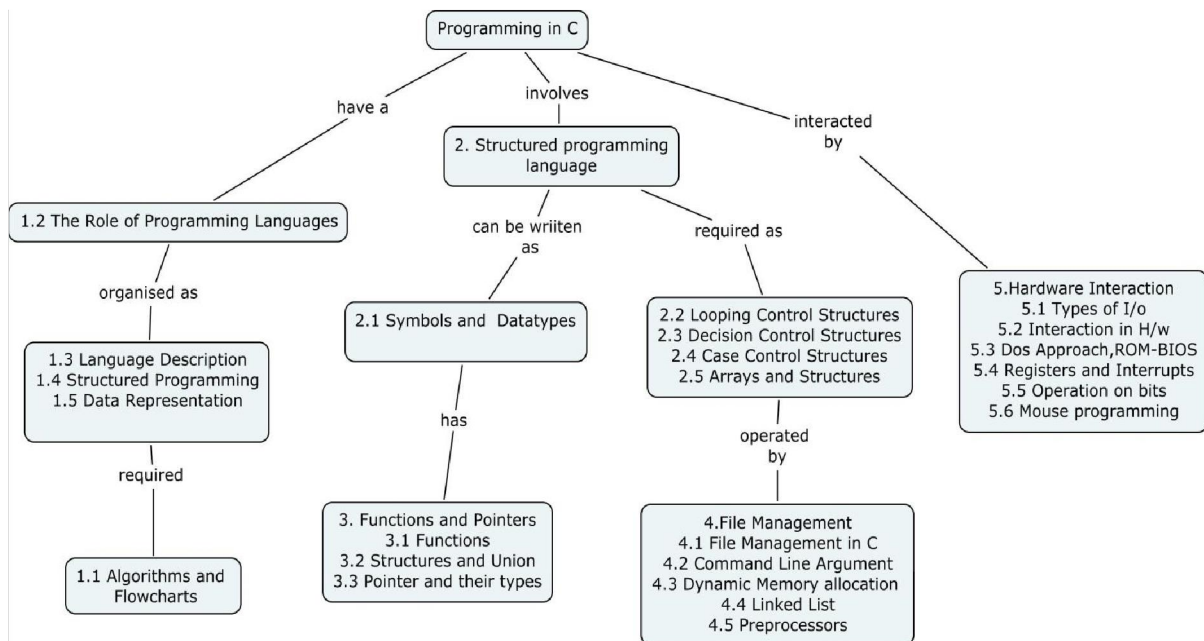
Apply C program for Data structure concept (CO4):

1. Write a Macro program to find the Armstrong number between 1 and 1000?
2. Write a recursive function to calculate the Combinatory of a  $nCr$ ?
3. Write a program to perform stack operation using pointers?
4. Write a program to perform linked list operation using pointers?
5. Write a program to generate the pay slip of an employee using dangling if – else statement?
6. Write a program to compute Matrix Multiplication using Pointers?
7. Write a program to read the content of the file and copy it to another file?
8. Write a program to check if the given word is available in the file or not?

Understand the Hardware interaction using Port I/O (CO5):

1. Explain how interrupts can work in Hardware programming
2. Illustrate the usage of mouse programming
3. Illustrate the usage of init86( )

## Concept Map



## Syllabus

**Introduction to Programming Language :** Algorithms, Flowcharts, The Role of Programming Languages, Language Description, Structured Programming, Data Representation, Procedure Activations **Structured Programming Language:** Symbols and data types, Looping control structures, Decision control structures, Case control structures, Arrays and Strings **Functions and Pointers:** Functions, Structures, Union, Pointers, Type of Pointer **File Management:** File Management in C, Command Line Argument, Dynamic Memory allocation, Linked List and Preprocessors **Hardware Interface :** Types of I/O, Interaction with H/W in C, CPU Registers, Interrupts, DOS Function Requests, Interaction with HW using Port I/O, Operation on bits, Mouse Programming.

## Reference Books

1. Yashavant Kanetkar, "Let us C", BPB Publications 8th Edition, 2007
2. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, 2004
3. Darnell and Margolis, "ANSI C- A Systematic programming Approach", Narosa publications, 2000.
4. Ravi Sethi, Viswanatha. K.V "Programming Languages – Concepts & Constructs" , Pearson Education, Second Edition

**Course Contents and Lecture Schedule**

Module No.	Topic	No of Lectures
1	<b>Introduction to Programming Language</b>	
1.1	Algorithms, Flowcharts	1
1.2	The Role of Programming Languages	1
1.3	Language Description	2
1.4	Structured Programming	2
1.5	Data Representation	2
2	<b>Structured Programming Language</b>	
2.1	Symbols and data types	1
2.2	Looping control structures	2
2.3	Decision control structures	2
2.4	Case control structures	1
2.5	Arrays and Strings	2
3	<b>Functions and Pointers</b>	
3.1	Functions	3
3.2	Structures, Union	1
3.3	Pointers, Type of Pointer	2
4	<b>File Management</b>	
4.1	File Management in C	2
4.2	Command Line Argument	1
4.3	Dynamic Memory allocation	2
4.4	Linked List	2
4.5	Preprocessors	1
5	<b>Hardware Interface</b>	
5.1	Types of I/O	1
5.2	Interaction with H/W in C	1
5.3	DOS Approach, ROM – BIOS	1
5.4	Registers, Interrupts	1
5.5	Operation on bits	1
5.6	Mouse Programming	1
	Total	<b>36</b>

**Course Designers:**

Dr. A. John Sanjeev Kumar

[ajscse@tce.edu](mailto:ajscse@tce.edu)

**14CA130****COMPUTER ORGANIZATION AND  
ARCHITECTURE**

Category	L	T	P	Credit
PC	4	0	0	4

**Preamble**

This course dedicated to number system, logic design, and memory and processing. This is the only course that is concerned with the hardware of a computer, its logic design and organization. It aims at making the student familiar with digital logic and functional design of arithmetic and logic unit that is capable of performing floating point arithmetic operations. The CPU and the organization of memory are explored by tracing the execution of assembly language instructions. Data needs to be transferred between I/O devices and CPU and between computers.

**Prerequisite**

None

**Course Outcomes**

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

- |   |                   |
|---|-------------------|
| <b>CO1:</b> Understand any computer architecture  | <b>Understand</b> |
| <b>CO2:</b> Perform simple arithmetic operations  | <b>Understand</b> |
| <b>CO3:</b> Design simple combinational and sequential digital functions  | <b>Apply</b>      |
| <b>CO4:</b> Design an instruction set of a simple computer capable of performing a specified set of operations      | <b>Analyze</b>    |
| <b>CO5:</b> Design a memory system for a given set of specifications  | <b>Analyze</b>    |
| <b>CO6:</b> Specify architectures using pipelining and paralleling features to improve the performance of computers | <b>Apply</b>      |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	L	-	-	-	-	-	-	-
CO2	S	L	-	-	-	-	-	-	-
CO3	-	S	S	L	L	-	M	M	-
CO4	-	S	S	L	L	-	-	S	-
CO5	-	S	S	L	L	-	M	M	-
CO6	-	S	-	S	L	-	S	-	-

S-Strong;M-Medium; L-Low

**Assessment Pattern**

<b>Bloom's Category</b>	<b>Continuous Assessment Tests</b>			<b>Terminal Examination</b>
	<b>1</b>	<b>2</b>	<b>3</b>	
Remember	30	10	10	10
Understand	30	20	20	20
Apply	20	30	30	30
Analyse	20	40	40	40
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions****Understand any computer architecture (CO1):**

1. What are the different units in a computer system?
2. What is an addressing mode?
3. What is an assembly language instruction?
4. What is the difference between machine language and assembly language?

**Perform simple arithmetic operations (CO2):**

1. Convert the decimal number 92.00625 into a binary number?
2. Convert the binary number 1101.001101 into decimal and octal forms?
3. Multiply the binary numbers 1010 x 0111 using any algorithm you know? Show all steps in calculation

**Design simple combinational and sequential digital functions (CO3):**

1. Obtain an algorithm to find all allowable weights for a weighted BCD code? Assume that all weights are positive integers.
2. Give a combinational circuit to multiply two numbers each of which is 3 bits long and has 1 bit sign? The output should have the right sign and magnitude.

**Design an instruction set of a simple computer capable of performing a specified set of operations (CO4):**

1. A byte addressed machine has 256 MB memory. It has 160 instructions and 16 general purpose registers.
  - What is the instruction format if an instruction and 3 GPRs can be addressed?
  - What is the word length of the machine?
  - Is the word size sufficient to represent floating point numbers? If yes, pick appropriate number of bits for the mantissa and exponent. Justify your choice.

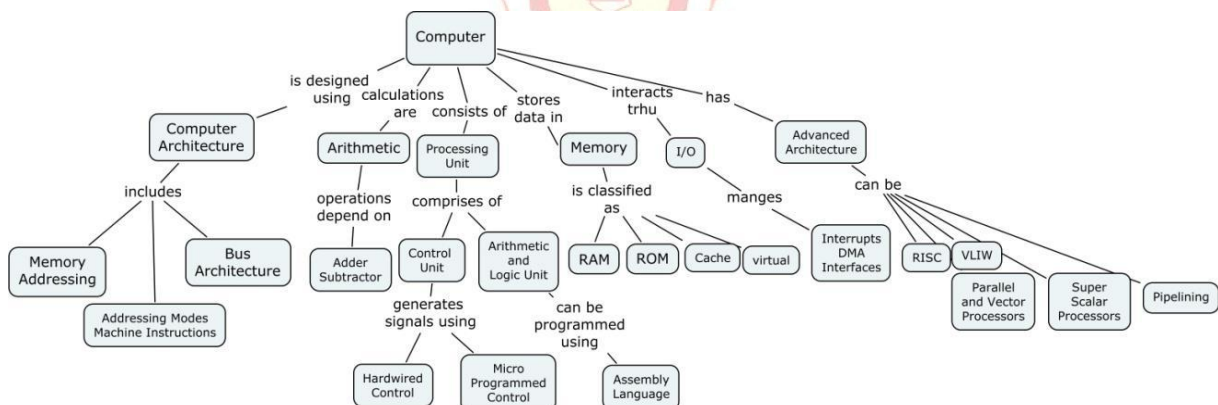
### Design a memory system for a given set of specifications (CO5):

1. Analyze the characteristics, organization and operation modes of Asynchronous and Synchronous DRAMs in Detail?
2. In data cache has space for only 8 blocks of data and each block consists of 16 bit word of data and memory is word addressable with 16 bit addresses.
  - Make a decision of which replacement algorithm is needed.
  - Calculate SUM and AVG of array elements
  - Implement Contents of data cache in each mapping functions

### Specify architectures using pipelining and paralleling features to improve the performance of computers (CO6):

1. Classify Hazards and analyze their impact on Pipelining
2. A pipelined processor has two branch delay slots. An optimizing compiler can fill one of these slots 85 % of the time and can fill the second slot only 20% of the time. What is the percentage improvement in performance achieved by this optimization, assuming that 20% of the instructions executed are branch instructions?

### Concept Map



### Syllabus

**Functional Units:** Basic operational concepts, Bus structures, Machine instructions, memory locations, addressing modes, assembly language **Arithmetic:** Number representations, addition and subtraction of signed numbers, Design of fast adders, Multiplication of signed numbers, Fast multiplication and Integer division **Processing Unit:** Concepts, Execution of complete instruction, Multi bus organization, ALU; Control Unit: Hardwired Control, Micro programmed Control; Micro Instructions, Micro program sequencing, Micro instructions with next address field and pre-fetching **Memory:** RAM, ROM, Cache Memories, and Virtual memory **Input and output organization:** Accessing I/O devices, Interrupts, DMA, and Interface circuits **Advanced Processor Architecture:** RISC, Pipelining, Super Scalar Processors, VLIW, Parallel and Vector Processors.

### Text Book

1. Carl Hamacher, Zvonko Vranesic, safwat Zaky, " Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.

### Reference Books

1. William Stallings, "Computer Organization and Architecture", Sixth Edition, Pearson Education, 2004.
2. David A. Patterson, John L. Hennessy, "Computer Organization and Design", Third Edition, Morgan Kaufmann Publishers, 2005.
3. David E. Culler, Jaswinder Paul Singh, Anoop Gupta: Parallel Computer Architecture: Hardware/Software Approach, Elsevier Science, 2008.

### Course Contents and Lecture Schedule

Module No.	Topic	No of Lectures
	<b>Functional Units</b>	
1	Basic structure of Computers: Functional Units, Operational Concepts	2
2	Bus Structures	1
3	Machine instructions and programs	1
4	Memory locations and Addresses, Memory operations	1
5	Instructions and instruction sequencing	1
6	Addressing Modes	1
7	Assembly Language	1
	<b>Arithmetic</b>	
8	Number Representation	2
9	Addition and Subtraction of signed numbers	1
10	Design of Fast Adders	2
11	Multiplication of numbers	1
14	Operand multiplication	2
15	Fast multiplication	1
16	Integer division	1
17	Floating point numbers and operations	1
	<b>Processing Unit</b>	
18	Processing Unit: Fundamental Concepts (Seminar)	1
19	Execution of complete Instruction	1
20	Multiple bus organization	1
21	Hardwired Control	1
22	Micro programmed control	2
23	Sequencing (Seminar)	1
24	Micro instructions with next address field	1
25	Pre-fetching, Emulations (Seminar)	1



	<b>Memory</b>	
26	Main memory: Concepts	1
27	Semiconductor RAM memories	1
28	Read Only Memory	1
29	Cache Memories	1
30	Virtual Memories	2
31	Memory Management Requirements(Seminar)	2
	<b>Input and output organization</b>	
32	Input – Output organization	
33	Accessing I/O devices	1
34	Interrupts	2
35	Direct Memory Access	2
36	Interface circuits	1
	<b>Advanced Processor Architecture</b>	
37	RISC	1
38	Pipelining	2
39	Super Scalar Processors	1
40	Parallel and Vector Processors	1
41	VLIW	1
	Total	48

#### Course Designers:

Mrs. K. Murugeswari

[kmcse@tce.edu](mailto:kmcse@tce.edu)



**14CA140****DATA STRUCTURES**

Category	L	T	P	Credit
PC	3	1	0	4

**Preamble**

This course aims at facilitating the student to understand the various data structures, their operations and apply them in real world problems.

**Prerequisite**

Fundamentals of Mathematics

**Course Outcomes**

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

- CO1:** Demonstrate the functionality and purpose of various data structures **Understand**
- CO2:** Identify the trade-offs in choosing various data structures for real-time requirements **Evaluate**
- CO3:** Ability to identify and implement appropriate data structure for a given application **Analyze**
- CO4:** In the context of searching, identify the trade-offs involved in selecting the most efficient data structure **Evaluate**
- CO5:** In the context of sorting, identify the trade-offs involved in Selecting suitable sort algorithms **Evaluate**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	-	-	-	-	-	-	-	-
CO2	S	M	-	-	-	-	-	-	-
CO3	S	M	-	-	M	M	M	M	-
CO4	S	M	L	-	M	M	M	M	-
CO5	S	M	L	-	M	M	M	M	-

S- Strong; M-Medium; L-Low

### Assessment Pattern

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	30	20	10	30
Understand	30	20	10	30
Apply	20	30	30	20
Analyse	10	20	20	10
Evaluate	10	10	30	10
Create	0	0	0	0

### Course Level Assessment Questions

#### Demonstrate the functionality and purpose of various data structures (CO1):

1. What is data structure?
2. List out the areas in which data structures are applied extensively?
3. List out few of the applications of tree data-structure?
4. List out few of the applications that make use of Multilinked Structures?
5. If you are using C language to implement the heterogeneous linked list, what pointer type will you use?

#### Identify the trade-offs in choosing various data structures for realtime requirements (CO2):

1. What are the major data structures used in the following areas: RDBMS, Network data model and Hierarchical data model?
2. What is the minimum number of queues needed to implement the priority queue?
3. How many null branches are there in a binary tree with 20 nodes?
4. How many different trees are possible with 10 nodes?
5. What is the condition for balancing to be done in an AVL tree?

#### Identify and implement appropriate data structure for a given application (CO3):

1. What are the notations used in Evaluation of Arithmetic Expressions using prefix and postfix forms?
2. How do you traverse a given tree using Inorder, Preorder and Postorder traversals.
3. What is the suitable efficient data structure for constructing a tree?
4. Convert the expression  $((A + B) * C - (D - E) ^ (F + G))$  to equivalent Prefix and Postfix notations.
5. Draw the B-tree of order 3 created by inserting the following data arriving in sequence - 92 24 6 7 11 8 22 4 5 16 19 20 78
6. Draw a binary Tree for the expression :  $A * B - (C + D) * (P / Q)$
7. If you have one million named objects and you want to store them in a data structure that lets you insert new objects quickly and search for an object by name quickly, what data structure should you use?

In the context of searching, identify the trade-offs involved in selecting the most efficient data structure (CO4):

1. What is the bucket size, when the overlapping and collision occur at same time?
2. What are the Collision Resolution Techniques and the methods used in each of the type?
3. Draw a hash table with open addressing and a size of 9. Use the hash function " $k\%9$ ". Insert the keys: 5, 29, 20, 0, 27 and 18 into your table (in that order).
4. Suppose that an open-address hash table has a capacity of 811 and it contains 81 elements. Analyze the table's load factor? (An approximation is fine).
5. A hash table with hash function  $H_1(k) = k \bmod 13$  is shown below.  

0	1	2	3	4	5	6	7	8	9
10	11	12	26	38	17	33	48	35	25

Collision is resolved using the hash function  $H_2(k) = (k \bmod 11) + 1$  (a) Analyze how many key comparisons occur in searching for key 35 in the given hash table? (b) If a new key 67 is inserted into the given hash table, what will be its address?

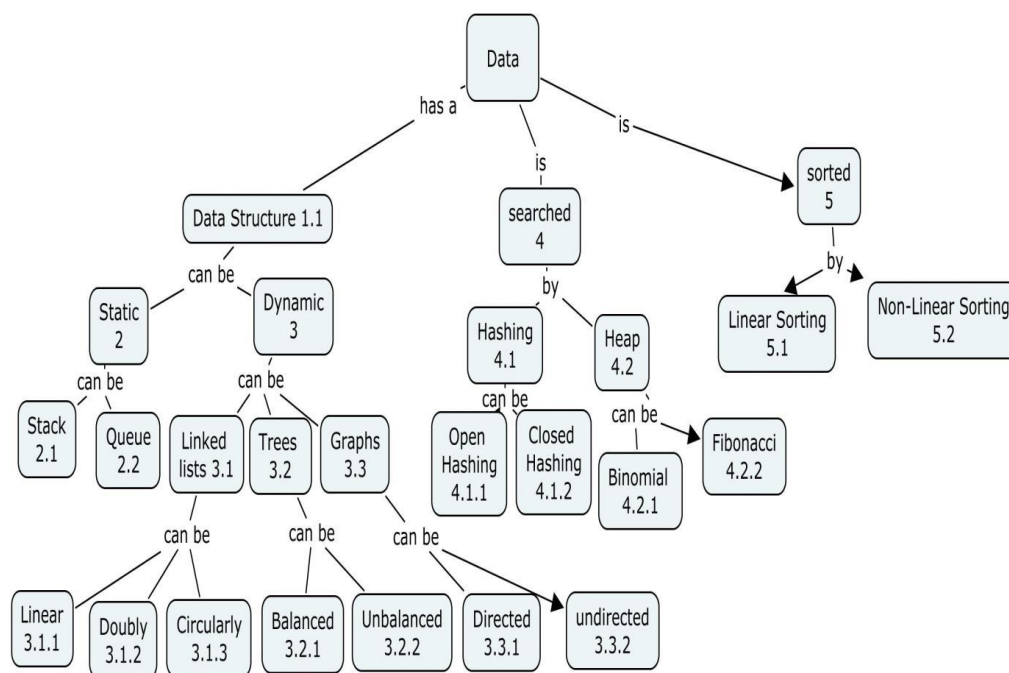
In the context of sorting, identify the trade-offs involved in Selecting suitable sort algorithms (CO5):

1. Sort the given values using Quick Sort?

65	70	75	80	85	60	55	50	45
----	----	----	----	----	----	----	----	----

2. The way a card game player arranges his cards as he picks them up one by one, is an example of 1. bubble sort 2. selection sort 3. insertion sort 4. merge sort
3. Given a string of characters (let us say there are about 100 characters or more in the string), what is the most efficient method to use for finding out the character that repeats itself the most?

### Concept Map



## Syllabus

**Introduction:** Data Structure, Stacks and Queues, Linked Lists, Hash Tables, **Trees:** Binary Search Tress, Red-Black Trees, AVL Trees, B-Trees. **Non Linear Sorting:** Insertion Sort, Bubble sort, Selection Sort, Heap sort, Priority queues, Quick sort ,**Linear Sorting:** Counting sort, Radix sort, Bucket sort. **Binomial Heaps:** Binomial tress and binomial heaps, Fibonacci Heaps, **Searching:** Breadth-first search, Depth-first search, **Graphs:** Topological sort, strongly connected components, Minimum Spanning Trees.

## Reference Books

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Prentice Hall of India, 2002.
2. Mark Allen Weiss, "Data Structures and Algorithms in C", Addison-Wesley, 1997
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education Asia, 2002.
4. Robert Sedgewick, " Algorithms in C++", Pearson Education Asia, 2002.

## Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
1	<b>Data</b>	
1.1	Data Structure	1
2	<b>Static Data Structures</b>	
2.1	Stacks	3
2.2	Queues	2
3	<b>Dynamic Data Structures</b>	
3.1	Linked Lists	1
3.1.1	Linear Linked Lists	2
3.1.2	Doubly Linked Lists	2
3.1.3	Circular Linked Lists	2
3.2	Trees	2
3.2.1	Unbalanced Trees	3
3.2.2	Balanced Trees	6
4	<b>Data Search</b>	
4.1	Hashing	1
4.1.1	Open Hashing	1
4.1.2	Closed Hashing	2

4.2	Heap - Max and Min Heap	2
4.2.2	Fibonacci Heap	2
4.2.3	Binomial Heap	1
5	<b>Data Sorting</b>	
5.1	Internal Sorting	
5.1.1	Insertion sorting	1
5.1.2	Shell sorting	1
5.1.3	Quick sorting	1
5.1.4	Merge sorting	1
5.1.5	Heap sorting	2
5.2	External Sorting	2
5.3	Graphs – Strongly Connected Components	2
5.4	Minimal Spanning Trees	2
	Total	45

**Course Designers:**

Dr. D. Jeyamala  
Mrs. K. Murugeswari

[djmcse@tce.edu](mailto:djmcse@tce.edu)  
[kmcse@tce.edu](mailto:kmcse@tce.edu)

<b>14CA150</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	Category	L	T	P	Credit
		PC	4	0	0	4

**Preamble**

This course aims at facilitating the student to understand the various functionalities of DBMS software and perform many operations related to creating, manipulating and maintaining databases for Real-world applications and student to understand the various designing concepts, storage methods, querying and managing databases.

**Prerequisite**

Elementary knowledge about computers including some experience using Unix or Windows

**Course Outcomes**

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

- CO1:** Understand the structure and model of the relational database system **Understand**
- CO2:** Create , retrieve and Display data from multiple tables, and using group functions, sub queries **Apply**
- CO3:** Design a database based on a data model and Normalize a given database to a specified level **Apply**
- CO4:** Estimate the storage size of the database and design appropriate storage techniques **Apply**
- CO5:** Analysis the requirements of transaction processing, concurrency control, backup and recovery **Analyze**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	L	-	-	-	-	-	-	-	-
CO2	S	S	S	M	S	M	L	M	-
CO3	S	S	S	M	S	M	L	M	-
CO4	S	S	S	M	S	M	L	M	-
CO5	S	S	S	M	S	M	S	M	L

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	30	30	20	20
Understand	30	20	20	20
Apply	30	30	20	20
Analyse	10	20	40	40
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions**

Understand the structure and model of the relational database system (CO1):

1. What is database management system?
2. Define schema?
3. Explain the structure of a DBMS.
4. Mention the types of constraint with an example for each type.
5. What is the use of having clause?
6. Mention the use of Commit and Rollback commands.
7. Define strong entity set with an example.
8. Define the term ACID properties.
9. How the database system is advantageous than file system?

Create , retrieve and Display data from multiple tables, and using group functions, sub queries (CO2):

1. For the following employee database  
employee(employee-name, street, city)  
works(employee-name, company-name, salary)  
company(company-name, city)  
manages(employee-name, manager-name)  
Construct the appropriate tables along with the required constraints.
2. If you want to remove the primary constraints that you have created for the employee table, how will you do that?
3. If you want to change the city name of the company "TCS", what will you do?
4. Find those companies whose employees earn a higher salary, on average than the average salary at TCS.
5. Delete all the employees in TCS who earn less than Rs.10,000 .
6. If you want to get back the employees in TCS who earn less than Rs.10,000, what will you do?
7. You allow the user "A" to access the information regarding the employee's address along with the company in which they are working.
8. Consider a relational database with two relations  
Course(course\_name,room,instructor)  
Entrollment(course\_name, student\_name, grade)  
Create the instances of these relations for three courses, each of which enrolls five students.
9. Consider the following account relation and construct a bitmap index on the attributes branch\_name and balance, dividing balance values into 4 ranges – < 250, 250 ..<500,



500.. $<750$  and  $>750$ .

Account_No	Branch_Name	Balance
A-217	Madurai	200
A-219	Chennai	600
A-117	Coimbatore	350
A-207	Madurai	800
A-317	Chennai	700

Design a database based on a data model and Normalize a given database to a specified level (CO3):

- Using the functional dependencies given  $A \rightarrow BC$ ,  $CD \rightarrow E$ ,  $B \rightarrow D$ ,  $E \rightarrow A$  Compute  $B^+$ .
- Let relations  $r1(A,B,C)$  and  $r2(C,D,E)$  have the following properties:  $r1$  has 20,000 tuples,  $r2$  has 45,000 tuples, 25 tuples of  $r1$  fit on one block, and 30 tuples of  $r2$  fit on one block. Estimate the number of block transfers and seeks required using Hash join strategy for  $r1$  natural joined with  $r2$ .
- List out all the functional dependencies satisfied by the relation. Explain how they are satisfied.

A	B	C
a1	b1	c2
a1	b1	c2
a2	b4	c1
a3	b2	c3

Design a database for the Banking environment by following the various design phases including normalization.

Estimate the storage size of the database and design appropriate storage techniques (CO4):

- How does the remapping of bad sectors by disk controllers affect data retrieval rates?
- Draw the various levels of Redundant Arrays of Independent Disks and explain.
- Illustrate the Physical characteristics of Magnetic Disks?
- Illustrate Multitable Clustering File organization with suitable example

Analysis the requirements of transaction processing, concurrency control, backup and recovery (CO5):

- Consider the following two transactions:

T1: read(A); read(B); if A=0 then B:=B+1; write(B)	T2: read(B); read(A); if B=0 then A:=A+1; write(A)
---	---

Let the consistency requirement be  $A=0$  or  $B=0$ , with  $A=B=0$  the initial values. Show that every serial execution involving these two transactions preserve the consistency of the database.

- Consider the following transactions

T1: read(A); read(B);	T2: read(B); read(A);
--------------------------	--------------------------



if A=0 then B:=B+1; write(B)	if B=0 then A:=A+1; write(A)
---------------------------------	---------------------------------

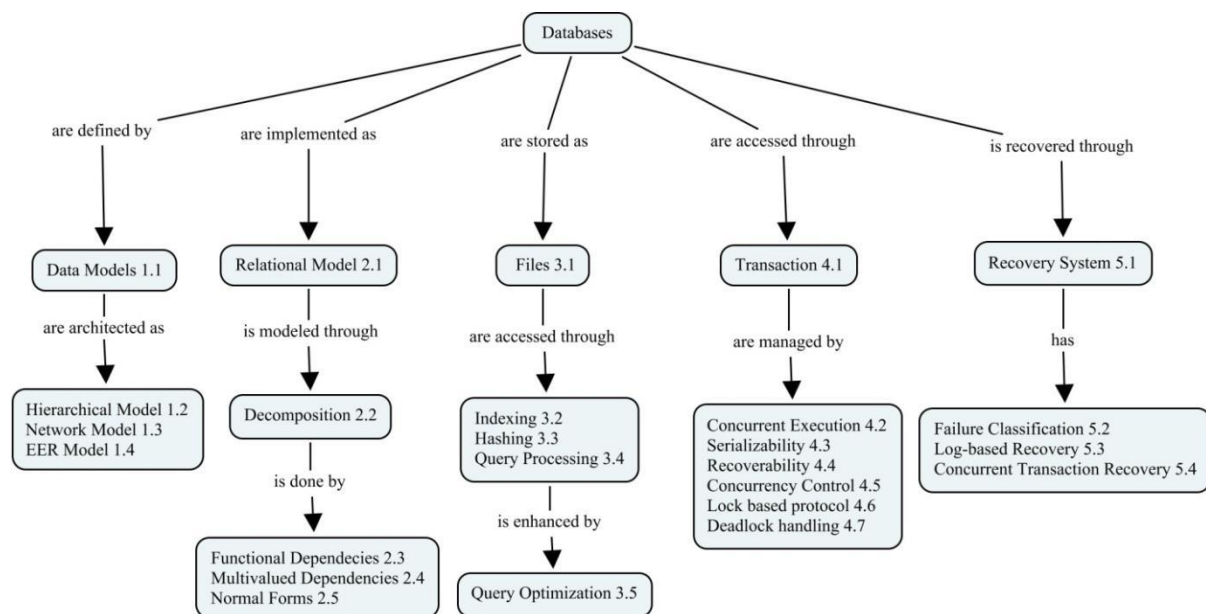
Add lock and unlock instructions to the above transactions and show that they observe two-phase locking protocol.

3. Compute the closure of the following set F of functional dependencies for relation schema R=(A,B,C,D,E).

A→BC, CD→E, B→D, E→A

List the candidate keys for R.

## Concept Map



## Syllabus

**Introduction** - Concepts, Relationships, System Architecture, Data Models, Relational languages **Data Definition Language:** Tables creation, Constraints, Displaying table information, Altering and Renaming an existing table, Truncating and dropping the table. **Data management and Retrieval** - DML operations – Insert, Delete & Update, Basic queries – select, Arithmetic operations, where clause, Sorting, CASE structure, DEFINE command, Complex queries – Functions and Grouping. **Database Design** – Relational Model, Decomposition, Functional Dependencies, Multivalued Dependencies, Normal forms **Storage Structure** - File Structure, Query Processing – Measures of query cost, Evaluation of Expressions, Query Optimization – Estimation statistics of Expression Results, Evaluation Plans, **Transaction and Concurrency control** - Transaction concepts, Concurrent Execution, Serializability, Recoverability, Concurrency Control, Lock based protocol, Deadlock handling.

## Reference Books

1. Henry F. Korth, Abraham Silberchatz, S.Sudarshan , Database System Concepts, McGraw-Hill – 2007
2. Ramez Elmasri, Shamkant B. Navathe - Fundamentals of Database Systems –Fifth Edition - Addison Wesley Higher Education – 2007
3. Raghu Ramakrishnan, Johannes Gehrke - Database Management Systems - Third Edition - McGraw-Hill - 2006
4. C.J.Date, Longman, Dr.S.Swamynathan, Introduction to Database Systems, Pearson Education - 2007
5. Hoffer, Prescott & McFadden - Modern Database Management – Eighth Edition - Prentice Hall – 2007
6. Kifer, Bernstein & Lewis - Database Systems: An Application Oriented Approach, Complete Version – Second Edition - Addison Wesley Higher Education - 2006

### Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
<b>1</b>	<b>Introduction</b>	
1.1	Concepts	1
1.2	Relationships	1
1.3	System Architecture	1
1.4	Data Models	2
1.5	Relational languages	1
<b>2.</b>	<b>Data Definition Language</b>	
2.1	Tables creation	1
2.2	Constraints	1
2.3	Displaying table information	1
2.4	Altering and Renaming an existing table	1
2.5	Truncating and dropping the table	1
<b>3.</b>	<b>Data management and Retrieval</b>	
3.1	DML operations – Insert , Delete & Update	1
3.2	Basic queries – select	1
3.2.1	Arithmetic operations , where clause , Sorting	1
3.2.2	CASE structure , DEFINE command	1
3.3	Complex queries – Functions and Grouping	1
3.3.1	Multiple tables : JOINS and SET operators	1
3.3.2	Sub queries : Nested queries	1
<b>4.</b>	<b>Database Design</b>	
4.1	Relational model	1
4.2	Decomposition	1
4.3	Functional dependencies	2

Module No.	Topic	No. of Lectures
4.4	Multi valued dependencies	2
4.5	Normal Forms	2
<b>5.</b>	<b>Data Storage and Querying</b>	
5.1	File Structure	2
5.2	Query Processing – Measures of query cost	2
5.3	Evaluation of Expressions	2
5.4	Query Optimization – Estimation statistics of Expression Results	2
5.5	Evaluation Plans	2
<b>6</b>	<b>Transaction and Concurrency control</b>	
6.1	Transactions - concepts	1
6.2	Concurrent Execution	1
6.3	Serializability	2
6.4	Recoverability	2
6.5	Concurrency Control	2
6.6	Lock based protocol	1
6.7	Deadlock handling	1
	Total	45

### Course Designers:

Dr. A. John Sanjeev Kumar  
Dr. S. Vijayalakshmi

ajscse@tce.edu  
svlcse@tce.edu

**14CA170****DATA STRUCTURES USING C  
PROGRAMMING LABORATORY**

Category	L	T	P	Credit
PC	0	0	2	2

**Preamble**

This is a course offered in first semester for the students of Computer Applications. This course has two credits dedicated to provide the students a strong foundation on programming concepts and its application. It also enables the students to use programming concepts to solve problem.

**Prerequisite**

14CA120 : Programming in C

14CA140 : Data Structures

**Course Outcomes**

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

- |   |                   |
|---|-------------------|
| <b>CO1:</b> Understand the reason why different constructs are available for iteration, such as "for" loops, "do...while" loops | <b>Understand</b> |
| <b>CO2:</b> Understand the Hardware interaction using Port I/O and Mouse programming  | <b>Understand</b> |
| <b>CO3:</b> Apply c program for Data structure concept  | <b>Apply</b>      |
| <b>CO4:</b> Apply c program for String and File operations  | <b>Apply</b>      |
| <b>CO5:</b> Apply c program for functions using iteration and recursion   | <b>Apply</b>      |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	L	-	-	-	-	-	-	-	-
<b>CO2</b>	S	S	S	M	S	M	L	M	-
<b>CO3</b>	S	S	S	M	S	M	L	M	-
<b>CO4</b>	S	S	S	M	S	M	L	M	-
<b>CO5</b>	S	S	S	M	S	M	S	M	L

S-  
M-Medium; L-Low

Strong;

**List of Experiments**

1. Base Conversion
2. String Manipulation using pointers
3. Sorting using array and pointers
4. Reverse a file
5. Read the lines from the keyboard and write it into a specified file
6. Illustrate stack and queue using pointer
7. Linked list with all the operations.
8. Binary Search Tree with all the operations.

9. Elementary Graph Operations
10. Finding Memory size,
11. Deleting a file & creating Directories.
12. Reading Disk sector
13. Mouse Programming
14. Mini Project

**Reference Books**

1. Yashavant Kanetkar, "Let us C", BPB Publications 8th Edition, 2007
2. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, 2004
3. Darnell and Margolis, "ANSI C- A Systematic programming Approach", Narosa publications, 2000.
4. Ravi Sethi, Viswanatha. K.V "Programming Languages – Concepts & Constructs" , Pearson Education, Second Edition

**Course Designers:**

Dr. A. John Sanjeev Kumar [ajscse@tce.edu](mailto:ajscse@tce.edu)



**14CA180****RDBMS LABORATORY**

Category	L	T	P	Credit
PC	0	0	2	2

**Preamble**

This Lab aims at giving adequate exposure to the SQL and programming language extension to SQL within the RDBMS environment with usage of Oracle 10G and DB2.

**Prerequisite**

14CA150 Data base Management Systems  
Programming in SQL/PLSQL/Oracle

**Course Outcomes**

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

**CO1:** compile SQL and PL SQL programs with no syntax errors

**CO2:** Analyze and develop triggers, procedures, user defined functions and design accurate and efficient PLSQL programs

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	M	S	S	S	L	S	S
CO2	S	M	S	S	M	L	S	S	S

S- Strong; M-Medium; L-Low

**List of Experiments**

1. Simple SQL Queries in Oracle
2. Simple SQL Queries in DB2
3. Exercises using PL/SQL
4. Cursor management
5. Procedures, functions and packages
6. Creation of triggers
7. Declaration of PL/SQL tables
8. Nested Tables
9. Declaration of v-arrays
10. Database application using ODBC
11. DB2 Triggers
12. UDF's and Stored Procedure

**Course Designers:**

Dr. S. Vijayalakshmi

[svlcse@tce.edu](mailto:svlcse@tce.edu)

**14CA210****OPERATIONS RESEARCH**

Category	L	T	P	Credit
BS	3	1	0	4

**Preamble**

The course aims at exploring the various problems like linear programming, Integer programming, Transportation, assignment problem and the project network analysis. It covers the various inventory and queuing models.

**Prerequisite**

None

**Course Outcomes**

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

- |             |  |                   |
|-------------|--|-------------------|
| <b>CO1:</b> | Remember and understand the Transportation and Assignment problems and to optimize in engineering fields | <b>Understand</b> |
| <b>CO2:</b> | Apply and Analyze the various sequencing and scheduling techniques                                       | <b>Analyze</b>    |
| <b>CO3:</b> | Apply linear programming techniques to optimization problems arising in all Computer fields              | <b>Apply</b>      |
| <b>CO4:</b> | Apply Integer linear programming techniques to optimization problems arising in all Engineering fields   | <b>Apply</b>      |
| <b>CO5:</b> | Evaluate the inventory and queuing models  | <b>Evaluate</b>   |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	L	-	-	-	-	-	-	-	-
<b>CO2</b>	S	S	S	M	S	M	L	M	-
<b>CO3</b>	S	S	S	M	S	M	L	M	-
<b>CO4</b>	S	S	S	M	S	M	L	M	-
<b>CO5</b>	S	S	S	M	S	M	S	M	L

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	10	10	10	10
Understand	10	10	10	10
Apply	60	60	60	60
Analyse	20	20	20	20
Evaluate	0	0	0	0
Create	0	0	0	0

### Course Level Assessment Questions

**Remember and understand the Transportation and Assignment problems and to optimize in engineering fields (CO1):**

- At the end of a cycle of schedules, a transport company has a surplus of one truck in each of the cities 1,2,3,4,5 and a deficit of one truck in each of the cities A,B,C,D,E and F. the distance between the cities with a surplus and cities with a deficit are given below.

		To city					
		A	B	C	D	E	F
From city	1	80	140	80	100	56	98
	2	48	64	94	126	170	100
	3	56	80	120	100	70	64
	4	99	100	100	104	80	90
	5	64	80	90	60	60	70

**how should the truck be dispatched so as to minimize the total distance traveled ? which city will not receive a truck?**

- Solve the assignment problem for maximization given the profit matrix,

	P	Q	R	S
A	51	53	54	50
B	47	50	48	50
C	49	50	60	61
D	63	64	60	60

- Define non existing feasible solution?
- State all the constraints in a transportation problem and how they are different from linear programming problem?
- What are assignment problems?

**Apply and Analyze the various sequencing and scheduling techniques (CO2):**

- Calculate the total float, free float and independent float for the project whose activities are given below.

Activity	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration	8	7	12	4	10	3	5	10	7	4

**Apply linear programming techniques to optimization problems arising in all Computer fields (CO3):**

- Solve by simplex method  
 $\text{Max } Z = X_1 + 2X_2 + 3X_3 - X_4$   
 Subject to,  
 $X_1 + 2X_2 + 3X_3 = 15$   
 $2X_1 + X_2 + 5X_3 = 20$   
 $X_1 + 2X_2 + X_3 + X_4 = 10$  and  
 $X_1, X_2, X_3, X_4 \geq 0$
- Solve the LPP.  
 $\text{Min } Z = X_1 + X_2 + X_3$   
 Subject to,  
 $X_1 - 3X_2 + 4X_3 = 5$   
 $X_1 - 2X_2 \leq 3$   
 $2X_2 - X_3 \geq 4$   
 $X_1, X_2 \geq 0$  and  $X_3$  is unrestricted.



### Apply Integer linear programming techniques to optimization problems arising in all Engineering fields (CO4):

- Solve the following mixed integer problem.  

$$\text{Max } Z = -3X_1 + X_2 + 3X_3$$
 Subject to,  

$$-X_1 + 2X_2 + X_3 \leq 4$$

$$2X_2 - \frac{3}{2}X_3 \leq 1$$

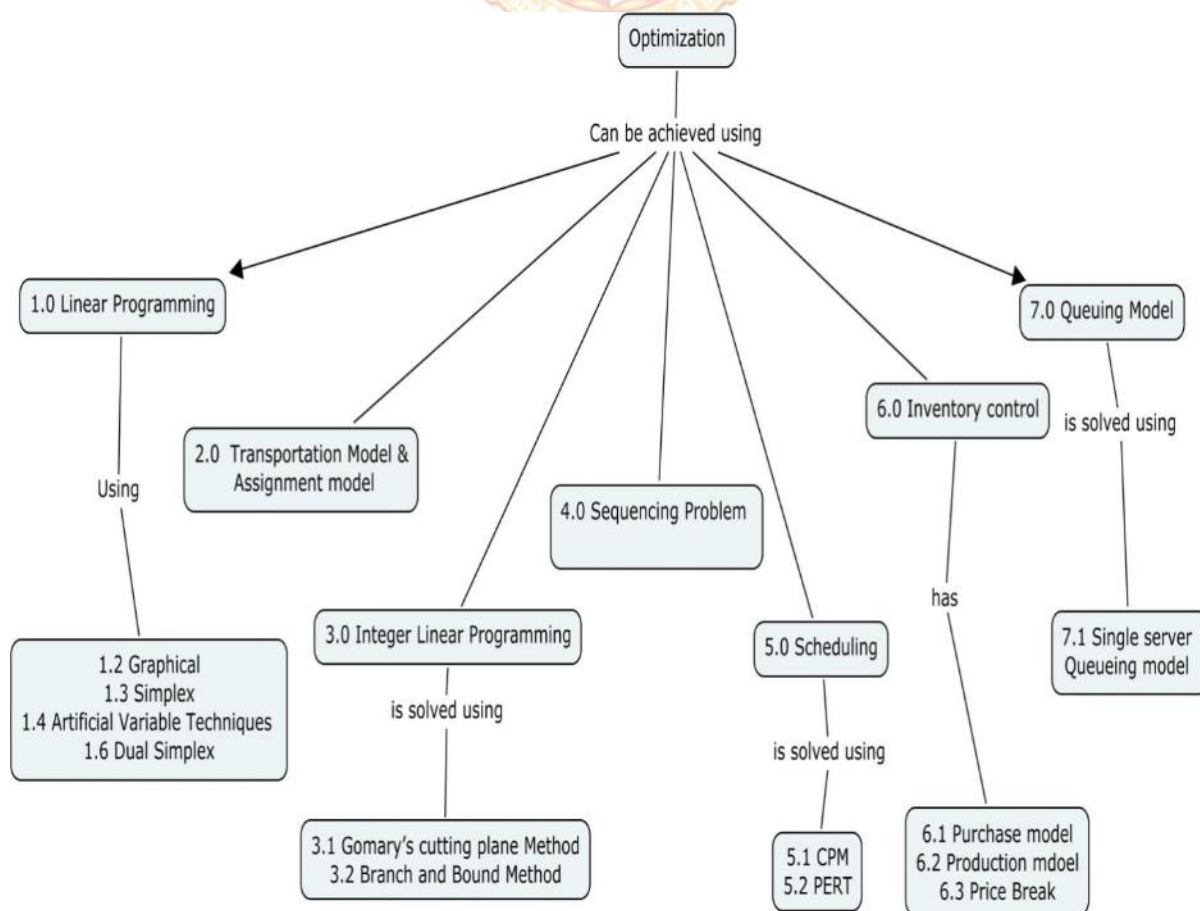
$$-X_1 - 3X_2 + 2X_3 \leq 3$$

$$X_1, X_2 \geq 0 \text{ and } X_3 \text{ is non negative integer.}$$

### Evaluate the inventory and queuing models (CO5):

- A branch of a National bank has only one typist. Since the typing work varies in length. The typing rate is randomly distributed. Approximating Poisson distribution with mean rate of 8 letters per hour, the letters arrive at the rate of 5 per hour. During the entire 8 hour work day if the PC is valued at Rs. 15.0/- per hour. Determine
  - Equipment utilization.
  - The percent time an arriving letters has to wait.
  - Average system time.
  - Average idle time cost of the type writer per day.

### Concept Map



## Syllabus

**Linear Programming**-Graphical Solution- The Simplex algorithm, Artificial Variable Technique -Duality-Dual Simplex - Variants of the Simplex Method **Transportation Model**-Initial Basic Feasible Solution methods Test for optimality-Variants of the Transportation problem **Assignment Model**- Hungarian algorithm Variants of the Assignment problem, Travelling Salesman Problem **Integer Linear Programming**- Gomary's cutting plane method Branch and Bound method **Sequencing Problem** - N jobs through 2 machines, N Jobs through 3 machines, N jobs through m machines **Scheduling** - Critical path Method, Project Evaluation and Review Techniques **Inventory control** - Purchase and production model with and without shortage , price break **Queuing Model**- single channel model

## Reference Books

1. Sharma J.K.: "Operations Research Theory and applications", Macmillan India Ltd., 2003.
2. Hamdy A. Taha: Operations Research – An Introduction", Prentice Hall of India Pvt Ltd., 2002.
3. Don T. Phillips, Ravindran A. and James Solberg, "Operation Research: Principles and Practice", John Willey and sons, 1986.
4. Chandrasekara Rao, K. Shanti Lata Misra "Operation Research", Alpha science international Ltd-2005.

## Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
1.0	<b>Linear Programming</b>	
1.1	Formulation	1
1.2	Graphical Solution	1
1.3	The Simplex algorithm	2
1.4	Artificial Variable Techniques	2
1.5	Variants of the simplex methods	1
1.6	Duality-Dual Simplex	2
2.0	<b>Transportation Model</b>	
2.1	Initial Basic Feasible Solution methods	2
2.2	Test for optimality-Variants of the Transportation problem	2
	<b>Assignment Model</b>	
2.3	Hungarian Algorithm	1
2.4	Variants of the Assignment Problem	2
2.5	Travelling Salesman problem	1
3.0	<b>Integer Linear Programming</b>	
3.1	Gomary's cutting plane method	3
3.2	Branch and Bound method	2
4.0	<b>Sequencing Problem</b>	
4.1	N jobs through 2 machines, N Jobs through 3 machines, N jobs through m machines	2

4.2	Processing Two jobs through m machines	2
5.0	<b>Scheduling</b>	
5.1	Critical path Method	2
5.2	Project Evaluation and Review Techniques	2
6.0	<b>Inventory control</b>	
6.1	Purchase model with and without shortage	1
6.2	Production model with and without shortage	1
6.3	Price Break	1
7.0	<b>Queuing Model</b>	
7.1	Single server Queueing model	2
	Total	36

**Course Designers:**

Dr. A. John Sanjeev Kumar [ajscse@tce.edu](mailto:ajscse@tce.edu)



<b>14CA220</b>	<b>OBJECT ORIENTED PROGRAMMING USING C++</b>	Category	L	T	P	Credit
		PC	3	1	0	4

**Preamble**

To provide sound knowledge on basic and advanced concepts of Object Oriented programming and apply them in developing industrial strength software applications.

**Prerequisite**

- 14CA120 : Programming in C
- 14CA140 : Data Structures

**Course Outcomes**

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

- |  |                               |
|--|-------------------------------|
| <b>CO1:</b> Understand and implement appropriate programming paradigm for a given application  | <b>Understand &amp; Apply</b> |
| <b>CO2:</b> Analyze all the trade-offs involved in choosing structured or procedural paradigm and Object Oriented Programming Paradigm                     | <b>Apply &amp; Analyze</b>    |
| <b>CO3:</b> Identify the trade-offs involved in selecting the most efficient programming mechanism   | <b>Apply &amp; Analyze</b>    |
| <b>CO4:</b> In the context of error handling, Analyze the trade-offs involved in selecting: (a) Exception Handling (b) Run Time Type Identification (RTTI) | <b>Apply &amp; Analyze</b>    |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	S	L	-	-	-	-	L	-	-
<b>CO2</b>	L	-	-	-	-	-	-	-	-
<b>CO3</b>	S	S	L	S	M	-	S	S	M
<b>CO4</b>	L	-	-	-	M	-	-	-	L

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	10	10
Understand	20	20	20	20
Apply	40	40	40	40
Analyse	20	20	30	30
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions****Understand and implement appropriate programming paradigm for a given application (CO1):**

1. Define: Class and Object.
2. What is a constructor? What are its types?
3. Write the purpose of a destructor?
4. Differentiate between procedural paradigm and OO paradigm.
5. What is the need for an explicit constructor in C++?
6. How namespaces reduces complexity? Explain.
7. How member and nonmember operators can be overloaded?
8. How C++ resolves the same method with different implementations in inheritance hierarchy?
9. Develop a program in C++ for calculating areas of different shapes by applying method overriding.
10. Apply method overloading to calculate incentives for different types of employees in an organization.

**Analyze all the trade-offs involved in choosing structured or procedural paradigm and Object Oriented Programming Paradigm (CO2):**

1. Suppose we have similar structured classes but with varying data types, how will you apply class templates to achieve the same.
2. Suppose that you have applied OO principle for your application. Analyze the drawbacks when compared to structured approach.
3. Differentiate between procedural paradigm and OO paradigm.

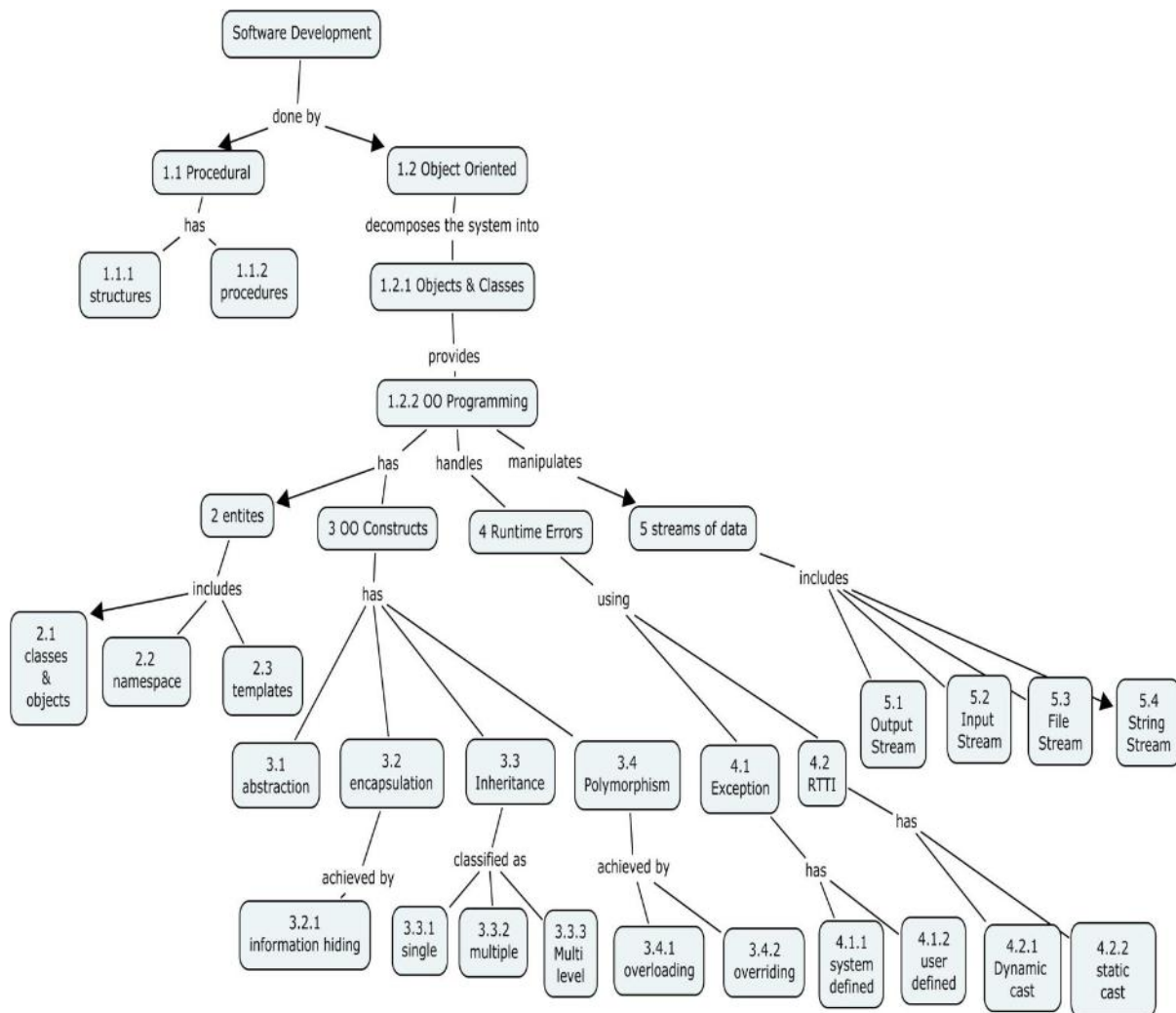
**Identify the trade-offs involved in selecting the most efficient programming mechanism (CO3):**

1. Differentiate static and dynamic binding?
2. Apply namespaces to achieve modularization in developing a complex application.
3. Consider a Client-Server application development – Banking Transaction System. Apply multiple inheritance to achieve the transaction and update the file for the same.
4. Consider a Stock Maintenance System. Do coding for Purchase and Sales and stock updating by applying virtual.
5. Apply file stream classes to manage an Address Book.

**In the context of error handling, Analyze the trade-offs involved in selecting:  
(a) Exception Handling (b) Run Time Type Identification (RTTI) (CO4)**

1. Differentiate Error and an exception?
2. Consider an Employee payroll system. Apply multiple inheritance to calculate the payroll and also apply RTTI to find out the current active object in the calculation.
3. Analyze the usage of RTTI?
4. Suppose that, a method doesn't have the ability to handle an exception, which may be the suitable way of handling it? Give an example.

## Concept Map



## Syllabus

**Introduction to Programming Paradigms** - Procedural Programming Vs. Object-Oriented Programming – Introduction to OO - **Classes and Objects** – Construction and Destruction - Default Constructors - Explicit Constructors - Destructors - Class Objects as Members - **Namespaces** - Modularization and Interfaces – Namespaces - Unnamed Namespaces - **Overloading** : Operator Overloading : Introduction - Binary and Unary Operators - Predefined and User-Defined operator Types - Member and Nonmember Operators - Mixed-Mode Arithmetic – **Method Overloading** : Introduction - Constructors overloading and Method overloading - Conversions – Additional Member Functions - Helper Functions - Conversion Operators- **Templates Overloading**: Function Templates - Function Template Overloading – Class Templates - **Inheritance and Polymorphism** : Introduction and Overview - Multiple Inheritance – **Method Overriding** - Virtual Base Classes - Derived Classes –Virtual Functions - Overriding Virtual Base Functions - Pointers to Members - Base and Derived Classes - Virtual Constructors- Access Control - Friends - Abstract Classes - **Streams**: Introduction - Output - Output Streams - Input - Input Streams-Input of Built-In Types - Standard I/O Manipulators -User-Defined Manipulators - File Streams and String Streams -File Streams - Closing of Streams - String Streams - **Exception Handling**: Introduction - Derived Exceptions - Catching Exceptions - Re-Throw - Exceptions in Constructors and in Destructors - Exception Specifications - Unexpected Exceptions - Mapping Exceptions - User Mapping of Exceptions - Uncaught Exceptions - **Run-Time**

**Type Information (RTTI)** : Introduction to RTTI - Dynamic Cast - Dynamic Cast of References - Static and Dynamic Casts - Class Object Construction and Destruction - typeid and Extended Type Information - Uses and Misuses of RTTI .

#### Reference Books

1. Bjarne Stroustrup, "The C++ Programming Language", 3<sup>rd</sup> Edition and Special Edition, Addison Wesley, 2000.
2. Robert Laffore, "Object Oriented Programming using C++", 4<sup>th</sup> Edition, Sams Publishing, 2002.
3. Stanley Lippman, "C++ Primer", 4th Edition, Pearson Education, 2007.
4. Yashavant P. Kanetkar, "Let Us C++", BPB Publications, 2007.

#### Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
1	<b>Software Development</b>	
1.1	Introduction to Programming Paradigms – Procedural Vs. Object Orientation	1
1.1.1	Structures	1
1.1.2	Procedures	1
1.2	Introduction to OO	1
1.2.1	Objects and Classes	1
1.2.2	OO Programming	2
2	<b>Entities</b>	
2.1	Classes, objects, templates	2
2.2	Modularization and Interfaces	2
2.3	Namespaces	2
3	<b>OO Constructs</b>	
3.1	Abstraction and Encapsulation	3
3.1.1	Information hiding	1
3.2	Inheritance	2
3.2.1	Single level inheritance	1
3.2.2	Multi level inheritance	2
3.2.3	Multiple inheritance	2
3.3	Polymorphism	2
3.3.1	Overloading	2
3.3.2	Overriding	2
4	<b>Runtime Error Handling</b>	
4.1	Exception handling	2
4.1.1	System Defined Exception	1
4.1.2	User Defined Exception	1



4.2	Runtime Type Identification (RTTI)	2
4.2.1	Dynamic Cast	2
4.2.2	Static Cast	2
5	<b>Handling Streams of Data</b>	
5.1	Input Streams	2
5.2	Output Streams	2
5.3	File Streams	2
5.4	String Streams	2
	<b>Total</b>	<b>48</b>

**Course Designers:**

Dr. D.Jeyamala  
Mrs. K.Murugeswari

djmcse@tce.edu  
kmcse@tce.edu





**14CA230****DESIGN AND ANALYSIS OF  
ALGORITHMS**

Category	L	T	P	Credit
PC	3	1	0	4

**Preamble**

This subject will enable students to identify, formulate and solve real world engineering problems that require usage of algorithms.

**Prerequisite**

14CA140: Data Structures

**Course Outcomes**

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

- |   |                   |
|---|-------------------|
| <b>CO1:</b> Determine the time and space complexity of algorithms for sorting (insertion, selection, merge, quick sort and heap sort), dynamic programming, searching (binary search tree and red black tree) and graphs (directed and undirected) applied to average, worst and best cases | <b>Understand</b> |
| <b>CO2:</b> Apply algorithms for shortest path, knapsack, divide and conquer, minimum spanning tree, and travelling salesman problems   | <b>Apply</b>      |
| <b>CO3:</b> Apply algorithms for NP hard and NP complete graph colouring problem  | <b>Apply</b>      |
| <b>CO4:</b> Evaluate the appropriateness of algorithms for given problems   | <b>Analyze</b>    |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	-	S	M	S	S	S	M	S	S
CO2	M	M	-	S	S	M	S	S	S
CO3	S	M	S	S	S	-	S	S	M
CO4	S	-	S	S	M	S	S	S	S

S-Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	10	10	10
Understand	30	20	20	20
Apply	40	40	30	40
Analyse	10	10	20	10
Evaluate	0	20	20	20
Create	0	0	0	0

### Course Level Assessment Questions

**Determine the time and space complexity of algorithms for sorting (insertion, selection, merge, quick sort and heap sort), dynamic programming, searching (binary search tree and red black tree) and graphs (directed and undirected) applied to average, worst and best cases (CO1):**

1. Prove  $T(m) = 27 \left( \left\lceil \frac{n}{2} \right\rceil + \left\lceil \frac{7}{2} \right\rceil \right) + n$  is  $O(n \log n)$
2. Prove the recurrence relationship  $T(n) = 2T(\sqrt{n}) + 1$  by making a change of variables. Your solution should be asymptotically tight. Do not worry about whether values are integral.
3. What are the fundamental steps involved in algorithmic problem solving?
4. Mention the two summation formulas?
5. What is the recurrence relation to find out the number of multiplications and the initial condition for finding the n-th factorial number?

**Apply algorithms for shortest path, knapsack, divide and conquer, minimum spanning tree, and travelling salesman problems (CO2):**

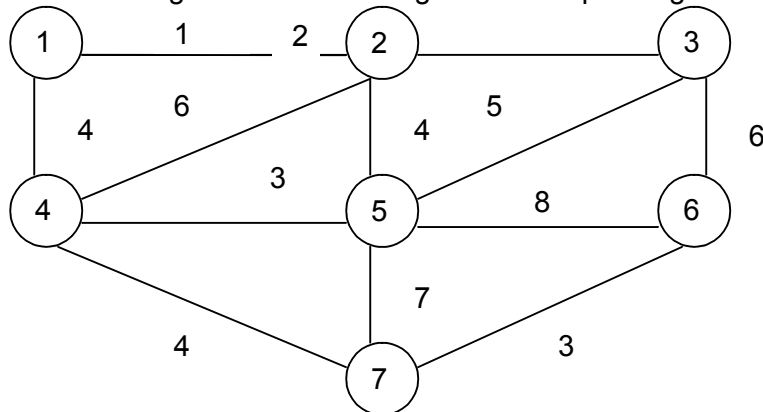
1. Describe the potential advantage of Notation  $\Omega$ ,  $\theta$ ,  $O$
2. Establish the worst-case running time of heap sort is  $\Omega(n \log n)$ ?
3. Verify the truth of the following statements
  - a)  $n^2 \in O(n^3)$
  - b)  $n^3 \in O(n^2)$
  - c)  $2n+1 \in O(2n)$
4. Verify  $t_n = n \geq 1$ ;  $t_0 = 0$
5. Prove the Following
  - i)  $n^2 \in O(n^3)$
  - ii)  $n^3 \in O(n^2)$
  - iii)  $2n+1 \in O(2n)$
6. Determine the optimal parenthesization of a matrix-chain produce whose sequence of dimension is  $\{5, 10, 3, 12, 5, 50, 6\}$
7. Calculate the product MNOP of four matrixes applying chained matrix multiplication  
 M is  $13 * 5$       N is  $89 * 3$   
 O is  $5 * 89$       P is  $3 * 34$
8. Analyze the greedy strategy to the traveling salesman problem yields the following algorithm: "At each stage visit the unvisited city nearest to the current city".
9. Give the formula used to find the upper bound for knapsack problem.
10. What is the method used to find the solution in n-queen problem by symmetry?

**Apply algorithms for NP hard and NP complete graph colouring problem (CO3):**

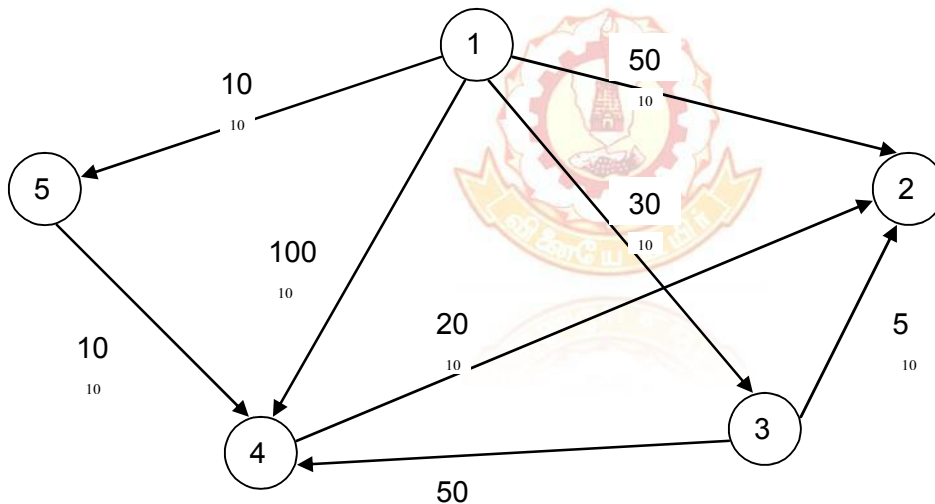
1. Determine the tight Asymptotic bounds for the following recurrence
  - i.  $T(n) = 4T(n/2) + n$
  - ii.  $T(n) = 4T(n/2) + n^2$
  - iii.  $T(n) = 4T(n/2) + n^3$
2. Apply Heap sort on the array  $A = \{5, 13, 2, 23, 7, 17, 20, 8, 11\}$ .
3. Apply a recursive algorithm for solving Tower of Hanoi problem.
4. Determine the optimal parenthesization of a matrix-chain produce whose sequence of dimensions is  $\{5, 10, 3, 12, 5, 50, 6\}$
5. Apply the rules of recurrence to the following function  
 t:  $N^+ \rightarrow R^+$

$$t(n) = \begin{cases} a & \text{if } n=1 \\ bn^2 + nt(n-1) & \text{otherwise} \end{cases} \quad \text{when } a, b \text{ are arbitrary +ve constant}$$

6. Apply the Kruskal's algorithm for following minimum spanning tree.



7. Apply the dijkstra algorithm for the graph



8. Calculate the product ABCD of our matrixes applying chained matrix multiplication

A is  $13 \times 5$       C is  $89 \times 3$   
B is  $5 \times 89$       D is  $3 \times 34$

9. Find out the tight asymptotic bounds for the following recurrence

- $T(n) = 4T(n/2) + n$
- $T(n) = 4T(n/2) + n^2$
- $T(n) = 4T(n/2) + n^3$

10. Apply the rules of recurrence to the following function

$t: \mathbb{N} \rightarrow \mathbb{R}^+$

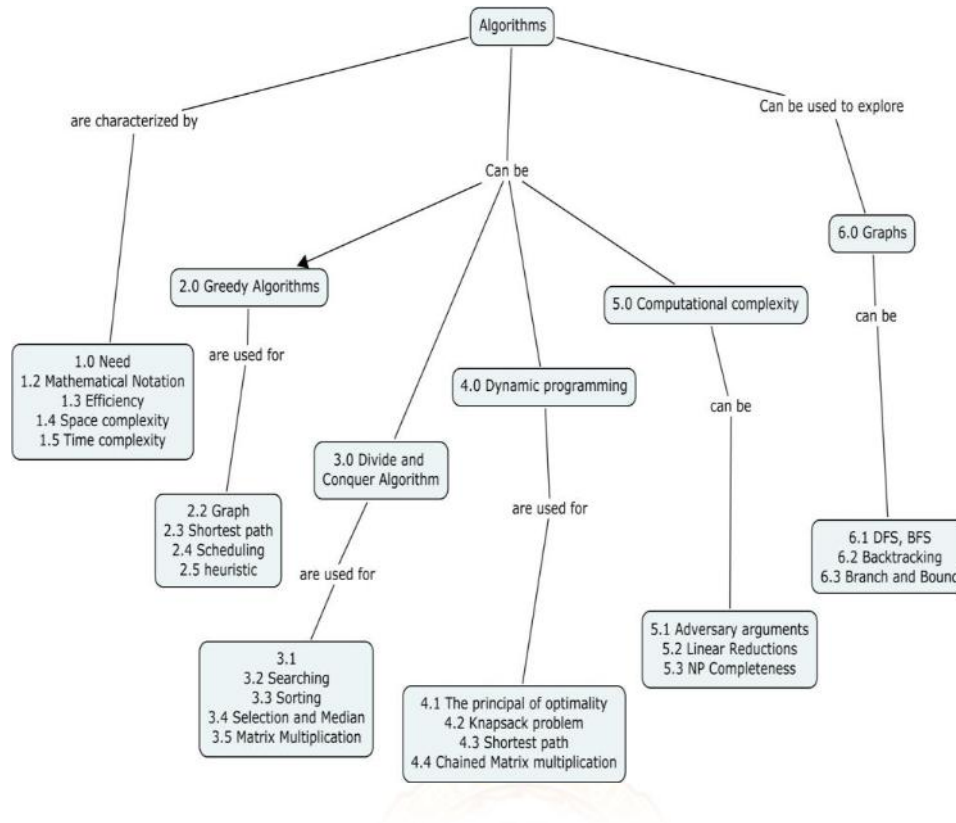
$$t(n) = \begin{cases} a & \text{if } n=1 \\ bn^2 + nt(n-1) & \text{otherwise} \end{cases}$$

#### Evaluate the appropriateness of algorithms for given problems (CO4):

- Evaluate the Reduction theorem  $MT \leq MQ$
- Evaluate NP-complete problems, indicating the reductions typically used to prove their NP-completeness.

3. Give a template for a generic backtracking algorithm.
4. Evaluate the solution for the 4-queen problem.
5. Give the Kruskal's algorithm.

### Concept Map



### Syllabus

**Algorithms:** Need for an Algorithm, efficiency of algorithms, space complexity, time complexity, data structures: solving recurrences. **Greedy Algorithms:** General Characteristics, Graphs, Shortest path, scheduling, greedy heuristics **Divide and Conquer:** binary searching, sorting by merging, quick sort, selection and the median, arithmetic with large integers, matrix multiplication **Dynamic Programming:** The principal of optimality, knapsack problem, shortest paths, chained matrix multiplication. **Computational complexity:** Adversary arguments, linear reduction, class P and NP, NP complete problems. **Graphs:** Traversing trees, depth-first search graphs, Breadth-First Search, Backtracking, Branch and Bound.

### Text Book

1. Fundamentals of Algorithmics, Gilles Brassard and Paul Bratley, Printice hall International, 2002.

### Reference Books

1. Introduction to Algorithms, T.H.Cormen, C.E.Leiseerson, R.L.Rivest, C. Stein, Prentice hall of India, second Edition, 2002.
2. Computer algorithms: Introduction to Design and Analysis –Sara Baase Addison wesley publication. 1998.

**Course Contents and Lecture Schedule**

<b>Module No.</b>	<b>Topic</b>	<b>No. of Lectures</b>
1.	<b>Algorithms</b>	
1.1	Need for an Algorithm	2
1.2	Mathematical Notation	1
1.2	Efficiency of Algorithm	1
1.3	Space Complexity	1
1.4	Time complexity (asymptotic notations)	2
1.5	Data structures: solving Recurrences	2
2.	<b>Greedy Algorithms</b>	
2.1	General Characteristics of Greedy Algorithms	2
2.2	Graphs :Minimum spanning trees Kruskal's algorithm, prims's algorithm	2
2.3	Shortest path	2
2.4	Scheduling – Scheduling with deadlines	2
2.5	Heuristics- Coloring a Graph – TSP	2
3.	<b>Divide and Conquer Approach</b>	
3.1	Introduction to divide and conquer approach	2
3.2	Binary searching Sorting by Merging	2
3.3	<b>Quick sort</b>	2
3.3.1	Heap sort	2
3.3.2	Merge sort	2
3.3.3	Selection sort	2
3.4	Selection and the median	2
3.5	Arithmetic with large integers -Matrix Multiplication	1
4.	<b>Dynamic programming</b>	
4.1	The principal of optimality	1
4.2	Knapsack problem	1
4.3	Shortest Paths(optimal search path)	1
4.4	Chained Matrix Multiplication	1
5.	<b>Computational complexity</b>	
5.1	Adversary arguments	1
5.2	Linear Reductions	1
5.3	Introduction to NP – Completeness	1
6.	<b>Exploring Graphs</b>	
6.1	Graphs: Traversing Trees, Depth-First Search:, Breadth-First Search (Undirected and Directed)	2
6.2	Backtracking : knapsack problem, eight queens problem	2

6.3	Branch and Bound : Assignment problem, Knapsack problem	2
	Total	47

**Course Designers:**

Dr. A. John Sanjeev Kumar  
Mr. T. Chandrakumar

[ajscse@tce.edu](mailto:ajscse@tce.edu)  
[tckcse@tce.edu](mailto:tckcse@tce.edu)



**14CA240****OPERATING SYSTEMS**

Category	L	T	P	Credit
PC	4	0	0	4

**Preamble**

Provides a clear description of the *concepts* that underlie operating systems. The fundamental concepts and algorithms are based on those used in existing commercial operating systems.

**Prerequisite**

- 14CA130: Computer Organization and Architecture
- 14CA140: Data Structures

**Course Outcomes**

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

- CO1:** Understand what operating systems are, what they do and how they are designed and constructed **Understand**
- CO2:** Describe about how OS manage resources **Understand**
- CO3:** Provide solutions for deadlock, scheduling, paging and segmentation **Analyze**
- CO4:** Discuss the design issues of modern, most popular, drastically different operating systems **Analyze**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	L	-	-	-	-	-	-	-
CO2	S	L	-	-	-	-	-	-	-
CO3	-	S	S	L	L	-	M	M	-
CO4	-	S	S	L	L	-	-	S	-

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	30	20	20	20
Understand	30	30	20	20
Apply	40	40	40	40
Analyse	0	10	20	20
Evaluate	0	0	0	0
Create	0	0	0	0

### Course Level Assessment Questions

**Understand what operating systems are, what they do and how they are designed and constructed (CO1):**

1. What is an operating system?
2. What is a time sharing system?
3. Give several definitions of a process
4. What is critical section?
5. What is storage compaction?
6. What is a) Demand paging b) Pure demand paging?
7. Why page sizes are always power of 2?

**Describe about how OS manage resources (CO2):**

1. What are the three major activities of an operating system in regard to memory management?
2. In which of the following operations, the scheduler is not called into play?
  - a. Process requests for I/O.
  - b. Process finishes execution.
  - c. Process finishes its time allotted.
  - d. All of the above through c
  - e. None of the options a through c above.
3. List three examples of deadlock that are not related to a computer system.
4. Why are segmentation and paging sometimes combined into one scheme?
5. How is the information organized along sectors on a disk?
6. Explain the concept of buffering? How is the double buffering scheme organized?

**Provide solutions for deadlock, scheduling, paging and segmentation (CO3):**

1. Assume you have the following jobs to execute with one processor, with the jobs arriving in the order listed here:
 

i	T(pi)
0	80
1	20
2	10
3	20
4	50

  - a. Suppose a system uses FCFS scheduling. Create a Gantt chart illustrating the execution of these processes?
  - b. What is the turnaround time for process p3?
  - c. What is the average wait time for the processes?
2. Give a solution to the readers-writers problem after explaining its nature?
3. Consider the following page reference string 7,0,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,2. How many page faults would occur in the case?
  - a. LRU
  - b. FIFO
  - c. Optimal algorithms
 assuming three, five or six frames. Note that initially all frames are empty.

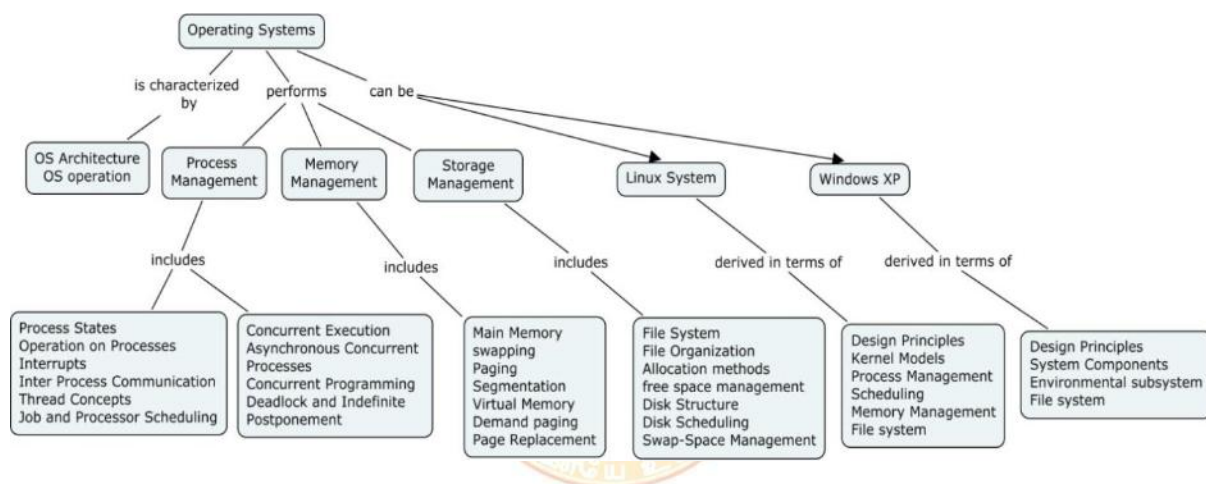


**Discuss the design issues of 2 modern, most popular, drastically different operating systems, GNU/Linux and Windows (CO4):**

The NT VM manager uses a two-stage process to allocate memory. Why is this approach beneficial?

1. Explain Inode structure in Linux.
2. What are the file access permissions in Linux?

### Concept Map



### Syllabus

**Operating System Introduction :** Basics, OS Architecture, OS Operations. **Process Management:** Process states – Operations on process–Interrupts–Interprocess communication–Thread concepts –Job and processor Scheduling **Concurrent Execution:** Asynchronous Concurrent Processes– Concurrent Programming–Deadlock and indefinite postponement. **Memory Management:** Main Memory – swapping, Paging, Segmentation, Virtual Memory – Demand paging, Page Replacement. **Storage Management:** File System, File Organization, Allocation methods, free space management, Disk Structure, Disk Scheduling, Swap-Space Management. **Case Studies: Linux System** – Design Principles, Kernel Models, Process Management, Scheduling, Memory Management, File system. **Windows** - Design Principles, System Components, Environmental subsystem, File system - **Mobile Operating System** – Windows,Android.

### Text Book

1. H.M. Deital, "Operating Systems", Pearson Education, Second Edition, 2003 .

### Reference Books

1. Andrew S. Tanenbaum, "Modern Operating System", Pearson Education, Third Edition, 2008
2. Avi Silberschatz, Peter Baer Galvin and Greg Gagne: Operating System Concepts, Seventh edition, John Wiley and Sons, 2006.
3. Gary Nutt, "Operating Systems", Addison-Wesley, Third edition, 2008

**Course Contents and Lecture Schedule**

Module No.	Topic	No. of Lectures
1	<b>Operating System Introduction &amp; Structure</b>	
1.1	Basics, OS Architecture	1
1.2	OS Operations	1
2	<b>Process Management</b>	
2.1	Process states	1
2.2	Operations on Process	1
2.3	Interrupts	1
2.4	Inter process Communication	1
2.5	Thread concepts	1
2.6	Job and processor Scheduling	2
3	<b>Concurrent Execution</b>	
3.1	Asynchronous Concurrent Processes	1
3.2	Concurrent Programming	3
3.3	Deadlock and indefinite postponement	3
4	<b>Memory Management</b>	
4.1	Main Memory – swapping	1
4.2	Paging	2
4.3	Segmentation	2
4.4	Virtual Memory – Demand paging	2
4.5	Page Replacement	2
5	<b>Storage Management</b>	
5.1	File System	1
5.2	File Organization	1
5.3	Allocation methods and free space management	2
5.4	Disk Structure	1
5.5	Disk Scheduling	2
5.6	Swap-Space Management	1
	<b>Case Studies</b>	
6	<b>Linux</b>	
6.1	Linux System – Design Principles	1
6.2	Kernel Models	1
6.3	Process Management	2
6.4	Scheduling	2
	Memory Management	1

7	<b>Windows</b>	
7.1	File system	1
7.2	System Components	1
7.3	Environmental Subsystem	1
7.4	File System	2
7.5	Mobile Operating System – Windows Phone	3
	Total	48

**Course Designers:**

Mrs. K.Murugeswari  
Dr. S.Vijayalakshmi

kmcse@tce.edu  
svlcse@tce.edu



**14CA250****ACCOUNTING AND FINANCIAL  
MANAGEMENT**

Category	L	T	P	Credit
HSS	3	1	0	4

**Preamble**

Accounting and Financial Management is a discipline that deals with managing the monetary transactions in an organization. The field is related with relying on accounting and enables an engineer in taking useful financial and costing related decisions by providing scientific tools and techniques.

**Prerequisite**

None

**Course Outcomes**

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

- |             |   |                                |
|-------------|---|--------------------------------|
| <b>CO1:</b> | Understand the concepts of Financial Statement Analysis                         | <b>Understand</b>              |
| <b>CO2:</b> | Remember and understand the concepts of Financial Planning                      | <b>Remember and Understand</b> |
| <b>CO3:</b> | Remember and Understand the various sources of finance                          | <b>Remember and Understand</b> |
| <b>CO4:</b> | Prepare ledgers, Trading account, Profit and Loss account and Balance Sheet     | <b>Apply</b>                   |
| <b>CO5:</b> | Analyze the financial status of an Organization with the help of Final Accounts | <b>Evaluate</b>                |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	L	S	S	M	-	-	-	-	-
CO2	S	S	S	M	S	M	L	M	M
CO3	S	S	S	M	S	M	L	M	M
CO4	S	S	S	M	S	M	L	M	M
CO5	S	S	S	M	S	M	S	M	L

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	Theory
Remember	10	10	10	10
Understand	10	10	10	10
Apply	80	80	80	80
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

### Course Level Assessment Questions

#### Understand the concepts of Financial Statement Analysis (CO1):

1. What is Cost Volume Profit Analysis?
2. Define Risk.
3. Define capital Budgeting.
4. Define Cost of Capital.
5. Mention some financial institutions.

#### Remember and understand the concepts of Financial Planning (CO2):

1. What is the purpose of Balance Sheet?
2. What are the various types of Assets?
3. Define Working Capital?
4. What is Cost Volume Profit Analysis?

#### Remember and Understand the various sources of finance (CO3):

1. What are the objectives of Capital Budgeting? Explain.
2. Discuss the non-traditional methods of investment decision making.
3. Explain the various sources of finance.
4. Discuss the legal and the procedural aspects of dividend policies

#### Prepare ledgers, Trading account, Profit and Loss account and Balance Sheet (CO4):

1. Journalize the following business transactions :
  - a).Rahul brings in cash Rs.10,000 as the capital and purchases land worth Rs.2000.
  - b). He purchases goods worth Rs.5000.
  - c).He sells goods for Rs.7000
  - d).He incurs travelling expenses for Rs.200
2. Journalise the following transactions in the books of Kumar & co. and post them to ledger and prepare trial balance

1998

- |         |   |
|---------|---|
| June 1  | Karthik commenced business with Rs. 20,000                          |
| June 2  | Paid into Bank Rs. 5000   |
| June 3  | purchased plant with Rs. 10000 from Modi & co.                      |
| June 4  | Purchased goods worth Rs. 5,000 from Anwar                          |
| June 6  | Goods worth Rs. 4,000 sold to Anbu                                  |
| June 8  | Sold goods worth Rs.2,000 for cash                                  |
| June 10 | Goods returned by Anbu Rs.50  |
| June 15 | Paid rent Rs. 250   |
| June 18 | Withdrawn from bank for office use Rs.2,500                         |
| June 20 | Paid salaries Rs. 1,8000  |
| June 25 | withdrawn for personal use Rs. 250                                  |
| June 26 | Goods returned to Anwar Rs. 100                                     |
| June 27 | Paid for office furniture Rs. 1,500 by cheque                       |
| June 28 | Received Rs.3900 cash from Anbu and discount allowed Rs. 50         |
| June 29 | Paid Anwar on account Rs. 48000 and discount allowed by him Rs. 100 |
3. Prepare Trading and Profit and Loss Account and Balance Sheet on 31.12.96 from the following trial balance extracted from the books of Mr.Kumar as on 31.12.96

Debit Balances	Rs.	Credit Balances	Rs.
Buildings	30000	Capital	4000
Machinery	31400	Purchase Returns	2000

Furniture	2000	Sales	280000
Motor Car	16000	Sundry creditors	9600
Purchases	188000	Discounts received	1000
Sales return	1000	Provision for bad and doubtful debts	600
Sundry debtors	30000		
General expenses	1600		
Cash at bank	9400		
Rates and taxes	1200		
Bad debts	400		
Insurance premium	800		
Discount allowed	1400		
Opening stock	20000		
Total	333200	Total	333200

4. The following are the balance extracted from the Books of Sri nayagam as on 31<sup>st</sup> March 2006.

Sri Nayagam's Capital	12500	Returns outwards	5000
Sri Nayagam's Drawing	6200	Returns Inwards	10000
Furniture and Fitting	1750	Carriage Outwards	8000
Type writer	1200	Salaries	11000
Purchases	180000	Advertisement	1200
Sales	235000	cycle	200
Lorry hire on purchase	12000	Opening Stock	21500
Travelling Expenses	900	Sundry Debtors	12000
Sundry creditors	10000	Reserve for Doubtful Debts	400
Insurance	500	Commission Earned	9000
General Expenses	600	Discount allowed	5000
Postage & Telegram	150	cash in hand	450
Bad Debts	500	over draft with banker	6500
Interest Paid	250	Rent and taxes	5000

The following adjustments are to be made :

- Stock on 31<sup>st</sup> march 2006 Rs. 17500
- Provide the following outstanding : interest – Rs. 250, Salaries – Rs. 1000, Rent Rs. 500, Audit fees Rs. 500  
Prepaid expenses : insurance Rs. 125, advertisement Rs. 200
- Maintain Reserve for doubtful Debts at 5% on sundry Debtors.
- Provide Depreciation : Furniture and fitting – 10% , cycle – 15%, Typewriter – 15%

Prepare Trading and Profit and Loss a/c for the year ending 31<sup>st</sup> march, 2006 and a Balance sheet as on that date.

5. From the following balance sheets of XYZ Ltd as on 31<sup>st</sup> Dec 2007 and 2008. You are required to prepare .

- Schedule of changes in working capital
- Fund flow statement
- Cash flow statement.

<b>Liabilities</b>	<b>2007</b>	<b>2008</b>	<b>Assets</b>	<b>2007</b>	<b>2008</b>
Share Capital	1,00,000	1,00,000	Goodwill	12,000	12,000
General Reserve	14,000	18,000	Buildings	40,000	36,000
Sundry creditors	16,000	13,000	Plant	37,000	36,000
P/L a.c	8,000	5,400	Investment	10,000	11,000
Bills payable	1,200	800	Stock	30,000	23,400
Provision for tax	16,000	18,000	Bill receivable	2,000	3,200
Provision for doubtful	400	600	Debtors	18,000	19,000
Debts			Cash at Bank	6,600	15,200
	<b>1,55,6000</b>	<b>1,55,800</b>		<b>1,55,600</b>	<b>1,55,800</b>

Additional Information :

Depreciation charge on plant was Rs. 4,000 and Building Rs. 4,000

Provision for taxation was Rs. 19,000 made during the year 2008

Interim dividend of Rs. 8,000 was paid during the year.

**Analyze the financial status of an Organization with the help of Final Accounts (CO5):**

1. A chemical company is considering investing in a project that costs Rs.500000. The estimated salvage values is zero; tax rate is 55%. The company uses straight line depreciation and the proposed project has cash flows before tax (CFBT) as follows.

Year	CFBT (Rs.)
1	100000
2	100000
3	150000
4	150000
5	250000

Find the following

- a) Pay Back Period b) ARR

2. SP Limited company is having two projects, requiring a capital outflow of Rs. 3,00,000. The expected annual income after depreciation but before tax is as follows:

Year	Rs.
1	9,000
2	80,000
3	70,000
4	60,000
5	50,000

Depreciation may be taken as 20% of original cost and taxation at 50% of net income:

You are required to calculate

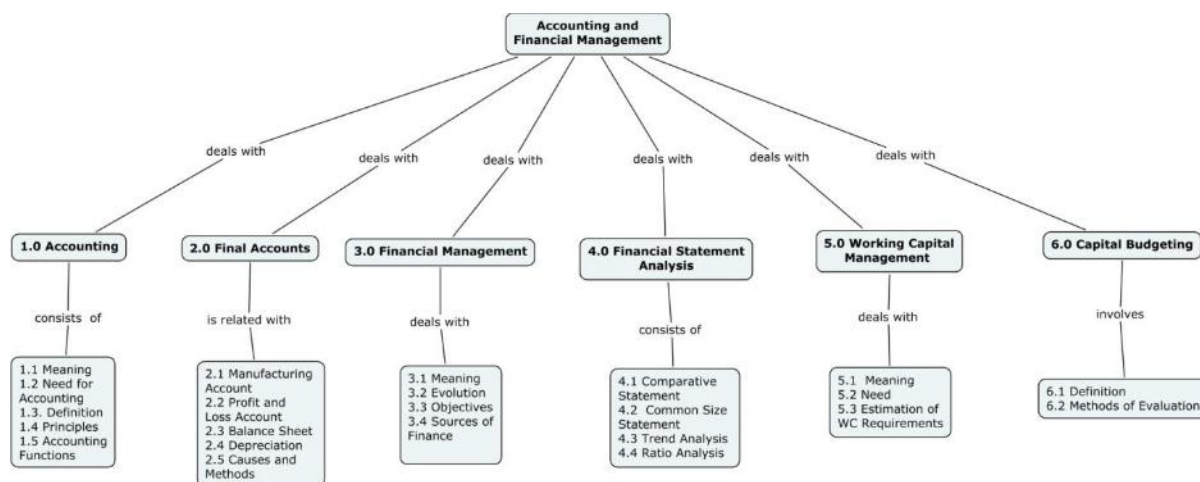
(a) Pay-back period (b) Net present value (c) Accounting rate of return (d) Net present value index. (e) Internal rate of return.

3. A company has to choose one of the following two mutually exclusive machines. Both the machines have to be depreciated. Calculate NPV.

Year	Cash inflows	
	Machine X	Machine Y
0	-20,000	-20,000
1	5,500	6,200
2	6,200	8,800
3	7,800	4,300
4	4,500	3,700
5	3,000	2,000



## Concept Map



## Syllabus

**Accounting** –Meaning and Scope,Need for Accounting, Definition, Principles, Accounting Functions-Recording, Classifying, Summarizing, Analysis and Interpretations.

**Final Accounts**- Manufacturing , Profit and Loss Accounts, Balance Sheet, Depreciation-causes and methods.

**Financial Management**-Meaning, Evolution, Objectives and Sources of Finance

**Financial Statement Analysis**- Comparative Statement, Common Size Statement, Trend Analysis, Ratio Analysis.

**Working Capital Management**-Meaning, need and requirements of Working Capital Estimation..

**Capital Budgeting**- Definition, Methods of Evaluation

## Reference Books

1. Prasanna Chandra, "**Fundamentals of Financial Management**", Tata McGraw Hill, 2002.
2. KY. Khan and P.K. Jain, "**Financial Management**", Tata McGraw Hill, 2003.
3. Khan and Jain, "**Theory and Problems of Financial Management**", Tata Mc Graw Hill Publishing Co, 1994
4. Pandey, "**Financial Management**", Vikas Publishing House Pvt. Ltd., 2003.
5. M.C.Sukhla, T.S.Grewal, "**Advanced Accounts Vol I**", S.Chand and Publications, New Delhi, 2006



**Course Contents and Lecture Schedule**

<b>Module No.</b>	<b>Topic</b>	<b>No. of Lectures</b>
<b>1.0</b>	<b>Accounting</b>	
1.1	Meaning and Scope	2
1.2	Need for Accounting	2
1.3	Definition	1
1.4	Principles	1
1.5	Accounting Functions-Recording, Classifying, Summarizing, Analysis and Interpretations.	2
<b>2.0</b>	<b>Final Accounts</b>	
2.1	Manufacturing Account	1
2.2	Profit and Loss Account	2
2.3	Balance Sheet	2
2.4	Depreciation	1
2.5	Causes and Methods	2
<b>3.0</b>	<b>Financial Management</b>	
3.1	Meaning	1
3.2	Evolution	1
3.3	Objectives	1
3.4	Sources of Finance	2
<b>4.0</b>	<b>Financial Statement Analysis</b>	
4.1	Comparative Statement	2
4.2	Common Size Statement	2
4.3	Trend Analysis	2
4.4	Ratio Analysis	2
<b>5.0</b>	<b>Working Capital Management (WC)</b>	
5.1	Meaning	1
5.2	Need	1
5.3	Estimation of WC requirements	2
<b>6.0</b>	<b>Capital Budgeting</b>	
6.1	Definition	1
6.2	Methods of Evaluation	2
	<b>Total</b>	<b>36</b>

**Course Designers:**

Dr. A. John Sanjeev Kumar      [ajscse@tce.edu](mailto:ajscse@tce.edu)

**14CA270 C++ PROGRAMMING LABORATORY**

Category	L	T	P	Credit
PC	0	0	1	1

**Preamble**

This course enables the students to use object oriented techniques to solve problem.

**Prerequisite**

14CA170 : Data Structure using C Programming

**Course Outcomes**

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

**CO1: Understand the concepts of oops for building object based applications** **Understand**

**CO2: Understand the different logic for developing validation in the applications** **Understand**

**CO3: Apply the techniques and features of the oops to construct a application** **Apply**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	M	S	S	S	-	S	S
CO2	S	M	S	S	M	-	S	S	S
CO3	-	-	M	S	S	S	-	S	S

S-

M-Medium; L-Low

Strong;

**List of Experiments**

1. Write a Program to illustrate Static member and methods
2. Write a Program to illustrate Bit fields
3. Write a Program to illustrate Scope and Storage class
4. Write a Program to illustrate Enumeration and Function Overloading
5. Write a Program to implement Job Scheduling application using Priority Queue (Apply Inheritance techniques)
6. Write a Program to overload unary operator in Postfix and Prefix form as member and friend function.
7. Write a Program to overload as binary operator, friend and member function
8. Write a program to create a template function for Quicksort and demonstrate sorting of integers and doubles
9. Write a Program to Construct a search engine using linear and binary search (apply any of the sorting techniques & Method Overriding)
10. Write a Program to Construct Binomial Heaps (Apply Max-Heap Property & virtual base class)
11. Write a Program to Implement the tree traversal algorithms using both recursive and non- recursive ways.(Apply Exception handling mechanism).
12. Write a Program to illustrate Iterators and Containers.

**Course Designers:**

Mr. R. Saravanan

rsncse@tce.edu

Mrs. K. Murugeswari

kmcse@tce.edu

<b>14CA280</b>	<b>CLIENT/SERVER APPLICATIONS LABORATORY</b>	Category	L	T	P	Credit
		PC	0	0	2	2

**Preamble**

This Lab aims at giving adequate exposure to the Oracle and programming language to gain knowledge on using a front-end tool (VB) and connecting it to a back- end tool (ORACLE database).

**Prerequisite**

14CA180-RDBMS Laboratory

**Course Outcomes**

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

<b>CO1:</b>	Understand the enabling technologies for building Internet and database applications	<b>Understand</b>
<b>CO2:</b>	<b>Understand the different components for developing client/server applications</b>	<b>Understand</b>
<b>CO3:</b>	<b>Apply the techniques and features of the client/server development languages to construct a database application based on Internet</b>	<b>Apply</b>

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	M	S	S	S	-	S	S
CO2	S	M	S	S	M	-	S	S	S
CO3	-	-	M	S	S	S	-	S	S

S- Strong; M-Medium; L-Low

**List of Experiments**

1. Windows Programming
2. Simulating a calculator
3. Number System: Conversion
4. Online Quiz
5. MCA Course - Selection List
6. Students database maintenance
7. Income Tax Calculation
8. Railway Reservation
9. System Allocation
10. Library Management

**Course Designers:**

Dr. S. Vijayalakshmi	svlcse@tce.edu
Mr. T. Chandrakumar	tckcse@tce.edu

<b>14CA290</b>	<b>PROFESSIONAL COMMUNICATION</b>	Category	L	T	P	Credit
		HSS	1	1	0	2

### Preamble

Professional Communication aims to develop Listening, Speaking, Reading and Writing skills in postgraduate students' professional development contexts such as projects, competitive exams, organizational communication and soft skills.

### Prerequisite

Fundamentals of English Language

### Course Outcomes

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

<b>CO1:</b> Listen and understand the various presentations, Global English Language Test exercises and organizational communication activities	<b>Understand</b>
<b>CO2:</b> Present project reports, self introduction	<b>Apply</b>
<b>CO3:</b> Participate in GD and interview in work context	<b>Apply</b>
<b>CO4:</b> Read and collect information for technical /project report writing.	<b>Analyze</b>
<b>CO5:</b> Read and understand the comprehension passages given in competitive examinations	<b>Apply</b>
<b>CO6:</b> Write a project report adhering to proper format	<b>Create</b>
<b>CO7:</b> Create a paragraph and an essay using their own ideas	<b>Create</b>
<b>CO8:</b> Design curriculum vitae	<b>Create</b>

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	-	-	-	-	-	-	M	S	M
<b>CO2</b>	-	-	-	-	L	M	S	S	S
<b>CO3</b>	-	-	-	-	S	M	S	S	S
<b>CO4</b>	-	-	-	-	S	M	S	S	S
<b>CO5</b>	-	-	-	-	S	M	S	S	S
<b>CO6</b>	-	-	-	-	S	M	S	S	S
<b>CO7</b>	-	-	-	-	S	S	S	S	S
<b>CO8</b>	-	-	-	-	-	-	S	S	M

S- Strong; M-Medium; L-Low

**Assessment Pattern**

<b>Bloom's Category</b>	<b>Internal (50)</b>	<b>Terminal Examination</b>
Remember	10	10
Understand	10	20
Apply	10	20
Analyse	10	30
Evaluate	5	10
Create	5	10

**Syllabus**

**Listening:** Listening to the extracts of various presentations, Asking Questions, Listening test as conducted in TOEFL ,IELTS and BEC

**Speaking:** Project presentation skill, Participation in Group Discussion and Interview, Speaking in the work Contexts : Speaking tests for TOEFL, IELTS, and BEC Exam, Self introduction, Mini Presentation

**Reading :** Reference skills for project report writing: topic selection, data collection, skimming, scanning, Reading comprehension passages from CAT, TOEFL, GRE and BEC,

**Writing :** Project Report Writing : Format, Abstract, Bibliography/References , Structure : Sentence structure, CV Writing.

**Reference Books (if any)**

1. Tony Lynch: Study Listening. Cambridge, Cambridge University Press, 2007
2. Sangeeta Sharma and Binod Mishra: Communication Skills for Engineers and Scientists.New Delhi, PHI Learning Pvt. Ltd. 2009.
3. Hari Mohan Prasad and Uma Rani Sinha: Objective English for Competitive Examination.New Delhi, Tata McGraw – Hill, 2005
4. Bob Dignen, Steeve Flinders et. al.: Work and Life: English 365. Students Book 1,2 & 3.New Delhi, Cambridge, 2004.

**Course Contents and Lecture Schedule****Lecture sessions:****Listening:**

1. Effective listening skills
2. Practice for Listening Tests of Global English Language Tests
3. Introduction of soft skills

**Speaking:**

1. Introduction of Presentation skills
2. Exposure for speaking tests in Global English Language Tests
3. How to participate in GD
4. Interview techniques

**Reading:**

1. Rapid reading techniques
2. Reference skills
3. Suggestions for reading tests in competitive exams

**Writing:**

1. Format of project report
2. Sentence structure
4. CV writing

**Practice Sessions:****Listening:**

1. Messages, descriptions, conversations and lectures

**Speaking:**

1. Self Introduction
2. Mini Presentation
3. GD
4. Interview

**Reading:**

1. Rapid reading practices
2. Comprehension exercises
3. Topic selection and data collection for project report

**Writing:**

1. Sentence structure
2. Abstract writing
3. Project report writing

**Course Designers:**

Dr. S.Rajaram

sreng@tce.edu

Mr. R.Vinoth

rveng@tce.edu

**14CA310****ORGANIZATIONAL BEHAVIOUR**

Category	L	T	P	Credit
HSS	4	0	0	4

**Preamble**

To learn challenges and opportunities in organizations from a behavioral perspective.

**Prerequisite**

- None

**Course Outcomes**

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

**CO1:** Develop an Organisational Behaviour model for any type of Organization. **Apply**

**CO2:** Develop and improve the quality of Leadership. **Analyze**

**CO3:** Evaluate the Common biases and eradication in Decision Making Process. **Evaluate**

**CO4:** Understand how to manage the Stress during a job. **Understand**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	-	S	M	-	S	S	M	S	S
CO2	M	M	S	S	S	M	S	S	S
CO3	S	-	S	S	S	S	S	-	M
CO4	-	M	S	S	M	S	S	S	S

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	10	10	10
Understand	30	20	20	20
Apply	40	40	40	40
Analyse	10	10	10	10
Evaluate	0	20	20	20
Create	0	0	0	0

**Course Level Assessment Questions**

Develop an Organisational Behaviour model for any type of Organization (CO1):

1. Define Organizational Behavior.
2. What are the disciplines that contribute to the Organizational Behaviour field?
3. What is meant by Contingency variable?
4. What are the main components of attitudes?
5. Define Personality.
6. Define JCM.
7. What is knowledge management?
8. What is the use of Path Goal Theory in organizational behavior?

9. What is a Positive Organizational Culture?
10. How does Globalization affect organizational structure?

Develop and improve the quality of Leadership (CO2):

1. Explain in detail about the personality, its factors and model.
2. Describe briefly about Equity Theory
3. Is socialization brainwashing? Explain.
4. Explain the job characteristics model and how does it motivate employees?
5. Explain with reasons for organizational structures differ and how it differs between a mechanic structure and an organic structure?

Evaluate the Common biases and eradication in Decision Making Process (CO3):

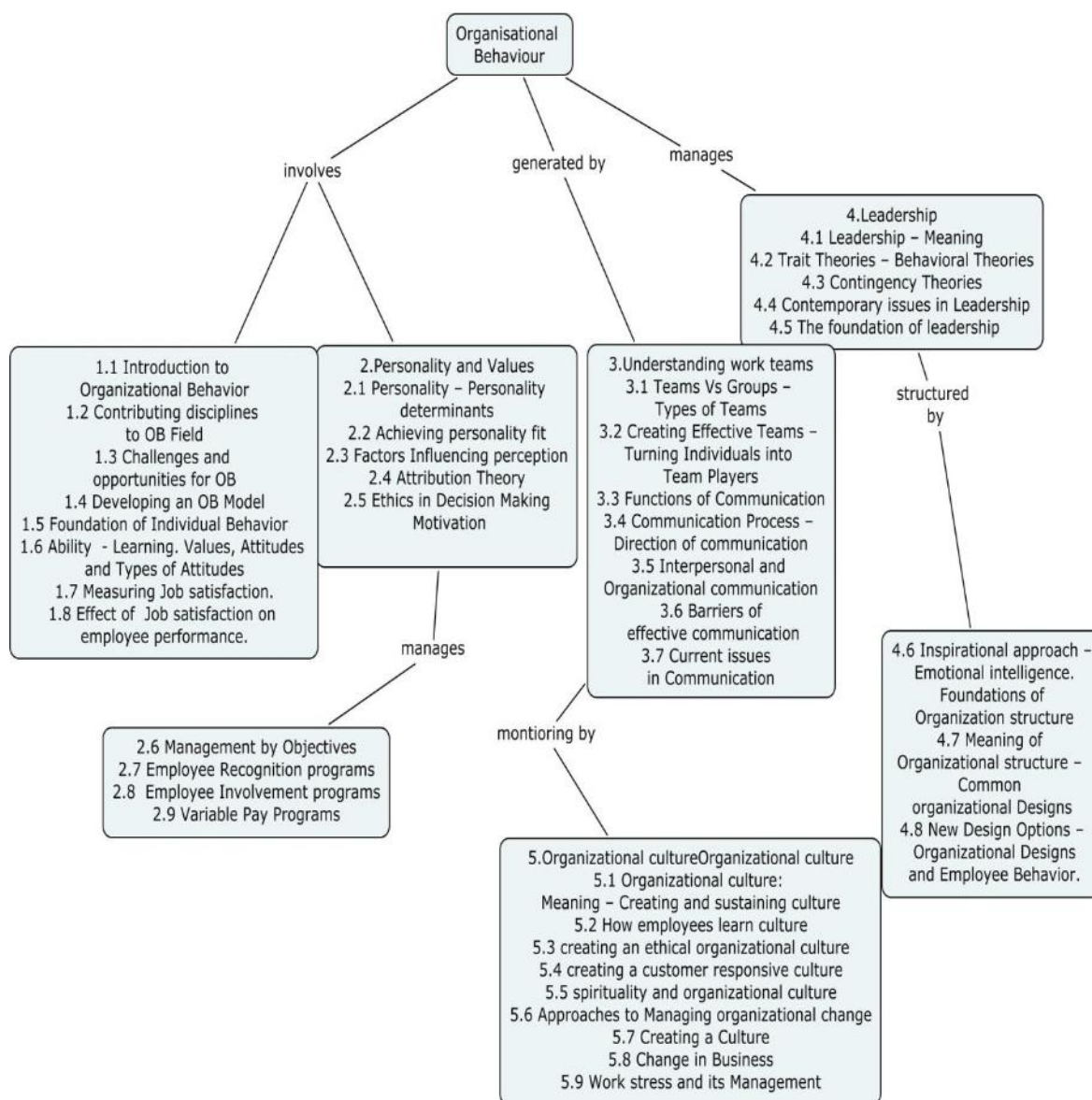
1. Develop and apply an OB model for Telecommunication Organization.
2. Compare and contrast downward, upward and lateral communication?
3. Identify a charismatic leader and a transformational leader. Compare the two Leaders. Give reason to support your answer
4. Apply a Matrix Structure for a College of Business Administration.
5. Can you identify a set of characteristics that describes your institution's Culture? Compare them with those of several of your peers. How closely do they agree?

Understand how to manage the Stress during a job (CO4):

1. Analyze the challenges and opportunities for OB.
2. Analyze Maslow's hierarchy of needs theory.
3. Analyze how Fiedler's contingency model has been supported in research based activities.
4. Analyze how Organization Culture Form managed in organisational Behaviour.
5. Analyze the reasons for the growing interest in Spirituality  
Employees form implicit models of organizational structure, "Do you agree?"
6. Evaluate how Organizational Culture has an impact on Employee Performance and Satisfaction.
7. King fisher Airlines and Air Deccan merge." "Corus accepts takeover bid by Tata steel." "Mittal capture Arcelor." "Vodafone acquires Essar." Each of these is a recent example of large companies combining with other large companies. Does this imply that small isn't necessarily beautiful? Are mechanical forms winning the "Survival of the fittest" battle? What are the implications of this consolidation trend to organizational behavior?



## Concept Map



## Syllabus

**Organizational Behavior:** Introduction to Organizational Behavior (OB), Contributing disciplines to OB Field, challenges and opportunities for OB, Developing an OB Model, Foundation of Individual Behavior, Ability - Learning. Values, Attitudes and Types of Attitudes. Job satisfaction- Measuring Job satisfaction, Effect of Job satisfaction on employee performance. **Personality and Values:** Personality determinants, Achieving personality fit, Factors Influencing perception, Attribution Theory, Perception / Individual Decision Making: Ethics in Decision Making. Motivation, Management by Objectives, Employee Recognition programs, Employee Involvement programs, Variable Pay Programs. **Understanding work teams:** Teams Vs Groups – Types of Teams, Creating Effective Teams – Turning Individuals into Team Players. **Communication:** Functions of Communication, Communication Process – Direction of communication, Interpersonal and Organizational communication, Barriers of effective communication, Current issues in Communication. **Leadership:** Leadership – Meaning, Trait Theories – Behavioral Theories,

Contingency Theories, Contemporary issues in Leadership, The foundation of leadership. **Organizational structure:** Inspirational approach – Emotional intelligence. Foundations of Organization structure, Meaning of Organizational structure – Common organizational Designs, New Design Options – Organizational Designs and Employee Behavior. Organizational culture: **Organizational culture:** Meaning – Creating and sustaining culture, How employees learn culture, creating an ethical organizational culture, creating a customer responsive culture, spirituality and organizational culture. **Organizational change and Stress Management:** Approaches to Managing organizational change, Creating a Culture, Change in Business, Work stress and its Management

### Text Book

1. Stephen P. Robbins, "Organisational Behaviour", 11/e, Pearson Education, 2009

### Reference Books

1. Uma Sekaran, "Organisational Behaviour", 2/e, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2010.
2. Sharma, R.A., "Organisational Theory and Behaviour", 2/e, Tata McGraw-Hill Ltd., New Delhi, 2007.

### Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	<b>Organizational Behavior</b>	
1.1	Introduction to (OB)Organizational Behavior	1
1.2	Contributing disciplines to OB Field	1
1.3	Challenges and opportunities for OB	1
1.4	Developing an OB Model	1
1.5	Foundation of Individual Behavior	1
1.6	Ability - Learning. Values, Attitudes and Types of Attitudes	1
	<b>Job satisfaction</b>	
1.7	Measuring Job satisfaction.	1
1.8	Effect of Job satisfaction on employee performance.	1
2	<b>Personality and Values</b>	
2.1	Personality – Personality determinants	1
2.2	Achieving personality fit	1
2.3	Factors Influencing perception	1
2.4	Attribution Theory	1
	<b>Perception / Individual Decision Making</b>	
2.5	Ethics in Decision Making. Motivation	1
2.6	Management by Objectives	1
2.7	Employee Recognition programs	1
2.8	Employee Involvement programs	1
2.9	Variable Pay Programs	1
3	<b>Understanding work teams</b>	
3.1	Teams Vs Groups – Types of Teams	1
3.2	Creating Effective Teams – Turning Individuals into Team Players	1
	<b>Communication</b>	
3.3	Functions of Communication	1
3.4	Communication Process – Direction of communication	1
3.5	Interpersonal and Organizational communication	1

3.6	Barriers of effective communication	1
3.7	Current issues in Communication	1
4	Leadership	1
4.1	Leadership – Meaning	1
4.2	Trait Theories – Behavioral Theories	1
4.3	Contingency Theories	1
4.4	Contemporary issues in Leadership	1
4.5	The foundation of leadership	1
	Organizational structure	
4.6	Inspirational approach – Emotional intelligence. Foundations of Organization structure	1
4.7	Meaning of Organizational structure – Common organizational Designs	1
4.8	New Design Options – Organizational Designs and Employee Behavior.	1
5	Organizational culture	2
5.1	Organizational culture: Meaning – Creating and sustaining culture	1
5.2	How employees learn culture	1
5.3	creating an ethical organizational culture	1
5.4	creating a customer responsive culture	1
5.5	spirituality and organizational culture	1
	Organizational change and Stress Management	1
5.6	Approaches to Managing organizational change	1
5.7	Creating a Culture	1
5.8	Change in Business	1
5.9	Work stress and its Management	1
	Total	<b>45</b>

**Course Designers:**

Mr. T.Chandrakumar

[tckcse@tce.edu](mailto:tckcse@tce.edu)

Dr. A.John Sanjeev Kumar

[ajscse@tce.edu](mailto:ajscse@tce.edu)

<b>14CA320</b>	<b>INTERNET AND JAVA PROGRAMMING</b>	Category PC	L 4	T 	P 	Credit 4
----------------	--	----------------	--------	-------	-------	-------------

### Preamble

This course aims at facilitating the student to understand the basic internet programming concepts and the programming concepts of JAVA towards developing Java based applications.

### Prerequisite

- 14CA180: RDBMS Laboratory
- 14CA220: Object Oriented Programming using C++

### Course Outcomes

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

<b>CO1:</b> Define the basic concepts of Java technologies.	<b>Remember</b>
<b>CO2:</b> Describe the Java architecture with its different techniques.	<b>Understand</b>
<b>CO3:</b> An ability to apply different Java technologies to solve Internet applications.	<b>Apply</b>

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	L	L	L	L	L	L	L	L	L
CO2	M	L	L	M	L	L	L	L	L
CO3	M	M	M	S	L	L	L	M	L

S- Strong; M-Medium; L-Low

### Assessment Pattern

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	30	30	30	30
Understand	30	30	30	30
Apply	40	40	40	40
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0

### Course Level Assessment Questions

**Define the basic concepts of Java technologies (CO1):**

1. What is an exception? List the keywords associated with handling an exception.
2. Write the syntax for creating an interface. Give an example.

3. What are the ways of creating a thread?
4. What is the use of final keyword?
5. What is the use of thread priority?
6. What is the role of JVM?

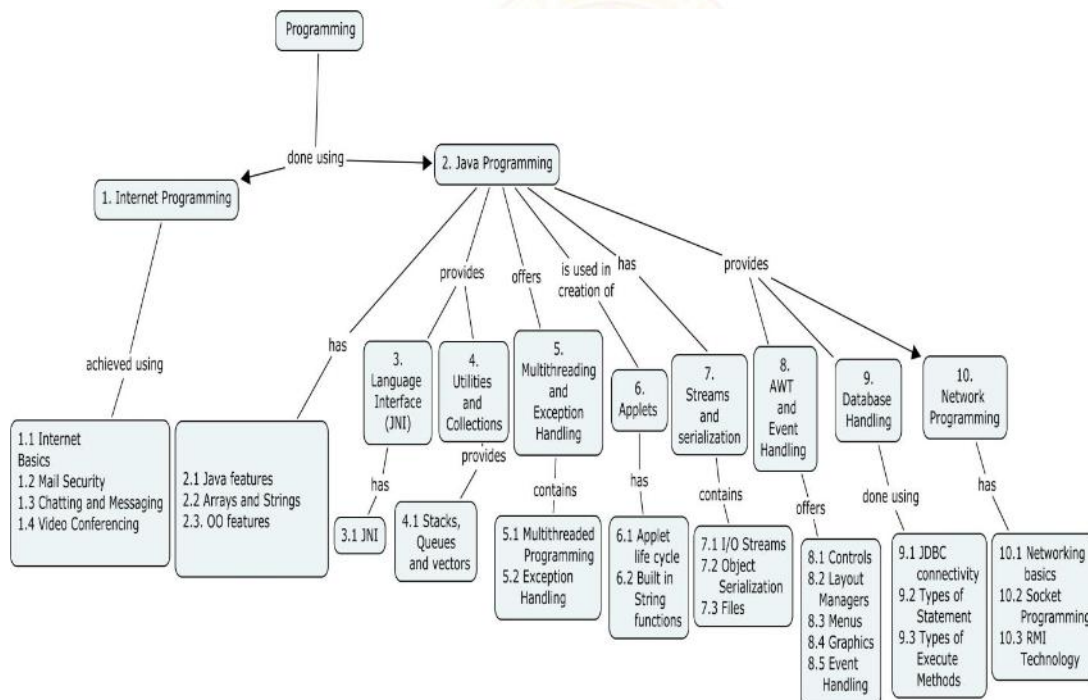
**Describe the Java architecture with its different techniques (CO2):**

1. What is the purpose of inner classes in effective software development?
2. Explain the scenario with sample application where synchronize keyword is so important?
3. Why object serialization is so important for data communication, explain with sample code?
4. Why vector is better than array?
5. How callable statement is different from Statement? Explain with your own Scenario?
6. When will you use Grid Bag layout in designing an applet?

**An ability to apply different Java technologies to solve Internet applications (CO3):**

1. Consider Area calculation of different shapes using the same area calculation by applying method overloading and method overriding in Java.
2. Develop a sample client/server application using sockets and datagram packets.
3. Develop an Applet for 'Online Job Portal' by applying the event handlers to handle the events.
4. Apply interfaces to achieve multiple inheritance in Java for your own example.
5. In an multi threading environment how inter thread communication will take place?
6. Develop a user defined exception for handling a negative number or zero during age validation in a Voter Management System using Exception base class.

**Concept Map**



## Syllabus

**Internet Programming:** Internet Basics, Mail Security, Chatting and Messaging, Video Conferencing,

**Java Programming:** Java features, Array and Strings, Object Oriented Features, Language Interface: JNI, Utilities and Collections, Stacks, Queues and vectors, **Multithreading and Exceptions:** Multithreaded Programming, Exception Handling, **Applets:** Applet life cycle, Built in String functions, Streams and serialization: I/O Streams, Object Serialization, Files, AWT Controls: Controls, Layout Managers, Menus, Graphics, Event Handling,

**Database Handling:** JDBC connectivity, Types of Statement, Types of Execute Methods,

**Java Network Programming:** Networking basics, Socket Programming, RMI Technology

## Reference Books

1. Patric Naughton and Herbert Schildt, "Java the Complete Reference", 5th Edition, Tata McGraw Hill, 2002, (Reprint 2011).
2. Margaret Levine Young, "The Internet - Complete Reference" , 2nd Edition, Tata McGraw Hill, 2002, (Reprint 2010).
3. Harley Hahn, "Internet and WWW", 2nd Edition, Tata McGraw Hill, 2002.
4. Bob Bredlovettall, "Web Programming Unleashed" - Sams Net Publishing, 1st Edition, 1996.

## Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
<b>1</b>	<b>Internet Programming</b>	
1.1	Internet Basics	1
1.2	Mail Security	1
1.3	Chatting and Messaging	1
1.4	Video Conferencing	1
<b>2</b>	<b>Java Programming</b>	
2.1	Java features	2
2.2	Array and Strings	2
2.4	Object Oriented Features	2
<b>3</b>	<b>Language Interface</b>	
3.1	JNI	2
<b>4</b>	<b>Utilities and Collections</b>	
4.1.	Stacks, Queues and vectors	3
<b>5</b>	<b>Multithreading and Exceptions</b>	
5.1	Multithreaded Programming	2
5.2	Exception Handling	2
<b>6</b>	<b>Applets</b>	
6.1	Applet life cycle	2
6.2	Built in String functions	2
<b>7</b>	<b>Streams and serialization</b>	
7.1	I/O Streams	2
7.2	Object Serialization	2
7.3	Files	1
<b>8</b>	<b>AWT Controls</b>	
8.1	Controls	1
8.2	Layout Managers	1
8.3	Menus	1



Module No.	Topic	No. of Lectures
8.4	Graphics	1
8.5	Event Handling	2
<b>9</b>	<b>Database Handling</b>	
9.1	JDBC connectivity	1
9.1.1	Types of Statement	1
9.1.4	Types of Execute Methods	1
<b>10</b>	<b>Java Network Programming</b>	
10.1	Networking basics	1
10.2	Socket Programming	2
10.3	RMI Technology	2
	Total	42

### Course Designers:

Mr. R. Saravanan

[rsncse@tce.edu](mailto:rsncse@tce.edu)

Dr. D. Jeyamala

[djmcse@tce.edu](mailto:djmcse@tce.edu)



**14CA330****COMPUTER NETWORKS**

Category	L	T	P	Credit
PC	3	1	0	4

**Preamble**

Computer network is the discipline which studies the theoretical, practical and managerial aspects of designing and managing computer networks. The course will enable the students to familiarize the various aspects of computer networks such as what they are, how they work, how to design, build and configure them.

**Prerequisite**

- 14CA140 : Data Structures

**Course Outcomes**

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

**CO1:** Understand the architecture of any computer network

**Remember & Understand**

**CO2:** Determine the performance of any computer network

**Apply & Analyze**

**CO3:** Synthesize addressing mechanisms for computer networks

**Analyze**

**CO4:** Design a computer network

**Apply & Analyze**

**CO5:** Design services based on computer network

**Apply & Analyze**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	-	-	-	-	-	-	-	-
CO2	L	S	-	-	-	-	-	-	-
CO3	L	-	S	-	-	-	-	-	-
CO4	-	S	S	L	L	-	M	M	-
CO5	-	S	S	L	L	-	M	M	-

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	10	10	10
Understand	30	20	20	20
Apply	30	40	30	30
Analyse	20	30	20	20
Evaluate	0	0	0	0
Create	0	0	20	20

**Course Level Assessment Questions**

**Understand the architecture of any computer network (CO1):**

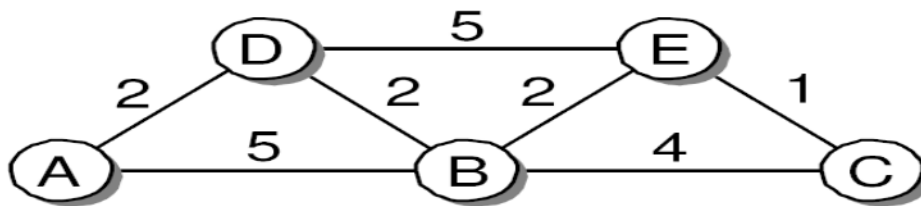
1. What are the advantages of FDDI over a basic Token Ring?



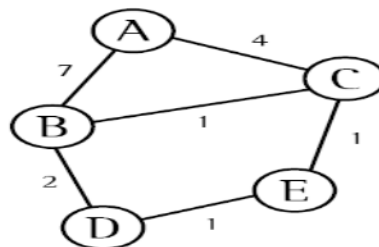
2. Describe the encapsulation involved in the creation of an Ethernet frame.
3. Differentiate the basic operation of hubs over switches.
4. Compare 10Base5, 10 Base2, 10BaseT, and 10Base F mediums used in IEEE 802.3.
5. Explain the data frame format of IEEE 802.5 Standard?
6. The Network address is 192.168.10.0 and the Subnet mask is 255.255.255.252. Find out
  1. How many subnets?
  2. How many hosts?

**Determine the performance of any computer network (CO2):**

1. The Internet is roughly doubling in size every 18 months. Approximate estimates put the number of hosts on it at 7 million in January 1996. Use this data, compute the expected number of Internet users in the year 2008.
2. Compute the shortest paths from router A to any of the other routers in the figure by means of Dijkstra's shortest-path algorithm.



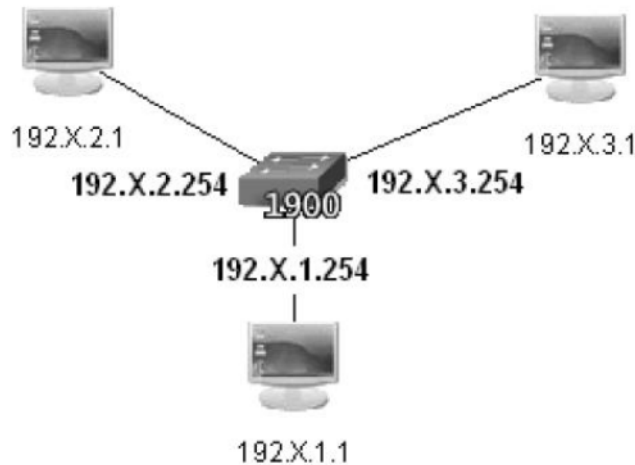
3. Draw a simple topology of routers with multiple connections. The connections should be assigned costs. What is the state of the routing table for each node before any distance vectors were exchanged? Now, exchange a few distance vectors between the routers and determine the routing tables which have changed.



**Synthesize addressing mechanisms for computer networks (CO3):**

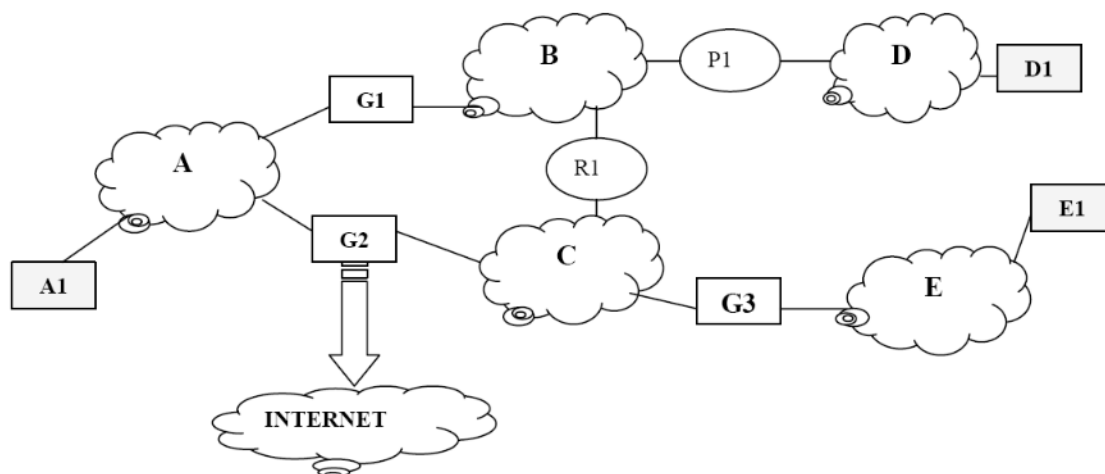
1. Convert a classless (CIDR) network address (e.g. 192.168.0.0/24) to its IP address/mask equivalent (e.g. 192.168.0.0 255.255.255.0) and vice versa.

2. You have 3 computers belonging to different networks. Configure them to be able to access each other. Note: Use at least three routers, one for each internal network. Change the IP Address to match the diagram below. Take note that you will need a fourth network (a new network address!) for all the routers so that they can communicate with one another. You can also use switches.



#### Design a computer network (CO4):

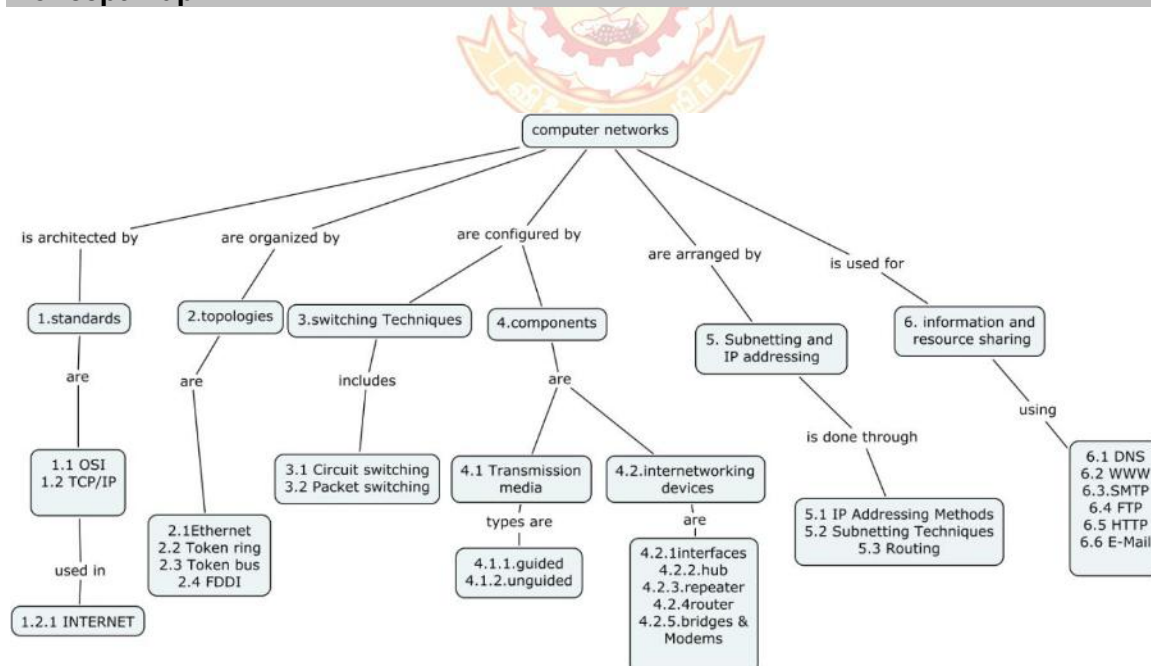
1. A company has two LANs, one in Chennai with 300 hosts and another one in Madurai with 150 hosts. Could it be possible to connect those networks to the Internet using only one Class C network addresses? Justify the answer. If the answer is positive, create a network layout, assign IP addresses to every router and to one host in the network, and specify the routing tables of all routers and the specified host.
2. Create a VPN to connect to branch office of the department. What would be the preliminary requirement?
3. In the figure below there is a set of Ethernet LANs (A,B,C,D and E) that conform to the Intranet policies of one company. The LANs are interconnected with three routers (G1, G2 y G3), a bridge (P1) and a hub (R1). The Internet connection is managed by router G2. The Company has only one class C network address for this Intranet. We highlight only three hosts - A1, D1 and E1. Assume that there are more hosts in each LAN. Assign IP addresses to every network element (network IDs, hosts, etc.). Specify the routing tables of all routers and the one corresponding to host D1.



### Design services based on computer network (CO5):

1. A routing protocol is a system used by routers to automatically maintain their forwarding tables. Outline a simple routing protocol which might be used to maintain the table under a *shortest path* routing policy. Mention any additional information that you must store in the router, and any problems you notice.

### Concept Map



### Syllabus

**Introduction:** Data Communication Concepts **Network Standards:** OSI Architecture, TCP/IP, Internet Architecture **Topologies:** LANS-Ethernet, Token Ring, Token Bus, FDDI **Encoding Techniques :** Digital to Digital conversion **Controlling Techniques :** Error Detection and Correction, Error and Flow Control **Switching Techniques:** Circuit Switching, Packet Switching **Components:** Transmission Media (Guided and Unguided media) Internetworking Devices: Interfaces, Hub, Repeaters, Routers, Bridges and Modems **Subnetting and IP Addressing:** IP Addressing Methods, Subnetting Techniques - Routing – Distance Vector Routing - Link State Routing **Information and Resource sharing:** DNS, WWW, SMTP, FTP, HTTP, E-Mail. **Case Studies: Networking Applications.**

**Text Book**

1. Behrouz A.Forouzan, “Data Communication and Networking”, Tata McGraw-Hill, 2006 (reprint 2011), Fourth Edition.

**Reference Books**

1. L.Peterson and Peter S.Davie, “Computer Networks”, Harcourt Asia Pvt.Ltd., 2008, Second Edition.
2. Andrew S.Tanenbaum,“Computer Networks”,PHI,Fourth Edition,2003.
3. Peterson and Davie, “Computer Networks: A Systems Approach”, Morgan Kaufmann, 2012, 5<sup>th</sup> Edition.
4. Black U., “Computer Networks- Protocols, Standards and Interfaces”, PHI, 2009.

**Course Contents and Lecture Schedule**

Module No.	Topics	No of Lectures
<b>1</b>	<b>Introduction</b>	1
1.1	Standards: OSI Architecture-Tutorial	2
1.2	TCP/IP	2
1.2.1	Internet Architecture	2
<b>2</b>	<b>Topologies</b>	
2.1	LANs-Ethernet	2
2.2	Token Ring-Tutorial	3
2.3	Token Bus	2
2.4	FDDI-Tutorial	2
<b>3</b>	<b>Encoding Techniques</b>	
3.1	Digital to Digital conversion-Tutorial	3
<b>4</b>	<b>Controlling Techniques</b>	
4.1	Error Detection and Correction-Tutorial	3
4.2	Error and Flow Control-Tutorial	3
<b>5</b>	<b>Switching Techniques</b>	
5.1	Circuit switching-Tutorial	1
5.2	Packet switching	1
<b>6</b>	<b>Components</b>	
6.1	Transmission Media	
6.1.1	Guided Media	2
6.1.2	Unguided Media	2
6.2	Internetworking Devices	
6.2.1	Interfaces	1
6.2.2	Hub	1
6.2.3	Repeaters	1
6.2.4	Routers	1
6.2.5	Bridges and Modems	2
<b>7</b>	<b>Subnetting and IP Addressing</b>	
7.1	IP Addressing and Methods-Tutorial	1
7.2	Subnetting Techniques-Tutorial	1
7.3	Routing: Distance Vector Routing - Link State Routing-Tutorial	2
<b>8</b>	<b>Information and Resource Sharing</b>	
8.1	DNS	1
8.2	WWW	1
8.3	SMTP	1
8.4	FTP, HTTP-Tutorial	2
8.5	Email	1

8.6	Case Studies: Networking Applications	1
	Total	<b>48</b>

**Course Designers:**

Mrs. K.Murugeswari

[kmcse@tce.edu](mailto:kmcse@tce.edu)

Mr. R.Saravanan

[rsncse@tce.edu](mailto:rsncse@tce.edu)

**14CA340****SOFTWARE ENGINEERING**

Category	L	T	P	Credit
PC	3	1	0	4

**Preamble**

This course aims at facilitating the student to learn the different life cycle models, requirement analysis, modelling and specification, architectural and detailed design methods, implementation and testing strategies, verification and validation techniques, Project planning and management and the use of CASE tools.

**Prerequisite**

- 14CA230 : Design and Analysis of Algorithms

**Course Outcomes**

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

**CO1:** Identify and implement appropriate software development life cycle model for a given application

**Remember,  
Understand, Apply  
Understand, Apply**

**CO2:** Apply the most appropriate design model for the given application

**CO3:** Generate test cases using the techniques involved in selecting: (a) White Box testing (b) Block Box testing

**Remember,  
Understand, Apply  
Understand, Analyze**

**CO4:** Analyze the cost estimate and problem complexity using various estimation techniques

**CO5:** Understand the advantages of configuration management and risk management activities and apply them for the given software development

**Analyze, Apply**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO3	M	S	M	M	M	-	S	S	S
CO4	L	S	L	S	L	-	M	S	S
CO5	M	S	M	S	L	-	M	S	S
CO6	M	S	L	S	L	-	S	S	S
CO7	-	-	-	-	-	-	-	-	-

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	10	10	10	20
Understand	10	10	10	30
Apply	20	20	10	30
Analyse	10	10	20	20
Evaluate	0	0	0	0
Create	0	0	0	0

### Course Level Assessment Questions

**Identify and implement appropriate software development life cycle model for a given application (CO1):**

1. Define: Software Engineering.
2. Define: Metric, Measure and Indicator
3. Who are called as Stakeholders?
4. How learning is performed in ASD process model?
5. How extreme programming helps in modern software product development scenario? Explain the various activities involved in it with neat diagram
6. How requirements elicitation process is carried out during requirements analysis using QFD? Explain it in detail.
7. Consider a scenario of a customer's organization in need of a faster product development and the requirements are well understood. Apply RAD model helps in developing software product in this scenario? Explain it with a neat diagram.
8. Consider a system that has aspects A01, A02, A03 and A04. The system has been analyzed and it has been identified that there are requirements R01, R02, R03, R04 and R05. During the analysis it has been identified that, Req. R01 covered A01 and A03; R02 covered A04; R03 covered A01, A02 and A04; R04 covered A03 and A04; R05 covered A02 and A03. Draw a Requirements Traceability Table for the above and identify which requirements are sufficient to construct the system.
9. Consider a system in which the developer has to add a new functionality based on changing customers' requirements. This has to be tested before and after by the tester. How Extreme Programming works in this situation? Explain it in detail.

**Apply the most appropriate design model for the given application (CO2):**

1. Consider an 'Online Vehicle Purchase System'. Apply requirements analysis and design to draw primary use case diagram, swimlane activity diagram and State Diagram for it.
2. Apply flow-oriented modeling to develop a DFD with level 0 and 1 and state diagram for a University Admission System.
3. Apply Control Flow based testing in White box testing to generate the test cases and independent paths in a sample piece of code.
4. Prepare a data dictionary by creating entries for all the data objects for an 'Online Vehicle Purchase System'
5. Construct a Structure chart from a DFD for your own application.
6. For a 'Students Attendance Monitoring System', create a primary use case diagram.

**Generate test cases using the techniques involved in selecting: (a) White Box testing (b) Block Box testing (CO3):**

1. What is White Box testing? Draw the notations of a CFG and derive independent paths and test cases for a given source code using it.
2. Explain the following testing techniques to derive test cases (a) Equivalence Partitioning (b) Boundary Value Analysis (c) Random testing for OO classes.
3. Apply Control Flow based testing in White box testing to generate the test cases and independent paths in a sample piece of code.
4. Suppose a test group was testing a mission critical software system. The group has found 85 out of the 100 seeded defects. If you were the test manager, would you stop testing at this point?
5. Consider the "Withdraw" module in an ATM application. The module reads the amount the user wishes to withdraw from his/her account. The amount must be multiple of 100 and less than 10000. Develop black box test cases using Equivalence class partitioning and boundary value analysis. List out any assumptions that you make in deriving these test cases.



**Analyze the cost estimate and problem complexity using various estimation techniques (CO4):**

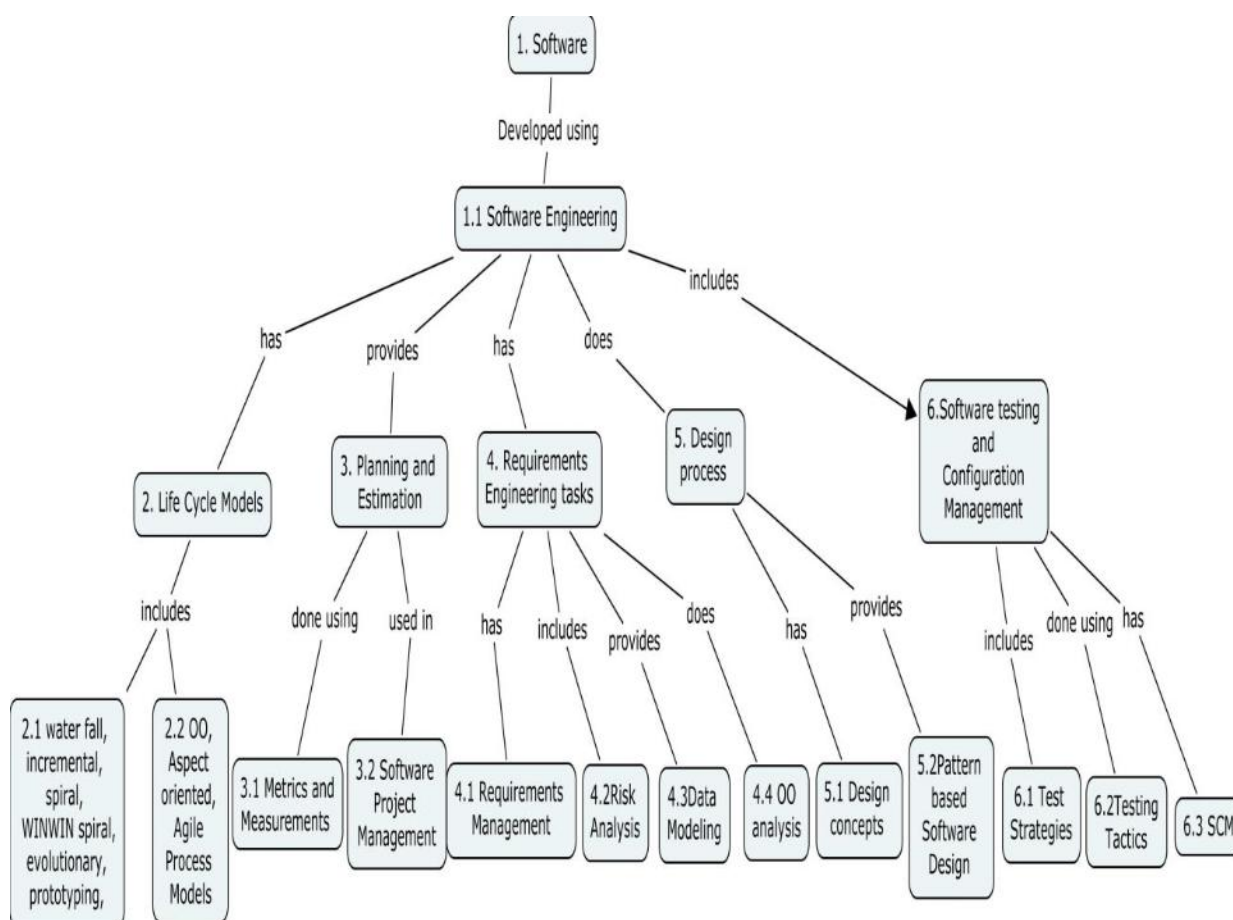
1. Analyze the effort calculated using COCOMO II model for semi detached and organic models for the same KLOC and provide your conclusion.
2. Evaluate the Cost estimate for a system having 10KLOC lines of code and is of 'Semi Detached Type' with average complexity metrics of all the attributes, using COCOMO II model.
3. Use the COCOMO-II model to estimate the effort required to build software for a simple E-Shopping application that provides 18 screens (simple), 15 reports (medium) and will require approximately 60 software components (difficult). Assume the developer's experience/capability is high and environment maturity/capability is very high. Use the application composition model with object points.
4. Evaluate the Complexity measure using FP based estimation for a system in which the following data exists:
  - i. No.of User Inputs – 20
  - ii. No.of User Outputs – 12
  - iii. No.of Enquiries - 8
  - iv. No.of Internal Logic Files – 4
  - v. No.of External Interfaces – 5
  - b. Assume your own complexity level for each of the categories and you're your own values for the 14 questions raised to the customers.
5. Evaluate the developers' efficiency in Delphi Cost estimation model.
6. Using the risk projection table evaluate the highest priority risks in a given software.

**Understand the advantages of configuration management and risk management activities and apply them for the given software development (CO5):**

1. Explain the role, contents and features of SCM repository in detail.
2. How risk mitigation, monitoring and management is done in software development process with RMMM plan? Explain.
3. How version control and change control are done in SCM process.
4. Using the risk projection table evaluate the highest priority risks in a given software.
5. Construct a sample risk projection table and assess the risk impact for any one risk.
6. Create a RMMM plan for any two risks identified during risk analysis.



## Concept Map



## Syllabus

Software: Software Engineering, Life cycle models: water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented, Aspect oriented, Agile Process Models, Planning and Estimation: Metrics, Project Management, Requirements Engineering tasks: Requirements Management, Risk Management, Data Modelling, OO analysis, Design process: Design concepts, Data design elements: Pattern based Software Design Software testing and Configuration Management: Test Strategies for conventional and OO software, Testing Tactics: SCM Resources, SCM Process/Standards, Version Control.

## Text Book

1. Roger S.Pressman, "Software engineering- A practitioner's Approach", McGraw-Hill International Edition, 2010

## Reference Books

1. Ian Sommerville, "Software engineering", Pearson education Asia, 9th edition, 2010.
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", Springer Verlag, 3rd Edition, 2005.
3. James F Peters and Witold Pedrycz, "Software Engineering – An Engineering Approach", 2nd edition, John Wiley and Sons, New Delhi, 2000.

**Course Contents and Lecture Schedule**

<b>Module No.</b>	<b>Topic</b>	<b>No. of Lectures</b>
<b>1</b>	<b>Software</b>	
1.1	Software Engineering	1
<b>2</b>	<b>Life Cycle Models</b>	
2.1	Water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping	2
2.2	Object oriented, Aspect oriented and Agile Process Models	2
	Tutorial	2
<b>3</b>	<b>Planning and Estimation</b>	
3.1	Metrics in Software Project Management	3
	Tutorial	2
<b>4</b>	<b>Requirements Engineering tasks</b>	
4.1	Requirements Management	3
4.2	Risk Management	3
4.3	Data Modeling	2
	Tutorial	4
4.4	OO analysis	3
<b>5</b>	<b>Design process</b>	
5.1	Design concepts	2
5.2	Data design elements	3
5.3	Pattern based Software Design	3
	Tutorial	2
<b>6</b>	<b>Software testing and Configuration Management</b>	
6.1	Test Strategies for conventional and OO software	3
6.2	Testing Tactics	4
	Tutorial	2
6.3	Software Configuration Management	2
	Total	48

**Course Designers:**

Dr. D.Jeya Mala  
Dr. S.Parthasarathy

[djmcse@tce.edu](mailto:djmcse@tce.edu)  
[spcse@tce.edu](mailto:spcse@tce.edu)

<b>14CA350</b>	<b>DATA WAREHOUSING AND DATA MINING</b>	Category	L	T	P	Credit
		PC	3	1	0	4

### Preamble

**Preamble:** This course aims at facilitating the student to understand the concepts of data warehousing and data mining. Students to understand the various techniques involved in mining the data from the databases. Data Warehousing and Data Mining represents a collection or set of computational techniques in computer science and engineering, which investigate, simulate, and formalize the human ability to make rational decisions in an environment of uncertainty and approximation.

### Prerequisite

- 14CA150 : Database management systems
- Programming in VB/VC++/Java/Oracle

### Course Outcomes

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

**CO1:** Identify and describe a data mining tools and techniques and their roles in building intelligent machines **Understand**

**CO2:** Analyze and apply the ideas of data mining algorithms in various logic and developing a real time applications. **Analyze**

**CO3:** Acquire the knowledge of unsupervised and supervised naïve baysine and their applications in approaching real world problems **Analyze**

**CO4:** Apply data mining algorithms to combinatorial optimization problems **Apply**

**CO5:** Apply the mining techniques like association, classification and clustering on transactional databases. **Apply**

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	L	M	L	M	M	M	L	L	L
CO2	S	S	S	M	S	M	L	M	L
CO3	S	S	M	M	M	S	L	M	L
CO4	S	M	S	M	S	M	L	M	M
CO5	S	S	S	M	S	M	S	M	L

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	10	10
Understand	40	20	30	30
Apply	40	40	40	40
Analyse	0	20	20	20
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions**

**Identify and describe a data mining tools and techniques and their roles in building intelligent machines (CO1):**

1. List the various data sources for the data warehouse.
2. Distinguish between Data Mart and Data Warehouse?
3. What do you mean by strong association rule?
4. How to select an attribute for classification?
5. What is cluster analysis?
6. Mention the purpose of correlation analysis

**Analyze and apply the ideas of data mining algorithms in various logic and developing a real time applications (CO2):**

1. What type of processing take place in a data warehouse? Describe.
2. Compare and contrast the clustering and the classification techniques.
3. In what way "Over Fitting" can be avoided?
4. Illustrate the significance of candidate set generation step of level wise algorithm.
5. Describe the importance of pruning in decision tree construction with an example.
6. Given the two vector objects  $X=(1,1,0,0)$  and  $Y=(0,1,1,0)$  identify the similarity between these objects.

**Acquire the knowledge of unsupervised and supervised learning and their applications in approaching real world problems (CO3):**

1. What are the types of learning?
2. Compare Supervised neural networks with unsupervised neural networks.
3. As the data warehouse administrator, performance enhancement is high on your list. Highlight the techniques you plan to adopt. For each technique, indicate tasks necessary to implement the technique.
4. Analyze the various Data mining techniques?

**Apply data mining algorithms to combinatorial optimization problems (CO4):**

1. Define: optimization
2. Suppose a group of 12 sales price records has been stored as follows:  
5, 10, 11, 13, 15, 35, 50, 55, 72, 92, 204, 215. Partition them into 3 bins by equal width binning.
3. Illustrate the apriori algorithm for the single dimensional transaction database.

**Apply the mining techniques like association, classification and clustering on transactional databases (CO5):**

1. For the given database find all the frequent item sets using Apriori method and list all the strong association rules that match the metarule

$$\forall x \in \text{transaction}, \text{buys}(X, \text{item1}) \wedge \text{buys}(X, \text{item2}) \Rightarrow \text{buys}(X, \text{item3}).$$

<i>TID</i>	<i>Items bought</i>	
100	{f, a, c, d, g, i, m, p}	
200	{a, b, c, f, l, m, o}	Minimum Support = 30%
300	{b, f, h, j, o, w}	
400	{b, c, k, s, p}	
500	{a, f, c, e, l, p, m, n}	Minimum Confidence = 70%

2. For the following Database use ID3 algorithm to construct the decision tree and partition the database based on the classification rules obtained from the decision tree.

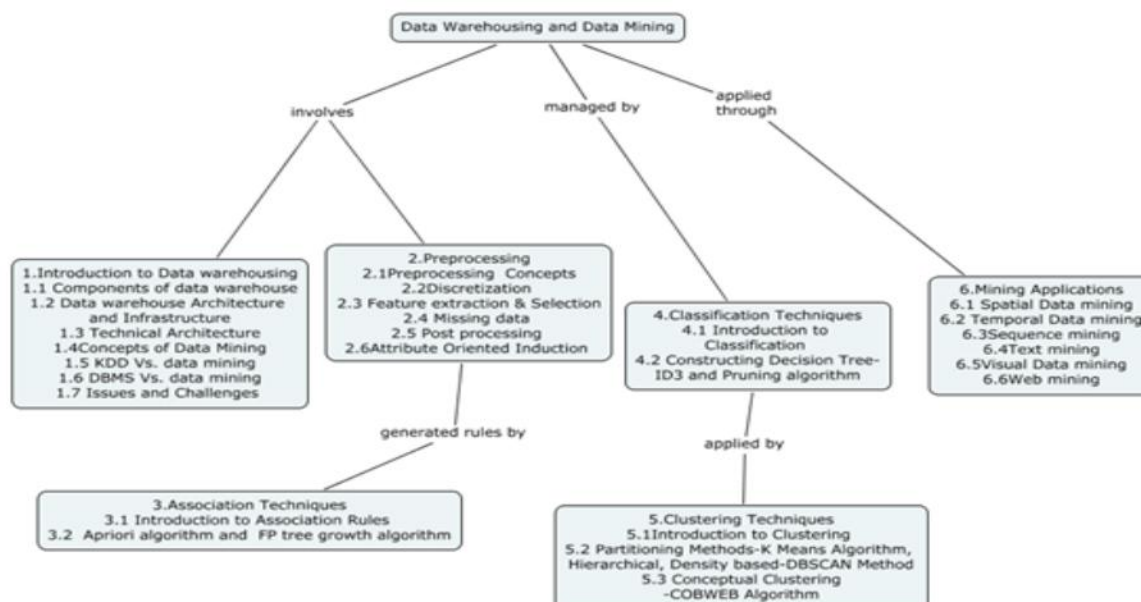
Name	Rank	Years	Turned
Mike	Purchase Manager	3	No
Mary	Purchase Manager	7	Yes
Bill	Sales Manager	2	Yes
Jim	Production Manager	7	Yes
Dave	Purchase Manager	6	No
Anne	Production Manager	3	No

3. For the following Database, apply the entropy-based discretization for the numerical attribute and find the best split.

S.NO	Age	Credit rating
1.	25	Fair
2.	29	Excellent
3.	35	Fair
4.	42	Excellent
5.	47	Fair
6.	49	Excellent
7.	32	Fair
8.	34	Fair
9.	37	Excellent
10.	40	Fair
11.	44	Fair
12.	45	Excellent

4. Given two objects A1(22,1,42,10) and A2(20,0,36,8) compute the distance by Euclidean measure. The data mining task wants to Cluster the following eight points ( with (x,y) representing locations) into 3 clusters A1(2,10), A2(2,5), A3( 8,4), B1(5,8), B2(7,5), B3(6,4), C1(1,2), C2(4,9). The distance function is Euclidean distance. Initially assign A1, B1 and C1 as the center of each cluster respectively. Use K-Means algorithm to show the final three clusters.

### Concept Map



### Syllabus

**Introduction to Data Warehousing** – Components of data warehouse, Datawarehouse Architecture and Infrastructure. Technical Architecture and OLAP. **Data Mining** – Concepts , KDD vs Data mining , DBMS vs Data mining , Issues and Challenges, **Preprocessing** – Concepts , Discretization , Feature extraction & Selection , Missing data , Post processing , Attribute Oriented Induction, **Association Techniques** - Introduction Association Rules , Apriori algorithm , FP tree growth algorithm , Types of association rules, **Classification Techniques** - Introduction to Classification , Constructing decision tree – ID3 algorithm , Pruning. **Clustering Techniques** - Introduction to Clustering , Partitioning Method – K Means algorithm , Hierarchical Method , Density Based Method – DBSCAN method , Conceptual clustering – COBWEB algorithm, **Mining Applications** - Spatial data mining, Temporal data mining, Sequence mining, Text mining, Visual data mining, Web mining.

### Reference Books

1. Jiawei Han, Micheline Kamper, Data Mining: Concepts and Techniques Morgan Kaufman, 2000, ISBN: 1-55860-489-8. Chap1-3, 5-10.
2. K.P.Soman, Shyam Diwakar, V.Ajay, "Insight into Data Mining – Theory and Practice", Prentice Hall of India, 2009. (Modules II, III and VI)
3. Arun K.Pujari, "Data Mining Techniques", Universities Press, 2010. (Modules I, IV, V and VI )
4. M.H Dunham, "Data Mining: Introductory and advanced topics", Pearson Education, 2006.

**Course Contents and Lecture Schedule**

<b>Module No.</b>	<b>Topic</b>	<b>No. of Lectures</b>
<b>1</b>	<b>Introduction to Data Warehousing</b>	
1.1	Components of data warehouse	2
1.2	Data warehouse Architecture and Infrastructure	2
1.3	Technical Architecture and OLAP	1
1.4	Data mining – basic concepts	1
1.5	Knowledge Discovery in Databases Vs. data mining	1
1.6	Database Management Systems Vs. data mining	1
1.7	Issues and Challenges	1
<b>2.</b>	<b>Processing</b>	
2.1	Preprocessing Basics	1
2.2	Discretization	1
2.3	Feature extraction & Selection	1
2.4	Missing data	1
2.5	Post processing Basics	1
2.6	Attribute Oriented Induction	1
<b>3.</b>	<b>Association Techniques</b>	
3.1	Introduction to Association Rules	1
3.2	Association Algorithms ( Apriori, FP tree )	4
<b>4</b>	<b>Classification Techniques</b>	
4.1	Introduction to Classification	1
4.2	Classifiers ( Decision tree, Pruning )	4
<b>5</b>	<b>Clustering Techniques</b>	
5.1	Introduction to Clustering	1
5.2	Algorithms ( Partioning, Hierarchical, Density based)	4
<b>6</b>	<b>Mining Applications</b>	
6.1	Spatial Data mining	1
6.2	Temporal Data mining	2
6.3	Sequence mining	3
6.4	Text mining	1
6.5	Visual Data mining	2
6.6	Web mining	1
	<b>Total</b>	<b>40</b>

**Course Designers:**

Dr. S. Vijayalakshmi

[Svlcse@tce.edu](mailto:Svlcse@tce.edu)

Dr. A. John Sanjeev Kumar

[ajscse@tce.edu](mailto:ajscse@tce.edu)



14CA370	<b>INTERNET AND JAVA PROGRAMMING LABORATORY</b>	Category	L	T	P	Credit
		PC	0	0	1	1

**Preamble**

To enable the students to practice the concepts of java programming language and develop solutions for real world problems.

**Prerequisite**

- 14CA180 : RDBMS Laboratory
- 14CA280 : Client / Server Application Laboratory
- 14CA270 : C++ Programming Laboratory

**Course Outcomes**

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

**CO1:** Understand the enabling technologies for building internet applications.

**CO2:** Understand the different techniques for developing client/server applications.

**CO3:** Apply the techniques and features of the networking and remote method development to Construct a internet application.

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	M	S	S	S	-	S	S
CO2	S	M	S	S	M	-	S	S	S
CO3	-	-	M	S	S	S	-	S	S

S- Strong; M-Medium; L-Low

**List of Experiments**

1. Programs illustrating the use of Objects
2. Programs using classes and inheritance
3. Programs using JNI concepts
4. Programs to achieve Inter thread communication and deadlock avoidance
5. Programs to implement Exception handling
6. Programs implementing packages, access specifiers and interfaces
7. A Game Program implementation using multithreading
8. Programs using streams
9. A JDBC program using different statements
10. An Applet program for Animation text, images and sounds
11. Program for Events and interactivity using Layout Manager.
12. A socket program for network chatting
13. A client server application using RMI techniques
14. Mobile Applications

**Software required:**

- Languages: Html, Java –jdk, jsdk, jvm.
- Browser (Internet Explorer, Netscape).
- User Interface Design tool (like Front Page, Visual Inter Dev)
- Backend tool (Oracle, Ms-Access, SQL Server, IBMDB2)

**Course Designers:**

Mr. R. Saravanan

[rsncse@tce.edu](mailto:rsncse@tce.edu)

Dr. D. Jeyamala

[djmcse@tce.edu](mailto:djmcse@tce.edu)



<b>14CA380</b>	<b>DATA WAREHOUSING AND DATA MINING LABORATORY</b>	Category	L	T	P	Credit
		PC	0	0	1	1

### Preamble

In this laboratory, students will implement the various Data Warehousing and Data Mining concepts using Oracle and WEKA tool

### Prerequisite

- 14CA180 : RDBMS Laboratory
- 14CA280: Client Server Application Development Laboratory

### Course Outcomes

**CO1:** Develop various real time applications using data mining techniques **Understand, ApBply**

**CO2:** Test the developed code using VB.net and Weka tool **Apply, Analyze**

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	M	M	S	M	S	S	L	L	M
<b>CO2</b>	L	L	M	M	S	S	S	M	M

S- Strong; M-Medium; L-Low

### List of Experiments

1. To perform various commands given in PL/SQL in Oracle 8.0(For brushing up)
2. To perform multi-dimensional data model using SQL queries. E.g. Star, snowflake and Fact constellation schemas
3. To perform various OLAP operations such slice, dice, roll up, drill up, pivot etc.
4. To perform the text mining on the given data warehouse
5. To perform the correlation ship analysis between for the given data set
6. To perform the attribute relevance analysis on the given data
7. To perform the information gain for a particular attribute in the given data
8. Performing data preprocessing for data mining in Weka tool
9. Performing clustering in Weka tool.
10. Association rule analysis in Weka tool

### Course Designers:

Dr. S. Vijayalakshmi [svlcse@tce.edu](mailto:svlcse@tce.edu)

Dr. A. John Sanjeev Kumar [ajscse@tce.edu](mailto:ajscse@tce.edu)

**14CA410****ELECTRONIC COMMERCE AND  
ELECTRONIC BUSINESS**

Category	L	T	P	Credit
PC	4	0	0	4

**Preamble**

To enable the students to gain knowledge in information systems such as Electronic Commerce and provide a customer specific software solution.

**Prerequisite**

- None

**Course Outcomes**

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

**CO1:** Know current management issues associated with electronic commerce      Understand strategies.

**CO2:** Recognize the Internet's role in the decision process that organizations go through in analyzing and purchasing goods and services.      Analyze

**CO3:** Demonstrate the functionality of Electronic Markets and different threats      Analyze

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	-	S	S	S	M	S	S
CO2	M	M	S	S	S	M	S	-	-
CO3	S	-	S	S	S	S	S	S	M

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	10	10	10
Understand	30	30	30	20
Apply	40	40	40	40
Analyse	10	20	20	30
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions**

Know current management issues associated with electronic commerce strategies (CO1):

1. Define E- Commerce.
2. State the definition of EDI.
3. What is Credit Transaction Trade Cycle?
4. State any two advantages of Electronic Markets..
5. What is Business to Consumer electronic commerce?
6. What is Internet?
7. Define E-Security.
8. What is Virus?
9. State any two legal and Ethical Issues.
10. What is Electronic Newspaper?

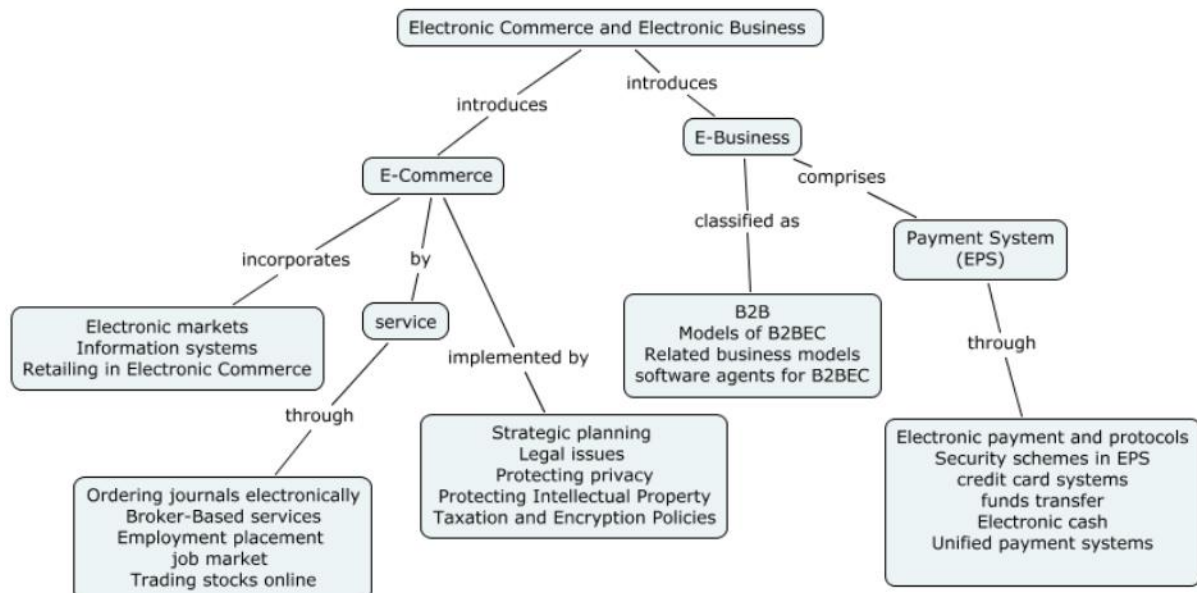
Recognize the Internet's role in the decision process that organizations go through in analyzing and purchasing goods and services (CO2):

1. Explain the following terms:
  - (i) Supply Chain
  - (ii) Value Chain
  - (iii) Competitive Advantage
  - (iv) Business Strategy
2. Explain in detail Electronic Data Interchange and how it is useful in implementation of E-Commerce.
3. Explain Business to Business E-Commerce in detail with one example.
4. State the advantages and disadvantages of Electronic market.
5. Discuss the various uses of Internet's.
6. Explain different kinds of Threats in E-Security

### **Demonstrate the functionality of Electronic Markets and different threats (CO3):**

1. Explain the Web Site Evaluation Model in detail and how do you apply it.
2. Explain in detail E- Security and how it will apply for an e-business.
3. Explain the Major threats to Ethics in detail
4. Explain the following Concepts with one example: Internet Book Shop, Virtual Auction, Online Share Dealing, and Electronic Newspaper
5. How could supply chain management be applied to a online book store.
6. Explain in detail Strategy formulation, Implementation Planning, Implementation and Evaluation of E-Commerce.
7. Analyze Business to Consumer E-Commerce in detail with one example.
8. Explain the Online Payments in detail and analyze it.

### **Concept Map**



### **Syllabus**

**Foundations of Electronic Commerce (EC)**-The EC field-Electronic markets-Information systems-Benefits and limitation of EC-Driving forces of Electronic Commerce-Impact of EC. Retailing in Electronic Commerce-Overview-Forecast of the B2C Electronic markets. **Electronic Commerce for service industries**-Ordering journals electronically-services-Employment placement and job market-Trading stocks online-Cyber banking and personal finance-Electronic Auctions. **Business-to-Business Electronic Commerce (B2BEC)**-Models of B2BEC-Traditional EDI-software agents for B2BEC-solutions of B2BEC-Managerial issues. Intranet and Extranet. **Electronic Payment Systems (EPS)**-Electronic payment and protocols-Security schemes in EPS-Electronic credit card systems-Electronic funds transfer-Electronic cash-Unified payment systems-Prospects of EPS. **Electronic Commerce strategy and implementation**-Strategic planning for Electronic Commerce-Competitive intelligence on the internet. Legal issues to Privacy in Electronic Commerce (EC)-Internet protocols-Client/Server technology-Internet Security-Selling on the web-Multimedia delivery-Webcasting-Challenges and Opportunities.

#### Text Book

1. "Electronic Commerce-A Managerial Perspective", Efraim Turban, Jae Lee, David King and H.Micheal Chung, Person Education,2008. Chapters 1, 2, 5, 6, 7, 8, 9, 10 and 11.

#### Reference Books

1. "Electronic Commerce: A Managers Guide", Ravi Kalakotta and Andrew B. Whinston, Person Education, 2009.
2. "E-Business and IS Solutions: An Architectural Approach to business Problems and Opportunities", William J. Buffan, Person Education, 2009.

#### Course Contents and Lecture Schedule

Module. No	Topics	No. of Lectures
1	<b>Foundations of Electronic Commerce</b>	1
1.1	The EC field, Electronic markets	1
1.2	Information systems, Benefits and limitation of EC	1
1.3	Driving forces of Electronic Commerce, Impact of EC.	1
1.4	Retailing in Electronic Commerce	1
1.5	Overview-Forecast of the B2C Electronic markets, Business models of Electronic marketing	1
1.6	Online customer service, Procedure for internet shopping	2
1.7	Aiding comparison shopping, Impact of EC on traditional retailing systems.	1
2	<b>Electronic Commerce for service industries</b>	
2.1	Ordering journals electronically, Broker-Based services	1
2.2	Travel and tourism services, Employment placement	1
2.3	job market , Trading stocks online,	1
2.4	Cyber banking and personal finance	1

2.5	Electronic Auctions-Types of Auctions-Benefits and limitations-	1
2.6	Business to business Auction-Managerial issues.	2
2.7	Case Studies	2
3	<b>Business-to-Business Electronic Commerce (B2BEC)</b>	1
3.1	Overview, Characteristics of B2BEC	1
3.2	Models of B2BEC, Traditional EDI-Internet based EDI-Roll of software agents for B2BEC Electronic marketing in B2BEC-Solutions of B2BEC-Managerial issues.	2
3.3	Intranet and Extranet-Architecture of the Internet	1
3.4	Intranet, Extranet-Applications, Related business models.	1
3.5	Mobile Commerce in B2B and B2C	2
3.6	Technical aspects of M-Commerce and Case Studies	3
3.6	<b>Electronic Payment Systems (EPS)-Overview</b>	1
3.7	Electronic payment and protocols, Security schemes in EPS-Authentication, Authorization and Access Rights	2
3.8	Electronic credit card systems, Electronic funds transfer, Prospects of EPS	1
3.9	Case Studies	2
4	<b>Electronic Commerce strategy and implementation-</b>	
4.1	Electronic Business's strategy, Strategic planning for Electronic Commerce	1
4.2	Competitive intelligence on the internet, Legal issues to Privacy in Electronic Commerce (EC)	1
4.3	Ethical issues-Protecting privacy, Protecting Intellectual Property-	1
4.4	Taxation and Encryption Policies, Consumer and Seller protection in EC.	1
4.5	Infrastructure for EC-Internet protocols, Client/Server technology-	1
4.6	Internet Security, Selling on the web-Multimedia delivery	1
4.7	Webcasting, Challenges and Opportunities	2
4.8	Case Studies	2
	Total	45

**Course Designers:**

Dr. S. Vijayalakshmi  
Mr. T. Chandrakumar

[svcse@tce.edu](mailto:svcse@tce.edu)  
[tckcse@tce.edu](mailto:tckcse@tce.edu)

**14CA420 OBJECT ORIENTED ANALYSIS AND**

**DESIGN**

Category	L	T	P	Credit
PC	3	1	0	4

**Preamble**

This course aims at facilitating the student to learn the object orientation on real world problems; analyze and design the problem domain using the principles and practices followed in industries in object oriented problem solving by applying Booch notations and UML based modelling.

**Prerequisite**

- 14CA220 : Object Oriented Programming using C++
- 14CA340 : Software Engineering

**Course Outcomes**

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

**CO1:** Understand the complexity of Software and the application of unified Process Model. **Understand**

**CO2:** Understand OOA and OOD and apply the different classification techniques for classes and objects identification. **Understand**

**CO3:** Analyze and apply different UML design documents for Object Oriented Design (OOD). **Analyze, Apply**

**CO4:** Understand, Apply and Analyze various design patterns and design principles in developing software. **Analyze, Apply**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	L	S	S	S	M	-	-	-	-
CO2	-	S	S	S	M	-	-	-	-
CO3	-	S	S	S	M	-	M	M	M
CO4	-	-	-	-	S	L	S	S	S

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	10	10	10	20
Understand	10	10	10	30
Apply	20	20	10	30
Analyse	10	10	20	20
Evaluate	0	0	0	0
Create	0	0	0	0



### Course Level Assessment Questions

**Understand the complexity of software and the application of Unified Process Model. (CO1):**

1. Write the reasons of Software Crisis? How to avoid it?
2. Why software is inherently complex? List the reasons.
3. Explain the major elements and minor elements in detail.
4. How OO based decomposition differs from algorithmic decomposition.
5. What is Unified Process Model?
6. Explain the different life cycle phases of Rational Unified Process Model.

**Understand OOA and OOD and apply the different classification techniques for classes and objects identification. (CO2):**

1. What is OOA and OOD?
2. Which tasks are involved in the OOA process?
3. Explain the different ways of classifying the objects and classes in OOA?
4. How objects and classes can be identified by means of OO analysis techniques? Explain with an example system.
5. Why Structured English representation is not suitable for objects identification?
6. How CRC card based analysis helps in identifying classes and objects?
7. Companies may employ many people, and people may work for many companies. Every employee in a company has a manager to manage many subordinate employees. One work role is assigned to each employee and each job requires and desired credentials. The credentials are composed of qualifications. Identify the classes from this scenario

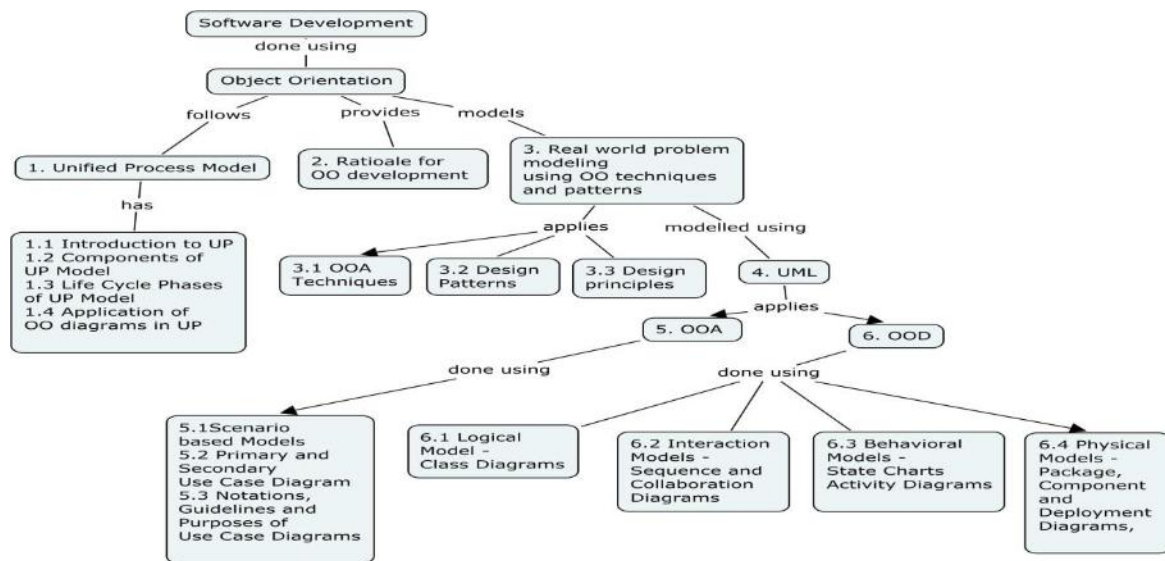
**Analyze and apply different UML design documents for Object Oriented Design (OOD). (CO3)**

1. What is the difference between use case diagram and use cases?
2. What are the standard class stereotypes available in UML 2.0?
3. List the purposes of sequence diagrams.
4. How object creation, deletion, life line of an object and life time of a method are represented in a sequence diagram? Draw its notations.
5. What are the types of links supported by collaboration diagrams?
6. Consider a 'Transport Management System'. This system proposes an efficient method for handling the transport operations. It provides an efficient record maintenance system. The main feature is it provides automatic intimation of expired date of driving license, complaints and suggestions to the RTO office, fix appointment for LLR test and get bus information. This information will maintain details of all employees, contacts, bus details etc. and provides an option for reports generation. Apply the techniques of OOA to find out classes and objects from it..

**Understand, Apply and analyze various design patterns and design principles in developing software. (CO4)**

1. What are design patterns? Analyze the creational based design patterns in classes and objects representation in OOD.
2. What are design principles? How the various types of it are used in OOD? Explain it with an example for each.
3. What are structural design patterns? Analyze how the different types of it are applied in OOD?
4. How behavioral patterns are used in representing the functionality in OOD?
5. What is the purpose of Memento? Give an example.
6. What is a framework? Distinguish it from design patterns.

## Concept Map



## Syllabus

**Unified Process in Object Oriented Software Development** - Basics of Software Development Process, Introduction to UP, Components of Unified Process Model, Life Cycle Phases of Unified Process Model, Application of OO diagrams in UP, Rationale for OO development - Object Orientation in Software development process, Flavors of Object Orientation, Basic Entities and Constructs of Object Orientation, Structured Approach Vs. Object Oriented Approach, **Modelling the real world problems using OO techniques and Design Patterns** - Object Oriented Analysis (OOA) of problem domain, OOA Techniques for Objects Identification, Object Oriented Design (OOD) of problem domain, Design Principles in Class Design, Design Patterns in Classes and Objects Identification and Refinement, Modeling with UML - Problem Domain Understanding, Traditional Analysis Methods and Models, Characteristics of Good Analysis, Deficiency with the traditional approaches, **UML** – Introduction, UML diagrams for OOA and OOD, Object Oriented Analysis using UML- Scenario based Models - Use Case Analysis - Primary and Secondary Use Case Diagram - Notations, Guidelines, Purposes of Use Case Diagrams, Object Oriented Design using UML- Logical Model -UML Class Diagram basic and advanced concepts - Interaction Models – Sequence and Collaboration Diagrams, Behavioral Models, State Charts and Activity Diagrams, Physical Models – Package, Component and Deployment Diagrams, Case Study - Tutorial

## Reference Books

1. Grady Booch, Robert A.Maksmichuk, Michael W.Engle, Bobbi J.Young, Jim Conallen, Kelli A. Houston, "Object-oriented analysis and design with applications", Third edition, Pearson Education, 2011.
2. Martin Fowler, "UML Distilled", Third edition, Pearson Education, 2011.
3. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, "Design Patterns: Elements of Reusable Object-Oriented Software", First Edition, Addison-Wesley Professional, 1994.
4. Ali Bahrami, "Object-oriented system development", First Edition, Tata McGraw Hill, 1999.
5. Hans-Erik Eriksson and Magnus Penker, UML toolkit, John Wiley, 1998.



**Course Contents and Lecture Schedule**

<b>Module No.</b>	<b>Topic</b>	<b>No. of Lectures</b>
<b>1</b>	<b>Unified Process in Object Oriented Software Development</b>	
1.1	Basics of Software Development Process	1
1.2	Introduction to UP	1
1.3	Components of Unified Process Model	1
1.4	Life Cycle Phases of Unified Process Model	1
1.5	Application of OO diagrams in UP	1
	Tutorial	2
<b>2</b>	<b>Rationale for OO development</b>	
2.1	Object Orientation in Software development process	1
2.2	Flavors of Object Orientation	2
2.3	Basic Entities and Constructs of Object Orientation	1
2.4	Structured Approach Vs. Object Orientated Approach	1
	Tutorial	2
<b>3</b>	<b>Modeling the real world problems using OO techniques and Design Patterns</b>	
3.1	OOA - Techniques for Objects Identification	2
	Tutorial	2
3.2	OOD - Design Principles in Class Design	2
3.3	OOD - Design Patterns in Classes and Objects Identification and Refinement	2
	Tutorial	2
<b>4</b>	<b>Modeling with UML</b>	
4.1	Problem Domain Understanding	1
4.2	Traditional Analysis Methods and Models	2
4.3	Characteristics of Good Analysis	1
4.4	Deficiency with the traditional approaches	1
4.5	UML - Introduction	1
4.6	UML diagrams for OOA and OOD	1
<b>5</b>	<b>Object Oriented Analysis</b>	
5.1	Scenario based Models - Use Case Analysis	1
5.2	Primary and Secondary Use Case Diagram	2
5.3	Notations, Guidelines, Purposes of Use Case Diagrams	2
	Tutorial	2
<b>6</b>	<b>Object Oriented Design</b>	

Module No.	Topic	No. of Lectures
6.1	Logical Model -UML Class Diagram basic and advanced concepts	2
6.2	Interaction Models – Sequence and Collaboration Diagrams	2
6.3	Behavioral Models – State Charts and Activity Diagrams	2
6.4	Physical Models – Package, Component and Deployment Diagrams	2
6.5	Case Study - Tutorial	2
	Total	48

**Course Designers:**

Dr.D.Jeya Mala  
Dr.S.Parthasarathy

[djmcse@tce.edu](mailto:djmcse@tce.edu)  
[spcse@tce.edu](mailto:spcse@tce.edu)



**14CAPA0****COMPONENT BASED  
TECHNOLOGIES**

Category	L	T	P	Credit
PE	3	0	0	3

**Preamble**

To introduce the development of software components and give in-depth knowledge of the existing software component solutions.

**Prerequisite**

- 14CA340 : Internet and Java Programming

**Course Outcomes**

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

- |   |                   |
|---|-------------------|
| <b>CO1:</b> State the necessity of breaking large, complex software applications into software components         | <b>Understand</b> |
| <b>CO2:</b> Explain the different terms related with distributed architecture                                     | <b>Understand</b> |
| <b>CO3:</b> Demonstrate different component models - CORBA, DCOM and Java based technology                        | <b>Understand</b> |
| <b>CO4:</b> Understand real time requirements and apply the usage of existing component models                    | <b>Apply</b>      |
| <b>CO5:</b> Develop reusable software components based on user requirements and existing distributed architecture | <b>Apply</b>      |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	L	-	-	-	-	-	-	-	-
CO2	S	-	-	-	-	-	-	-	-
CO3	S	L	-	M	M	M	-	-	-
CO4	S	M	L	S	M	M	L	S	L
CO5	S	M	M	S	M	M	M	S	M

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	30	30	30	30
Understand	40	40	30	30
Apply	30	30	40	40
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions**

State the necessity of breaking large, complex software applications into software components (CO1):

1. Compare Components Vs. Objects.
2. Write a short note on model driven architecture.

**Explain the different terms related with distributed architecture (CO2):**

1. What do you mean by object serialization?
2. Define Callback, Give an example.

Demonstrate different component models - CORBA, DCOM and Java based technology (CO3):

1. Draw the Java thread state transition diagram.
2. What are the different aspects of Java Bean, explain with relevant code?
3. Discuss about EJB architecture and different types of Beans with sample code.

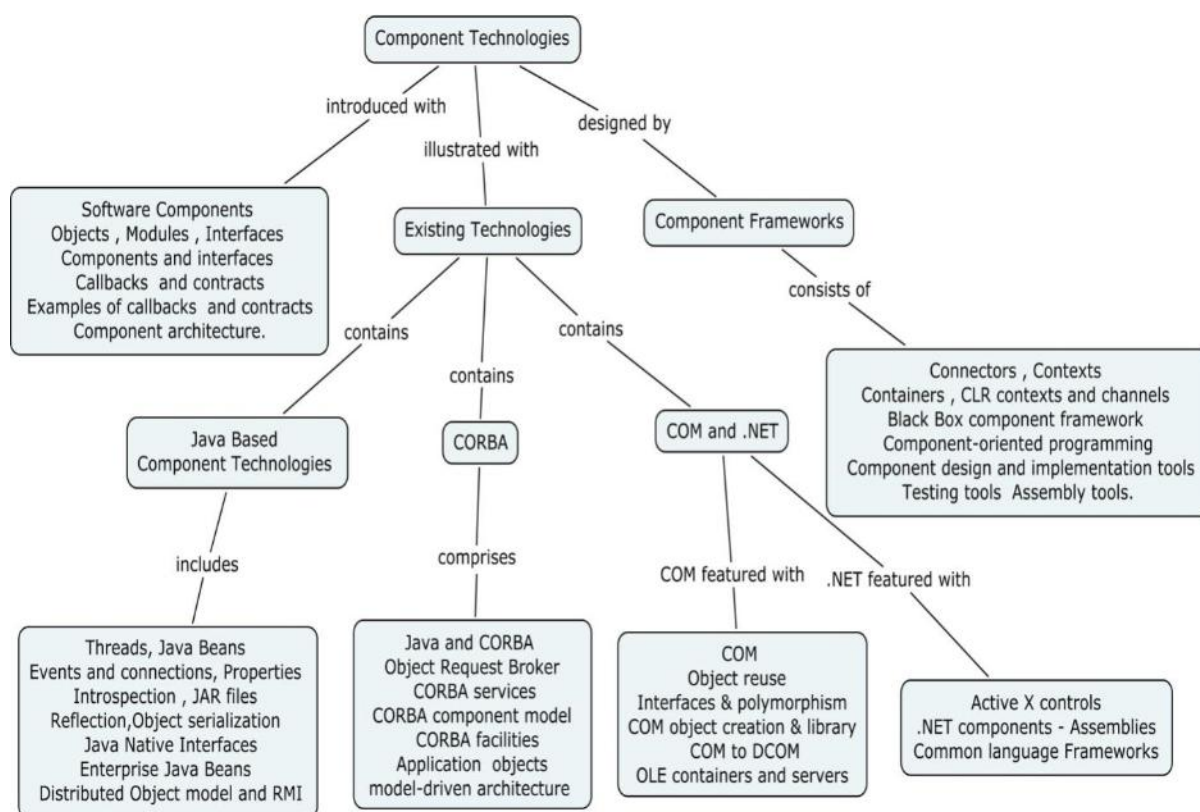
Understand real time requirements and apply the usage of existing component models (CO4)

1. List down the CORBA services that supports enterprise distributed computing
2. With neat diagram explain on How Object Request Broker used in CORBA.
3. Explain the interaction between COM OLE container and server.
4. Demonstrate the use of CORBA facilities and portable object broker.

**Develop reusable software components based on user requirements and existing distributed architecture (CO5)**

1. By applying reflection and object serialization concepts, write a Java program to calculate volume and area for different solids.
2. Generate an application by applying callbacks and contracts.
3. By applying anyone of the testing tool carry out testing on any component.
4. Develop a component framework by applying contexts and connectors.

## Concept Map



## Syllabus

**Introduction** Software Components – objects – modules – interfaces – components and interfaces- callbacks and contracts– Examples of callbacks and contracts -component architecture.**Java Based Component Technologies** Threads – Java Beans – Events and connections – properties – introspection – JAR files – reflection – object serialization – Java Native Interfaces-Enterprise Java Beans – Distributed Object model and RMI.**Corba Component Technologies** Java and CORBA – Object Request Broker – CORBA services – CORBA component model – CORBA facilities– Application objects– model-driven architecture **COM And. NET Technologies** COM – object reuse – interfaces and polymorphism–COM object creation and library– From COM to DCOM-OLE containers and servers – Active X controls – .NET components - assemblies –Common language Frameworks. **Component Frameworks And Development** Connectors – contexts – containers – CLR contexts and channels – Black Box component framework – component-oriented programming – Component design and implementation tools – testing tools - assembly tools.

## Reference Books

1. Clements Szyperski, Dominik, Stephen “Component Software: Beyond Object-Oriented Programming, 2/E”, ACM Press, Reprint: 2011.
2. Jason Pritchard, “COM and CORBA Side by Side: Architectures, Strategies, and Implementations”, Pearson Education Publishes, 2008.

3. Ed Roman, "Mastering Enterprise Java Beans", Third Edition, Wiley, Reprint 2009.
4. Mowbray, "Inside CORBA: Distributed Object Standards and Applications", Pearson Education, 2006.
5. Kuth Short, "Component Based Development and Object Modeling", Sterling Software, 1997.

#### Course Contents and Lecture Schedule

Module No	Topic	No. of Lectures
1	<b>Introduction to component technologies</b>	
1.1	Software Components	2
1.2	Objects – modules – interfaces	1
1.3	Components and interfaces	1
1.4	Callbacks and contracts– Examples of callbacks and contracts	2
1.5	Component architecture	1
2	<b>Java Component Technologies</b>	
2.1	Threads – Java Beans	1
2.2	Events and connections –Properties	1
2.3	Introspection – JAR files	1
2.4	Object serialization	1
2.5	Reflection — Java Native Interfaces	1
2.6	Enterprise Java Beans	1
2.7	Distributed Object model and RMI	1
3	<b>Corba Technologies</b>	
3.1	Java and CORBA	2
3.2	Object Request Broker	1
3.3	CORBA services	1
3.4	CORBA component model	1
3.5	CORBA facilities	2
3.6	Application objects– model-driven architecture	1
4	<b>COM And .NET Technologies</b>	
4.1	COM – object reuse	1
4.2	Interfaces and polymorphism	1
4.3	COM object creation and library	1

4.4	From COM to DCOM-OLE containers and servers	1
4.5	Active X controls – .NET components	2
4.6	Assemblies –Common language Frameworks	1
5	<b>Component Frameworks And Development</b>	
5.1	Connectors – Contexts	1
5.2	Containers – CLR contexts and channels	2
5.3	Black Box component framework	1
5.4	Component-oriented programming	2
5.5	Component design and implementation tools- Testing tools- Assembly tools	1
	<b>Total</b>	36

**Course Designers:**

Mrs. K. Murugeswari

[kmcse@tce.edu](mailto:kmcse@tce.edu)

Mrs. D. Anitha

[anithad@tce.edu](mailto:anithad@tce.edu)

**14CAPB0 PROGRAMMING IN C# USING .NET**

Category	L	T	P	Credit
PE	2	1	0	3

**Preamble**

To understand the syntactical features of C# language and use the design of the language to develop robust software.

**Prerequisite**

- CA14120 : Programming in C
- CA14220 : Object Oriented Programming in C++

**Course Outcomes**

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

<b>CO1:</b> Comprehend the .NET framework	Understand
<b>CO2:</b> Comprehend and apply the general programming structure of C# in developing software solutions	Apply
<b>CO3:</b> Develop windows application and web applications in .NET framework analyzing user requirements	Analyze
<b>CO4:</b> Demonstrate the advanced features of .NET programming	Apply

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	S	L	-	M	-	-	M	-	-
<b>CO2</b>	S	S	-	S	S	M	S	-	-
<b>CO3</b>	S	S	-	S	S	S	S	M	M
<b>CO4</b>	S	M	M	S	S	-	M	-	-

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	20	20
Understand	30	20	20	20
Apply	40	50	50	50
Analyse	10	10	10	10
Evaluate	0	0	0	0
Create	0	0	0	0



**Course Level Assessment Questions**

Comprehend the .NET framework (CO1):

1. What are the advantages of using .NET?
2. What do you mean by CLR?
3. What is the use of CTS?
4. What is CLS?
5. Explain in detail about the activities of CLR.
6. Explain about various Namespaces of .NET framework.

**Comprehend and apply the general programming structure of C# in developing software solutions (CO2):**

1. What do you mean by reference type? Give example.
2. What do you mean by Jagged Arrays?
3. What is string? How strings are declared?
4. What is structure? How it is created in C#?
5. Explain about interfaces in C#.
6. What is dialog box? What are the different types of dialog box? Write the program for creating dialog boxes. What is the difference between the methods open ( ) and openRead ( ) of the class FileInfo?
7. What is event? How events are created? Give example.
8. Explain in detail about various operators available in C# and apply it in your program.
9. What is the use of Binary Reader and Binary Writer? Explain with a suitable program.

Develop windows application and web applications in .NET framework analyzing user requirements (CO3):

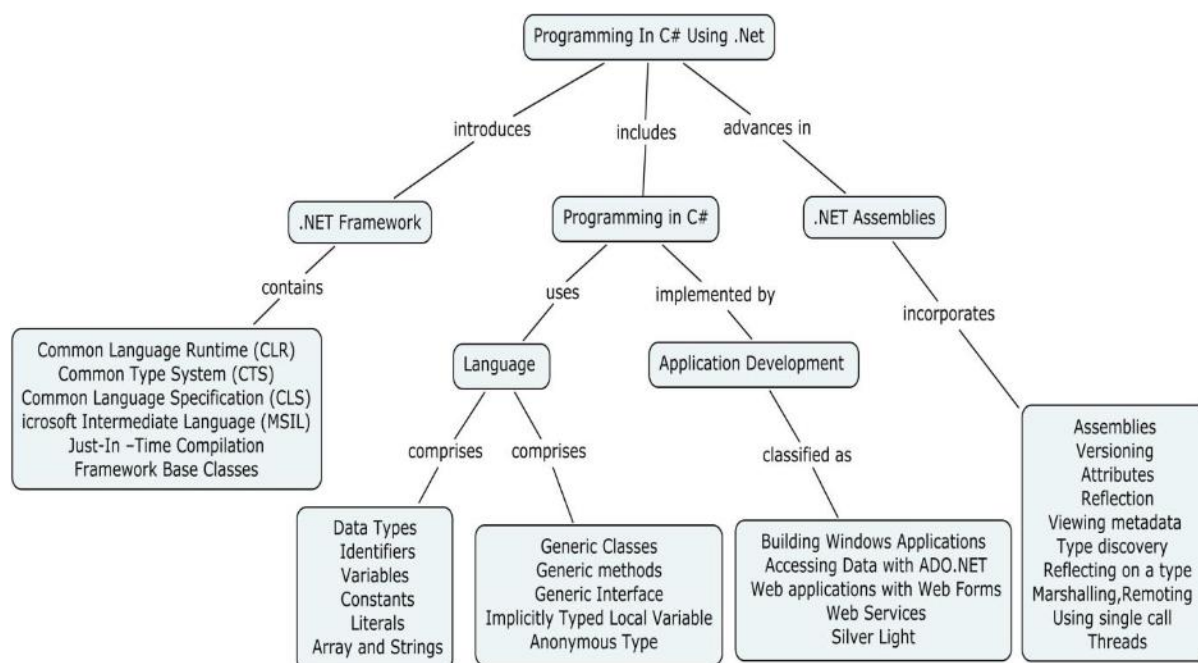
1. What is OleDbDataReader? How to insert update and delete Records using OleDb command.
2. Explain in detail about various ASP.NET webform controls.
3. Explain and apply the steps to be followed to create the complete data table.
4. What is the purpose of applying the method Peek ( ) of class TextReader?
5. What is the Role of XML Web services?
6. Analyze the building blocks of an XML web service.
7. List out the various ADO.NET Namespaces.

Demonstrate the advanced features of .NET programming (CO4)

1. Analyze the methods to compare two objects in C.

2. Write a C# code for Exception Handling.
3. Justify your argument over using .NET frame work for a distributed application.
4. Analyze the distributed application in which marshalling and assembling finds their usage.

### Concept Map



### Syllabus

**The .Net framework:** Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In-Time Compilation, Framework Base Classes. **C -Sharp Language:** Introduction-Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, -OOPS concepts-Delegates and Events- -Generic Classes-Generic methods-Generic Interface-Implicitly Typed Local Variable- Anonymous Type. **Application Development on .NET:** Building Windows Applications. Accessing Data with ADO.NET. Web applications with Web Forms, Web Services. **.NET Assemblies:** Assemblies- Versioning- Attributes- Reflection- Viewing metadata – Type discovery – Reflecting on a type – Marshalling – Remoting – Using single call – Threads-Silver Light.

### Reference Books

1. Liberty, J., Donald Xie, "Programming C# 3.0", 5th Edition, O'Reilly, 2007
2. Herbert Schildt, C# 3.0 The Complete Reference 3/E., McGraw-Hill, 2008.
3. Andrew Troelsen, "Pro C# with .NET 3.0", APress, 2007.
4. Robinson, "Professional C#", 3rd Edition, Wrox Press, 2004.

**Course Contents and Lecture Schedule**

<b>Module No</b>	<b>Topic</b>	<b>No. of Lectures</b>
<b>1</b>	<b>The .Net framework</b>	
1.1	Introduction, The Origin of .Net Technology,.	1
1.2	Common Language Runtime (CLR), Common Type System (CTS),	1
1.3	Microsoft Intermediate Language (MSIL), Just-In –Time Compilation	2
1.4	Framework Base Classes	2
<b>2</b>	<b>C -Sharp Language</b>	
2.1	Introduction-Data Types, Identifiers, Variables, Constants, Literals	2
2.2	Array and Strings	2
2.3	OOPS concepts	1
2.4	Delegates and Events	1
2.5	Generic Classes-Generic methods-Generic Interface	2
2.6	Implicitly Typed Local Variable- Anonymous Type	1
<b>3</b>	<b>Application Development on .NET</b>	
3.1	Building Windows Applications	3
3.2	Accessing Data with ADO.NET	3
3.3	Web applications with Web Forms	3
3.4	Web Services	2
<b>4</b>	<b>.NET Assemblies</b>	
4.1	Assemblies-Introduction	2
4.2	Versioning, Attributes	2
4.3	Reflection- Viewing metadata Type discovery – Reflecting on a type	2
4.4	Marshalling – Remoting	1
4.5	Using single call – Threads	1
4.6	Silver Light	2
	<b>Total</b>	<b>36</b>

**Course Designers:**

Mrs. D. Anitha

[anithad@tce.edu](mailto:anithad@tce.edu)

Mr. T. Chandrakumar

[tckcse@tce.edu](mailto:tckcse@tce.edu)

**14CAPC0 SOFTWARE PROJECT MANAGEMENT**

Category	L	T	P	Credit
PE	2	1	0	3

**Preamble**

To provide a sound understanding of: The application of project management concepts with problem domains. Incorporating leadership and management qualities in software project development

**Prerequisite**

- 14CA340 : Software Engineering

**Course Outcomes**

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

**CO1:** Apply software project management principles for successful software project development **Apply**

**CO2:** Develop software metrics for successful software project development **Analyze**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	M	S	-	S	M	S	S
CO2	M	M	-	S	S	-	S	S	S

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	10	10	10
Understand	30	20	20	20
Apply	40	40	40	40
Analyse	10	20	20	30
Evaluate	0	10	10	0
Create	0	0	0	0

**Course Level Assessment Questions**

**Apply software project management principles for successful software project development (CO1):**

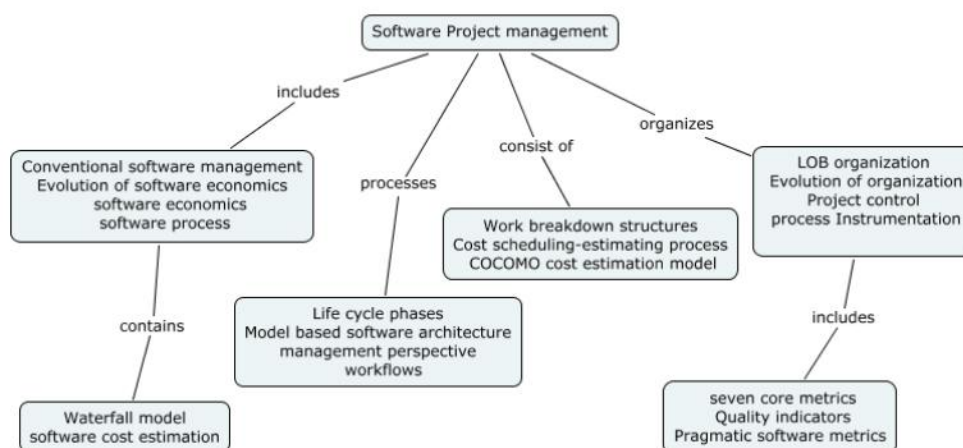
1. What is software project management?
2. Define process.
3. List the characteristics of software projects.
4. Define a product breakdown structure.
5. How plans, methods and methodologies differ from each other?
6. How to identify and estimate the cost of project?

7. What are the categories of software projects?
8. What are the activities of project management?
9. What is ROI? How it is calculated?
10. Define activity.
11. Explain the various activities covered by software project management.
12. Diagrammatically explain the ISO 12207 SDLC activities.
13. List the Outline of stepwise project planning.

### Develop software metrics for successful software project development (CO2):

1. What is project schedule? Explain the stages of project schedules and apply it for some project.
2. Describe with an example how the effect of risk on project schedule is evaluated using PERT.
3. Using the basic COCOMO model, under all three operating modes, determine the performance relation for the ratio of delivered source code lines per person-month of effort. Determine the reasonableness of this relation for several types of software projects.
4. What are the top 10 software management principles in modern project profile? How can it be applied?
5. Apply the top 10 industrial software metrics in conventional software management performance.
6. Analyze outline of step wise planning activities for a project with neat diagram.
7. Explain objectives of activity planning in detail.
8. Evaluate how cost- benefit evaluation techniques can be used to choose the best among competing project proposal.
9. Consider a project to develop a full screen editor. The major components identified are (1) Screen edit (2) Command language Interpreter (3) file input and output, (4) Cursor movement and (5) screen movement. The sizes are estimated to be 4k, 2k, 1k, 2k and 3k delivered source code lines. Use COCOMO model to evaluate:
  - (a) Overall cost and schedule estimates (assume values for different cost drivers, with at least three of them being different from 1.0)
  - (b) Cost and schedule estimates for different phases.
10. Explain how object-oriented methods and visual modeling help in reducing the project size.
11. Evaluate the different levels of software process.

### Concept Map



### Syllabus

**Software Management** - Conventional software management, Waterfall model, Evolution of software economics, Pragmatic software cost estimation, Improving software economics, and improving software process. **Software Management process framework** - Life cycle phases, Model based software architecture-management perspective, Software process workflows. **Software management Disciplines** - Iterative Process planning, Work breakdown structures, Cost, scheduling-estimating process, COCOMO cost estimation model. Project organizations and responsibilities - LOB organization, Evolution of organization, **Project control and process Instrumentation** – seven core metrics, Quality indicators, Pragmatic software metrics. **Modern project profiles** - Continuous integration, Early risk resolution, project risks, Software Management principles, Software Management practices.

### Text Book

1. Walker Royce, "Software Project Management", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2011.

### Reference Books

1. Bob Hughes, Mikecotterell, "Software Project Management", Third Edition, Tata McGraw Hill, 2004
2. Robert T. Futrell, Donald F. Shefer and Linda I. Shefer, "Quality Software Project Management", Pearson Education, 2003.

### Course Contents and Lecture Schedule

Module. No	Topics	No. of Lectures
1	<b>Software Management</b>	
1.1	Conventional software management	2
1.2	Waterfall model	2
1.3	Evolution of software economics	1
1.4	Pragmatic software cost estimation	2
1.5	Improving software economics	1
1.6	Improving software process	2
	<b>Software Management process framework</b>	
1.7	Life cycle phases	2
1.8	Model based software architecture-management perspective	1
1.9	Software process workflows	2
2	<b>Software management Disciplines</b>	
2.1	Iterative Process planning	1

2.2	Work breakdown structures	1
2.3	Cost, scheduling-estimating process	2
2.4	COCOMO cost estimation model	1
	<b>Project organizations and responsibilities</b>	
2.5	LOB organization, Evolution of organization	2
2.6	Project control and process Instrumentation – seven core metrics	2
2.7	Quality indicators	1
2.8	Pragmatic software metrics	1
2.9	Case study	2
3	<b>Modern project profiles</b>	
3.1	Continuous integration	1
3.2	Early risk resolution, project risks	2
3.3	Software Management principles	2
3.4	Software Management practices	2
3.5	Case study	3
	Total	36

#### Course Designers

Mr. T. Chandrakumar

[tckcse@tce.edu](mailto:tckcse@tce.edu)

Dr. D. Jeya Mala

[djmcse@tce.edu](mailto:djmcse@tce.edu)



**14CAPD0****INFORMATION RETRIEVAL**

Category	L	T	P	Credit
PE	3	0	0	3

**Preamble**

This course is intended to explore the practices, issues and theoretical foundations of organizing and analyzing information and information content for the purpose of providing intellectual access to textual and non-textual information resources.

**Prerequisite**

- 14CA150: Database Management Systems
- 14CA140 : Data Structures

**Course Outcomes**

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

- |  |            |
|--|------------|
| <b>CO1:</b> Explain the principles and process of Information Retrieval  | Understand |
| <b>CO2:</b> Demonstrate the process of search system and evaluation in information retrieval                               | Understand |
| <b>CO3:</b> Use a set of tools and procedures for organizing information   | Apply      |
| <b>CO4:</b> Use different theoretical foundations, methods and measurements to analyze major information retrieval systems | Analyze    |
| <b>CO5:</b> Analyze the crucial role of relevance feedback in IR Systems   | Analyze    |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	L	-	-	-	-	-	M	-	-
<b>CO2</b>	L	-	-	-	-	-	S	-	-
<b>CO3</b>	S	L	M	S	S	-	S	S	-
<b>CO4</b>	S	S	S	M	S	M	M	M	-
<b>CO5</b>	S	S	S	M	S	-	-	-	-

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	20	20
Understand	30	30	30	30
Apply	30	30	30	30
Analyse	20	20	20	20
Evaluate	0	0	0	0
Create	0	0	0	0



### Course Level Assessment Questions

Explain the principles and process of Information Retrieval (CO1):

1. Define each of the following concepts, giving an example in the context of the above text if applicable:
  - (i) sure-fire rule;
  - (ii) lexico-semantic template;
  - (iii) inference rule
  - (iv) template learning
2. Describe clustering in detail with example.
3. Describe how the factor of weight is used in IR retrieval.
4. Provide a table chart to differentiate Data retrieval & Information retrieval.

**Demonstrate the process of search system and evaluation in information retrieval (CO2):**

1. Illustrate conflation algorithm in detail.
2. Write a note on a) Single link algorithm b) Single pass algorithm.
3. Demonstrate different types of compression used IR systems.

**Use a set of tools and procedures for organizing information (CO3):**

1. Describe the information access process.
2. Write down the Tdf-idf document relevance rating formula.
3. Compare Parallel IR & Distributed IR.
4. The figure below shows the output of two information retrieval systems on the same two queries in a competitive evaluation. The top 15 ranks are shown. Crosses correspond to a document which has been judged relevant by a human judge; dashes correspond to irrelevant documents. There are no relevant documents in lower ranks.

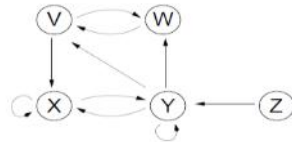
System 1			System 2		
Rank	Q1	Q2	Rank	Q1	Q2
1	-	X	1	X	X
2	X	-	2	X	-
3	X	-	3	X	-
4	X	-	4	-	X
5	-	-	5	X	X
6	-	-	6	X	-
7	-	-	7	-	-
8	X	-	8	-	-
9	X	-	9	-	-
10	X	-	10	-	-
11	X	-	11	X	-
12	-	-	12	X	-
13	-	X	13	-	-
14	-	X	14	-	-
15	X	-	15	X	-

- a) Give the formula for mean average precision (MAP), and illustrate the metric by calculating System 1's MAP.
- b) For each system, draw a precision-recall curve. Explain how you arrived at your result. How could one create more informative curves?

**Use different theoretical foundations, methods and measurements to analyze major information retrieval systems (CO4):**

1. Define the concept of PageRank.

2. What is data centric xml retrieval?
3. How is term weighting used to position objects in the space? Why is term weighting important for effective document retrieval?
4. Suggest one way in which the orthogonality assumption could be relaxed.
5. Give the linkage matrix A of the network given in the diagram below.



Show the final matrix that will be subjected to the PageRank calculation, if  $q = 0.8$  is used.

6. Consider the following text, which gives the input to three different information extraction systems dealing with texts about job succession events.

Last Monday Rajnath resigned his position as CEO of Sparkling Inc., the well-known cleaning supply manufacturer, following recent corruption allegations. This move has been expected for some time now. He is succeeded by his brother, RajPrasath.

The tasks of the three systems are as follows:

- System 1 determines all person and organisation names.
- System 2 determines the employed-by relationship, which holds between employees and employers.
- System 3 fills templates about job successions, in the style of MUC templates (as in the following figure).

START-JOB-EVENT

Person:  
Position:  
Company:  
Start Date:

END-JOB-EVENT

Person:  
Position:  
Company:  
End Date:

For each system, give a description of how it could plausibly solve its task. What is the most difficult problem each system will encounter? Use examples from the text.

#### Analyze the crucial role of relevance feedback in IR Systems (CO5):

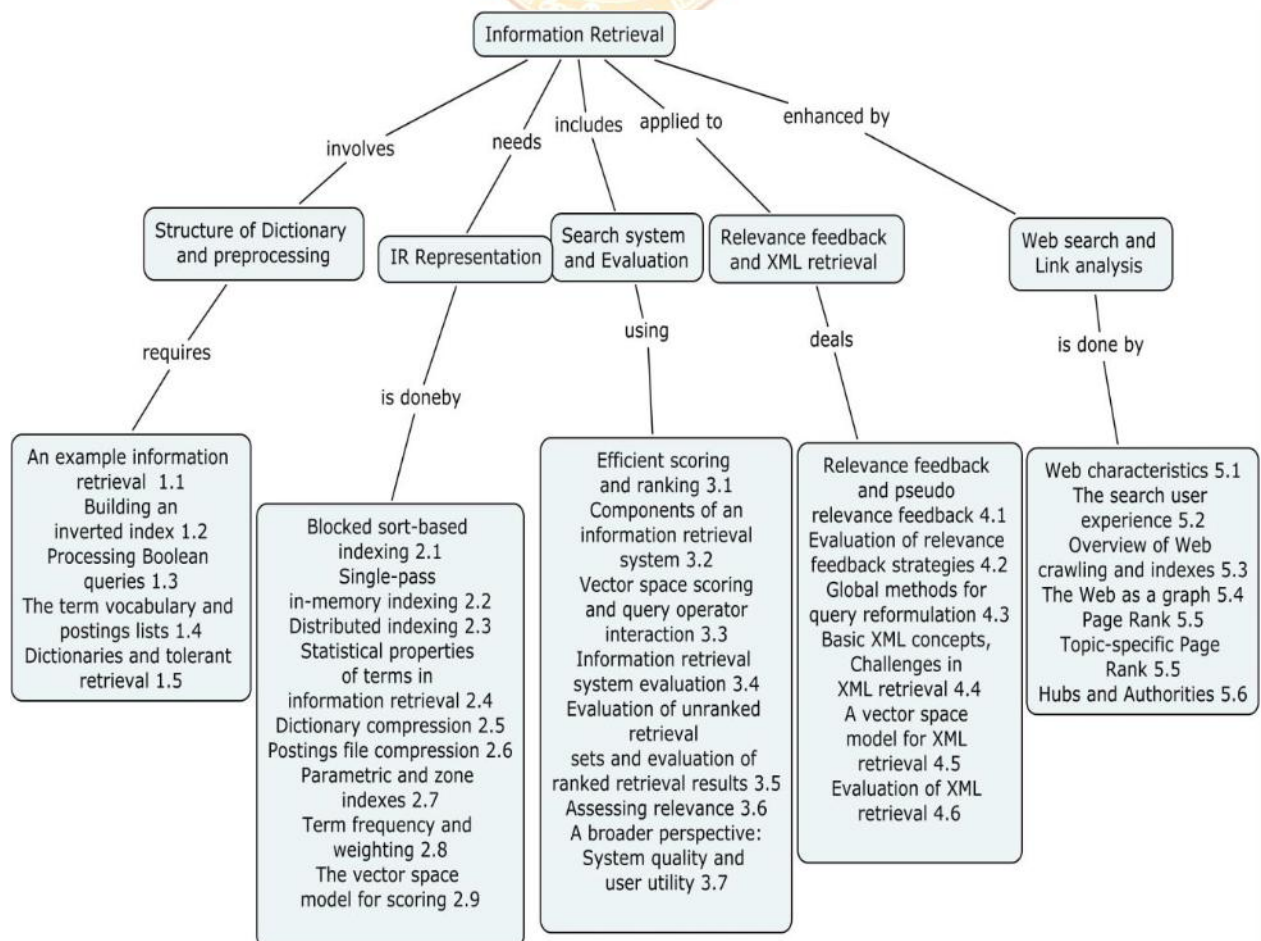
1. Explain how the random surfer moves about the web.
2. Find differences between meta crawler and meta searcher.
3. Why is page ranking relevant for web search?
4. Describe how the random surfer can be modelled as an ergodic Markov chain, and how this leads to the PageRank values being calculated as the principal left eigenvector of the transition probability matrix.
5. The figure below shows the output of two information retrieval systems on the same two queries in a competitive evaluation. The top 15 ranks are shown. Crosses correspond to a document which has been judged relevant by a human judge;

dashes correspond to irrelevant documents. There are no relevant documents in lower ranks.

System 1			System 2		
Rank	Q1	Q2	Rank	Q1	Q2
1	–	X	1	X	X
2	X	–	2	X	–
3	X	–	3	X	–
4	X	–	4	–	X
5	–	–	5	X	X
6	–	–	6	X	–
7	–	–	7	–	–
8	X	–	8	–	–
9	X	–	9	–	–
10	X	–	10	–	–
11	X	–	11	X	–
12	–	–	12	X	–
13	–	X	13	–	–
14	–	X	14	–	–
15	X	–	15	X	–

- a) Explicate the following evaluation metrics and give results for query Q1 for both systems.
  - (i) Precision at rank 10.
  - (ii) Recall at precision
- (b) The metrics in part (a) above are not adequate measures of system performance for arbitrary queries. Why not? What other disadvantages do these metrics have?
6. Bring out a comparison chart when relevance feedback and pseudo relevance feedback is applied to document retrieval.
7. Analyze the page ranking algorithms used by any one of the popular search engines.

### Concept Map



## Syllabus

**Structure of Dictionary and preprocessing:** An example information retrieval problem , Processing Boolean queries, the extended Boolean model versus ranked retrieval, document delineation and character sequence decoding, obtaining the character sequence in a document determining the vocabulary of terms, tokenization, normalization, Stemming and lemmatization , search structures for dictionaries, general wildcard queries-gram indexes for wildcard queries, k-gram indexes for spelling correction, faster postings list intersection via skip pointers ,positional postings and phrase queries. **IR Representation** : hardware basics, blocked sort-based indexing ,single-pass in-memory indexing, distributed indexing, dynamic indexing, statistical properties of terms in information retrieval, heaps' law, Zipf's law, dictionary compression, parametric and zone indexes, weighted zone scoring, learning weights, term frequency and weighting, inverse document frequency, Tf-idf weighting, the vector space model for scoring. Variant tf-idf functions. **Search system and Evaluation:** efficient scoring and ranking ,inexact top K document retrieval, index elimination ,champion lists ,static quality scores and ordering, components of an information retrieval system ,tiered indexes, query-term proximity. Information retrieval system evaluation, standard test collections, evaluation of unranked retrieval sets, evaluation of ranked retrieval results, assessing relevance, a broader perspective: System quality and user utility, system issues. **Relevance feedback and XML retrieval:** Relevance feedback and pseudo relevance feedback ,the Rocchio algorithm for relevance feedback ,probabilistic relevance feedback ,relevance feedback on the web, evaluation of relevance feedback strategies, basic XML concepts, challenges in XML retrieval, a vector space model for XML retrieval, evaluation of XML retrieval, text-centric vs. data-centric XML retrieval **Web search and Link analysis:** Web search basics, web characteristics, the web graph, the search user experience, web crawling and indexes, features a crawler must provide, features a crawler should provide, crawler architecture, the Web as a graph, anchor text and the web graph, Page Rank, the Page Rank computation, topic-specific Page Rank, hubs and authorities.

## Reference Books

1. Christopher D.Manning, Prabhakar Raghavan and Hinrich Schütze, "An Introduction to Information Retrieval", Cambridge University Press Cambridge, England,2009.
2. David A. Grossman, Ophir Frieder, "Information Retrieval: Algorithms and Heuristics , Springer (2nd Edition), 2004

## Course Contents and Lecture Schedule

Module No	Topic	No of Lectures
<b>1.</b>	<b>Structure of Dictionary and preprocessing</b>	
1.1	An example information retrieval problem	1
1.2	Building an inverted index	1
1.3	Processing Boolean queries	1
1.4	The term vocabulary and postings lists	1
1.5	Dictionaries and tolerant retrieval	1
<b>2.</b>	<b>IR Representation</b>	
2.1	Blocked sort-based indexing	1
2.2	Single-pass in-memory indexing	1
2.3	Distributed indexing	1
2.4	Statistical properties of terms in information retrieval	1
2.5	Dictionary compression	1

2.6	Postings file compression	1
2.7	Parametric and zone indexes	1
2.8	Term frequency and weighting	1
2.9	The vector space model for scoring	1
<b>3.</b>	<b>Search system and Evaluation</b>	
3.1	Efficient scoring and ranking	1
3.2	Components of an information retrieval system	1
3.3	Vector space scoring and query operator interaction	1
3.4	Information retrieval system evaluation	1
3.5	Evaluation of unranked retrieval sets and evaluation of ranked retrieval results	1
3.6	Assessing relevance	1
3.7	A broader perspective: System quality and user utility	1
<b>4.</b>	<b>Relevance feedback and XML retrieval</b>	
4.1	Relevance feedback and pseudo relevance feedback	1
4.2	Evaluation of relevance feedback strategies	2
4.3	Global methods for query reformulation	1
4.4	Basic XML concepts, Challenges in XML retrieval	1
4.5	A vector space model for XML retrieval	1
4.6	Evaluation of XML retrieval	1
<b>5.</b>	<b>Web search and Link analysis</b>	
5.1	Web characteristics	1
5.2	The search user experience	1
5.3	Overview of Web crawling and indexes	1
5.4	The Web as a graph	1
5.5	Page Rank	1
5.6	Topic-specific Page Rank	2
5.7	Hubs and Authorities	1
	<b>Total</b>	<b>36</b>

**Course Designers:**

Dr. S. Vijayalakshmi  
Mrs. D. Anitha

[svlcse@tce.edu](mailto:svlcse@tce.edu)  
[anithad@tce.edu](mailto:anithad@tce.edu)

**14CAPE0 WIRELESS AD HOC NETWORKS**

Category	L	T	P	Credit
PE	3	0	0	3

**Preamble**

The course aims at exploring the concepts of wireless networks, protocols, architectures and applications.

**Prerequisite**

- 14CA330 : Computer Networks
- 14CA230 : Design and Analysis of Algorithms

**Course Outcomes**

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

- CO1:** Define the basic principles of wireless ad hoc networks. Remember
- CO2:** Describe the different issues and working concepts of wireless Ad hoc networks based on different layers. Understand
- CO3:** An ability to apply different algorithms and techniques based on the layer wise problem solving. Apply
- CO4:** Ability to analyze the better problem solving approaches based on the layer wise issues. Analyze
- CO5:** Evaluate the overall efficiency of the ad hoc network using any layer based algorithms and techniques. Evaluate

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	L	L	S	M	L	L	L	L
CO2	S	L	L	S	M	L	L	L	L
CO3	S	S	S	S	L	L	L	M	L
CO4	S	S	S	S	L	L	L	M	L
CO5	S	S	S	S	L	L	L	M	L

S- Strong; M-Medium; L-Low



**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	10	10
Understand	30	20	10	10
Apply	0	10	10	10
Analyse	50	50	60	60
Evaluate	0	0	10	10
Create	0	0	0	0

**Course Level Assessment Questions****Define the basic principles of wireless ad hoc networks (CO1):**

1. List the three important radio propagation phenomena at high frequencies.
2. Identify and list the limitation of Table driven routing protocols.
3. State the advantages of TORA.
4. Define confidentiality.
5. State the different classifications of energy management schemes.

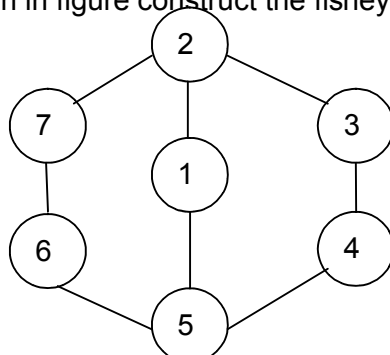
Describe the different issues and working concepts of

**wireless Ad hoc networks based on different layers. (CO2):**

1. Summarize the different issues in Ad hoc wireless networks.
2. Explain the RTS –CTS Mechanism involved in CSMA/CA.
3. Explain the concept of location aided routing.
4. Explain the working of source initiated protocols.
5. Explain the concept of security aware AODV protocol.

**An ability to apply different algorithms and techniques based on the layer wise problem solving. (CO3)**

1. Assume that when the current size of congestion window is 48 KB, the TCP sender experiences a timeout. What will be the congestion window size if the next three transmission bursts are successful? Assume that MSS is 1 KB. Consider TCP Tahoe and TCP Reno.
2. For the network shown in figure construct the fisheye routing table for nodes 7 and 5.



3. Calculate the probability of a path break for an eight-hop path, given that the probability of line break is 0.2.
4. In a military vehicular ad hoc wireless network using PRTMAC, formed by 500 nodes distributed uniformly in a battlefield area of 1000 m x 1000 m, calculate the number of

nodes contending for the data channel and for control channel. The transmission range of data channel is 250 m.

5. In a military vehicular ad hoc wireless network using PRTMAC, formed by 500 nodes distributed uniformly in a battlefield area of 1000 m x 1000 m, calculate the number of nodes contending for the data channel and for control channel. The transmission range of data channel is 250 m. Also find the probability that a beacon gets collided, when the beacons are generated periodically with a period of 10 seconds. Assume the beacon length to be equal to 1 ms.

Ability to analyze the better problem solving approaches based on the layer wise issues  
(CO4):

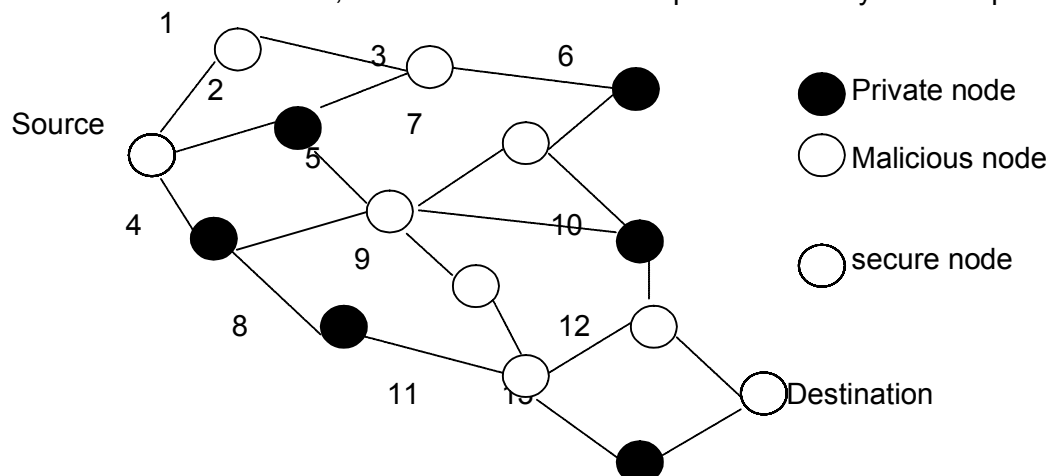
1. Compare the different TCP solutions for Ad hoc wireless networks.
2. Examine the different phases of Associativity- Based Ad hoc Multicast routing.
3. Compare the various secure routing methods used in Ad hoc networks.
4. Examine the system power management schemes.
5. With A neat block diagram explain the concept of INSIGNIA Qos framework.

Evaluate the overall efficiency of the ad hoc network using any layer based algorithms and techniques. (CO5)

1. Nodes A and B want to establish a secure communication, and node A generates a random key 11001001. Suppose the functions used by both the nodes A and B for encryption is XOR, and let node A generate a random transport key 10010101 and let node B generate 00101011. Sketch the three pass Shamir protocol exchanges.

2. Predict the possible steps of the algorithms executed at the source and the intermediate nodes of an ad hoc wireless network that follow the following strategies: a) random energy b) pay-for-it strategy. Assume a session between source s and destination d. let  $R(s,d)$  be the set containing available routes between s and d,  $\text{sympathy}(k,r)$  be the kth node in route r, and  $\text{credit}(k,r)$  and  $\text{debit}(k,r)$  be the credit and debit of kth node in route r respectively.

3. Mark the paths chosen by the following secure-routing protocols for the network topology shown in figure: a) Shortest path routing and b) SAR protocol. Assume that node 2 is secure node. C) If node 2 (which lies in the path chosen by SAR protocol) is suddenly attacked and becomes a malicious node, then mark an alternative path chosen by SAODV protocol.

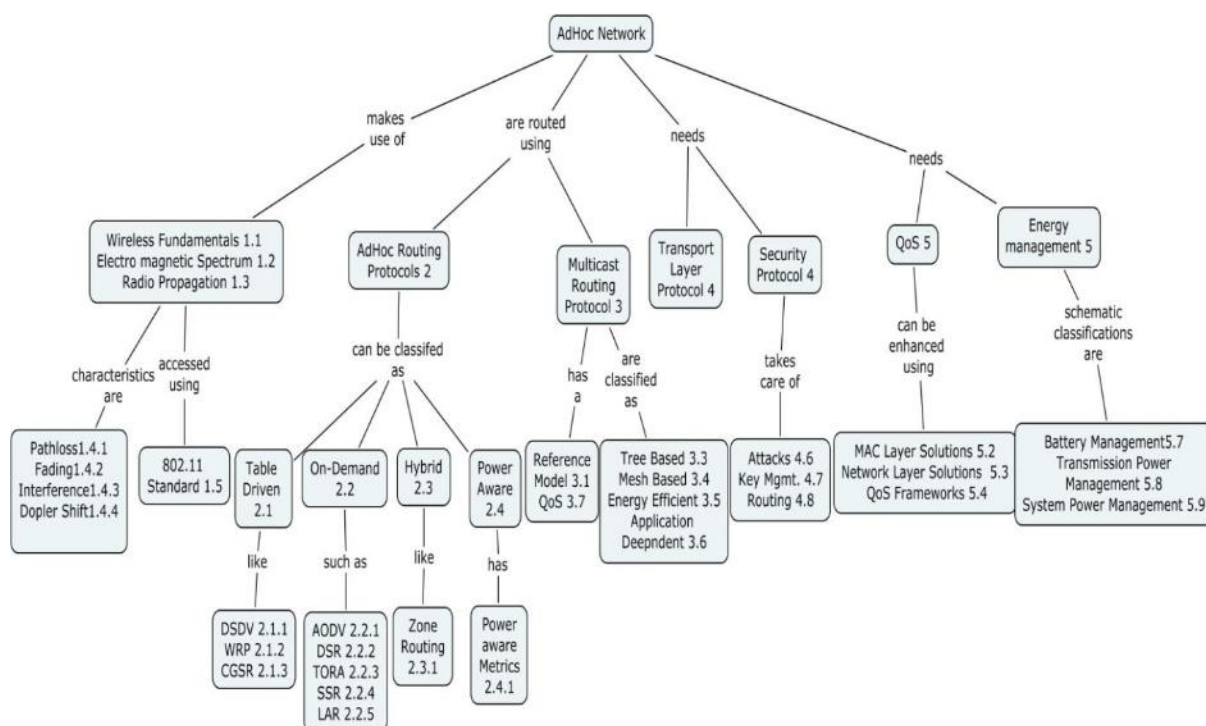




4. Estimate the approximate control overhead for the ODMRP protocol over a 200 second time period. Assume that all nodes are stationary. Number of nodes: 50 . Time period for sending a JoinReq : 2 secs.

5. Estimate the approximate control overhead for the DCMP protocol over a 200 second time period. Assume that all nodes are stationary. S1 is a active source and S2 is a passive source. Number of nodes: 50 . Time period for sending a JoinReq : 2 secs.

## Concept Map



## Syllabus

**Introduction:** Introduction-Fundamentals of Wireless Communication Technology - The Electromagnetic Spectrum - Radio Propagation Mechanisms - Characteristics of the Wireless Channel - IEEE 802.11 Standard.

**Ad Hoc Routing Protocols:** Issues and Challenges - Classifications of Routing Protocols- Table-Driven Routing Protocols - On-Demand Routing Protocols – Hybrid Routing Protocols- Power-Aware Routing (PAR).

**Multicast routing In Ad Hoc Networks:** An Architecture Reference Model for Multicast Routing Protocols -Classifications of Multicast Routing Protocols- Tree-Based Multicast Routing Protocols- Mesh-Based Multicast Routing Protocols-Energy-Efficient Multicasting - Multicasting with Quality of Service Guarantees – Application-Dependent Multicast Routing

**Transport Layer, Security Protocols:** Designing a Transport Layer Protocol - Design Goals of a Transport Layer Protocol -Classification of Transport Layer Solutions - TCPOver Ad Hoc Wireless Networks -Other Transport Layer Protocols - Security Requirements - Issues and

Challenges in Security Provisioning - Network Security Attacks - Key Management - Secure Routing

**Qos and Energy Management:** Classifications of QoS Solutions - MAC Layer Solutions- Network Layer Solutions - QoS Frameworks for Ad Hoc Wireless Networks  
Energy Management in Ad Hoc Wireless Networks –Introduction - Need for Energy Management in Ad Hoc Wireless Networks - Classification of Energy Management Schemes - Battery Management Schemes - Transmission Power Management Schemes - System Power Management Schemes.

### Reference Books

1. C. Siva Ram Murthy and B.S. Manoj “Ad Hoc Wireless Networks: Architectures and Protocols”, Pearson education, 2008.
2. Charles E. Perkins, Ad Hoc Networking, Addison Wesley, 2000.
3. William Stallings, “Wireless Communications and Networks”, Pearson education, 2003
4. J. Schiller, “Mobile Communications”, Pearson education, 2003
5. Vijay K. Garg, “Wireless Communications and Networking”, Elsevier, 2008.

### Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
1	AdHoc Networks Introduction	
1.1	Fundamentals of Wireless Communication	1
1.2	The Electromagnetic Spectrum	1
1.3	Radio Propagation Mechanisms	1
1.4	Characteristics of the Wireless Channel	1
1.5	IEEE 802.11 Standard	1
2	Ad Hoc Routing Protocols	
2.0	Issues and Challenges	1
2.1	Table-Driven Routing Protocols	1
2.2	On Demand Routing Protocols	1
2.3	Hybrid Routing Protocols	1
2.4	Power-Aware Routing	1
3	Multicast routing In Ad Hoc Networks	
3.1	An Architecture Reference Model for Multicast Routing Protocols	1
3.2	Classifications of Multicast Routing Protocols	1
3.3	Tree-Based Multicast Routing Protocols	1
3.4	Mesh-Based Multicast Routing Protocols	1
3.5	Energy Efficient Routing Protocols	1
3.6	Application Dependent Protocols	1
3.7	Multicasting with QoS Gurantee	1
4	Transport Layer, Security Protocols	
4.1	Designing a Transport Layer Protocol	1
4.2	Design Goals of a Transport Layer Protocol	1
4.3	TCP Over Ad Hoc Wireless Networks	1
4.4	Other Transport Layer Protocols	1
4.5	Security Requirements - Issues and Challenges in Security Provisioning	1
4.6	Network Security Attacks	1

4.7	Key Management	1
4.8	Secure Routing	1
5	Qos and Energy Management	
5.1	Classifications of QoS Solutions	1
5.2	MAC Layer Solutions	1
5.3	Network Layer Solutions	1
5.4	QoS Frameworks	1
5.5	Energy Management	1
5.6	Classification of Energy Management Schemes -	1
5.7	Battery Management Schemes -	1
5.8	Transmission Power Management Scheme	1
5.9	System Power Management Schemes	1
5.10	Case Study	1
	Total	36

### Course Designers:

Mr. R. Saravanan

[rsncse@tce.edu](mailto:rsncse@tce.edu)

Dr. A. John Sanjeev Kumar

[ajscse@tce.edu](mailto:ajscse@tce.edu)



**14CAPF0****SUPPLY CHAIN MANAGEMENT**

Category	L	T	P	Credit
PE	3	0	0	3

**Preamble**

Students will learn the basic concepts in supply chain management (SCM) and its related technologies to design an integrated software solution for manufacturing industries.

**Prerequisite**

- None

**Course Outcomes**

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

<b>CO1:</b> Understand what a supply chain is and its importance.	Understand
<b>CO2:</b> Understand the different phases in supply chain.	Understand
<b>CO3:</b> Identify the drivers of supply chain performance.	Analyze
<b>CO4:</b> Overview the supply chain models and its systems.	Apply

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	S	S	M	S	-	S	M	S	S
<b>CO2</b>	M	M	S	-	M	M	S	S	-
<b>CO3</b>	S	S	-	S	S	S	M	S	S
<b>CO4</b>	-	M	S	S	S	M	S	S	S

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	10	10	10
Understand	30	30	30	20
Apply	40	40	40	40
Analyse	10	20	20	30
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions**

Understand what a supply chain is and its importance (CO1):

1. Define supply chain.
2. What are the objectives of supply chain?
3. Identify the three key supply chain decision phases.
4. What types of distribution networks are typically best suited for commodity items?
5. Give example of products that displays seasonality of demand.
6. What is the difference between lot size-based and volume-based quantity discounts?
7. When are quantity discounts justified in supply chain.

Understand the different phases in supply chain (CO2):

1. Describe the cycle and push/pull view of a supply chain.
2. Explain why achieving strategic fit is critical to a company's overall success.
3. How do you understand the role of network design decision in a supply chain?
4. What are the major cost categories needed as input for aggregate planning?
5. What are the operational parameters to identify in aggregate plan?

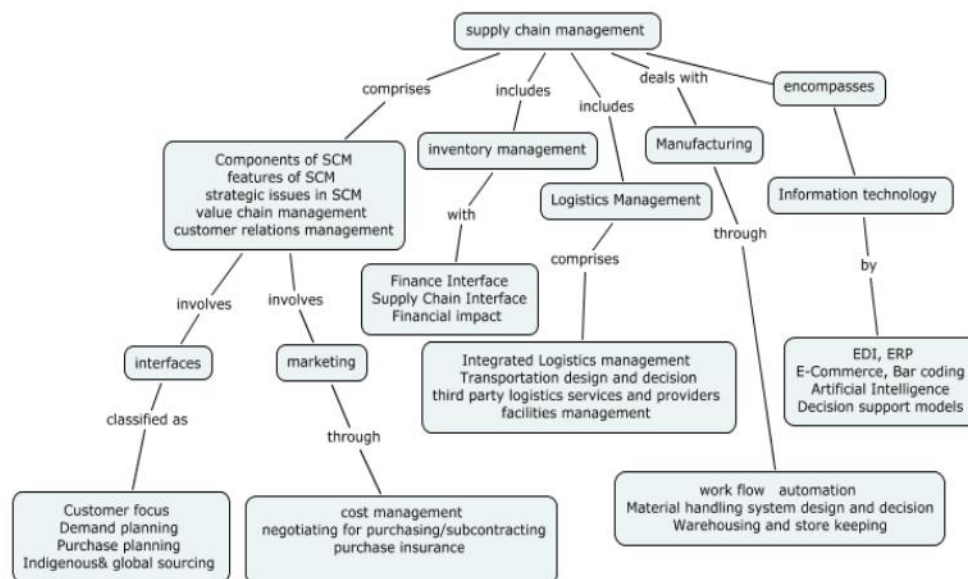
Identify the drivers of supply chain performance (CO3):

1. Define and apply the key metrics that track the performance of the supply chain in terms of each driver.
2. Is e-business likely to be more beneficial in the early part or the mature part of a product's life cycle? Why?
3. Develop a framework for making network design decisions.
4. A super market has experienced weekly demand of milk of 120,127,114 and 122 gallons over the last four weeks. Forecast demand for period 5 using a four –period moving average. What is the forecast error if demand in period 5 turns out to be 125 gallons.
5. Identify the managerial levers that reduce lot size and cycle inventory in a supply chain without increasing cost.

Overview the supply chain models and its systems (CO4):

1. Analyze the major drivers of supply chain performance.
2. How do static and adaptive forecasting methods differ?
3. Demand for the Deskpro computer at best buy is 1000 units per month. Best buy incurs a fixed order placement, transportation, and receiving cost of \$4000 each time an order is placed. Each computer cost best buy \$500 and the retailer has a holding cost of 20 percent. Evaluate the no of computers that the store manager should order in each replenishment lot.
4. Discuss key drivers that may be used to tailor transportation. How does tailoring help?
5. Discuss why the high-tech industry has been the leader in adopting supply chain IT systems.

### Concept Map



### Syllabus

**Introduction to supply chain management (SCM)** – concept of SCM – Components of SCM, an overview – features of SCM – strategic issues in SCM – Systems View - SCM current scenario – value chain management and customer relations management. **Marketing and Supply Chain Interface** – Customer focus in SCM – Demand planning Purchase planning – Make or Buy decision – Indigenous and global sourcing – Development and management of suppliers – legal aspects of buying – cost management – negotiating for purchasing/subcontracting – purchase insurance – evaluation of purchase performance (performance indices) **Inventory management**- Finance and Supply Chain Interface. Financial impact of inventory. **Manufacturing scheduling** – Manufacturing flow system – work flow automation – Flexibility in manufacturing to achieve dynamic optimization. Material handling system design and decision. Warehousing and store keeping – strategies of warehousing and storekeeping – space management. **Logistics management** – Role of logistics in SCM – Integrated Logistics management – transportation design and decision – multi modalism – third party logistics services and providers – facilities management (port/airport.ICD's) channels of distribution – logistics and customer service. **Information technology and SCM** – EDI, ERP, Internet and Intranet, E-Commerce, Bar coding, Telecommunication Network, Advanced planning system, Decision support models for Supply Chain Management, Artificial Intelligence for SCM- Best practice in supply chain management – organizational issues to implement SCM.

### Text Book

1. Chopra, S, and P. Meindl, "Supply Chain Management: Strategy, Planning and Operation", 2nd edition, Pearson Education, 2010.

### Reference Books

1. David Simchi-Levi, Philip Kaminsky, and Edith Simchi-Levi, "Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies", McGraw-Hill, New York, 2009.

### Course Contents and Lecture Schedule

Module .No	Topics	No.of Lectures
1	<b>Introduction to supply chain management (SCM)</b>	1
1.1	concept of SCM – Components of SCM, an overview	1
1.2	features of SCM	1
1.3	strategic issues in SCM, Systems View	1
1.4	SCM current scenario	1
1.5	value chain management and customer relations management	1
2	<b>Marketing and Supply Chain Interface</b>	
2.1	Customer focus in SCM , Demand planning, Purchase planning	1
2.2	Make or Buy decision	1
2.3	Indigenous and global sourcing	1



2.4	Development and management of suppliers – legal aspects of buying	2
2.5	cost management, negotiating for purchasing/subcontracting	1
2.6	purchase insurance – evaluation of purchase performance (performance indices)	1
3	<b>Inventory management-</b> Finance and Supply Chain Interface.	1
3.1	Financial impact of inventory	1
3.2	<b>Manufacturing scheduling</b> – Manufacturing flow	1
3.3	System, work flow automation	1
3.4	Flexibility in manufacturing to achieve dynamic optimization.	1
3.5	Material handling system design and decision.	1
3.6	Warehousing and store keeping.	1
3.7	strategies of warehousing and storekeeping	2
3.8	space management	1
4	<b>Logistics management</b>	
4.1	Role of logistics in SCM	1
4.2	Integrated Logistics management	1
4.3	Transportation design and decision, multi modalism	1
4.4	third party logistics services and providers	1
4.5	facilities management (port/airport.ICD's)	1
4.6	Channels of distribution, logistics and customer service.	1
5	<b>Information technology and SCM</b>	1
5.1	EDI, ERP, Internet and Intranet	1
5.2	E-Commerce, Bar coding	1
5.3	Telecommunication Network, Advanced planning system	1
5.4	Decision support models for Supply Chain Management	1
5.5	Best practice in supply chain management	1
5.6	Organizational issues to implement SCM.	1
	Total	36

#### Course Designers

Dr. S. Parthasarathy                      spcse@tce.edu

Mr. T. Chandrakumar                      tckcse@tce.edu

BOS meeting approved: 19-11-2014

Approved in 49<sup>th</sup> Academic Council Meeting on 04-12-2014

**14CAPG0****MANAGERIAL ECONOMICS**

Category	L	T	P	Credit
PE	3	0	0	3

**Preamble**

To familiarize the students with concepts & analytical tools in Managerial Economics, applied in a variety of day-to-day business situations

**Prerequisite**

- None

**Course Outcomes**

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

- |  |         |
|--|---------|
| <b>CO1:</b> Compute the relevant costs of any decision.  | Apply   |
| <b>CO2:</b> Use marginal analysis to make extent(how much) decisions.                                      | Analyze |
| <b>CO3:</b> Make investment decisions that increase firm value, Set optimal prices and price discriminate. | Apply   |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	M	S	S	S	M	S	S
CO2	M	-	S	S	M	-	S	S	S
CO3	S	S	-	-	S	S	-	S	-

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	20	20
Understand	20	20	20	20
Apply	60	60	60	40
Analyse	0	0	0	20
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions**

Get an understanding to compute the relevant costs of any decision (CO1):

1. What is Managerial Economics?
2. Elucidate on the characteristics and scope of managerial economics
3. What is monopoly
4. list the various types of Demand
5. Define Break even analysis.

Am understanding to Use marginal analysis to make extent(how much) decisions(CO2):

1. Using relevant examples, explain the distinction between macroeconomics and
2. Microeconomics
3. When effort and productivity are not directly observable, it is more likely that a firm will be charged with discrimination
4. Why do economies of scale affect the horizontal boundaries of an organization?

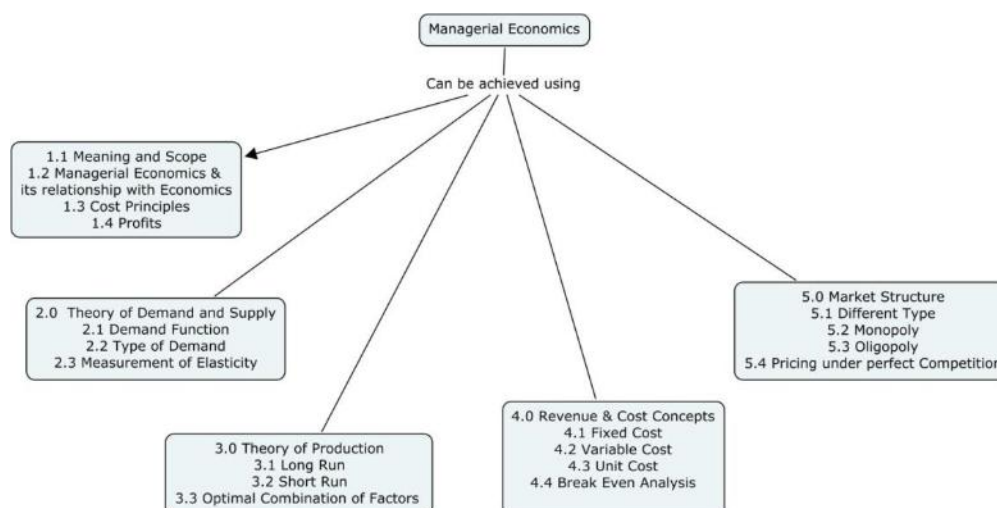


### 5. Why Production function is needed in long run?

Make investment decisions that increase firm value, Set optimal prices and price discriminate (CO3):

1. “Managerial economics uses less than completely realistic models.” Is this necessarily bad?
2. What is the own price elasticity when  $P_x$  is Rs150: Is the demand elastic or In-elastic?
3. What will happen to the revenue if we were to increase the price?
4. Apply Elasticity of Demand for Business Applications.

### Concept Map



### Syllabus

**Meaning and scope of Managerial Economics:** Managerial Economics & its relationship with Economics - Fundamental Concepts; Opportunity, Cost Principle – Equi-marginal Principle - Marginal & Incremental Principle - Discounting Principle – Economic Profit & Accounting Profit. **Theory of Demand & Supply:** Law of Demand – Demand Function- Demand Curves -Types of Demand - Elasticity of Demand – Measurement of Elasticity- Business applications – Law of Supply – Elasticity of Supply. **Theory of Production:** Production Function; Short run & Long run – Optimal Combination of Factors of Production. **Revenue & Cost Concepts:** Fixed Costs – Variable Costs - Unit Costs - Cost Curves - Decision Making Costs – Break Even Analysis. **Market Structure:** Different types of Markets – Pricing under Perfect Competition, Monopoly, Monopolistic competition and Oligopoly.

### Text Book

1. G.S. Gupta, “Managerial Economics”, Tata Mc Graw-Hill, 2010

### Reference Books

1. Joel Dean, “Managerial Economics”, PHI.2, 2009.
2. Varshiney, R.L. & : Managerial Economics, S. Chand & Son, 2008.
3. Maheshwari. K.I. Mote, Paul & Gupta, Managerial Economics, Tata Mc-Graw Hill, 2010
4. Koutsoiannis. A, Modern Micro Economics, Mc-Millan., 2010

### Course Contents and Lecture Schedule

<b>Module. No</b>	<b>Topics</b>	<b>No.of Lectures</b>
1.1	<b>Meaning and scope of Managerial Economics</b>	1
1.2	Managerial Economics & its relationship with Economics	2
1.3	Fundamental Concepts, Opportunity	2
1.4	Cost Principle – Equi-marginal Principle	1
1.5	Marginal & Incremental Principle - Discounting Principle	1
1.6	Economic Profit & Accounting Profit	1
2.1	<b>Theory of Demand &amp; Supply:</b> Law of Demand	1
2.2	Demand Function- Demand Curves	2
2.3	Types of Demand - Elasticity of Demand	2
2.4	Measurement of Elasticity	1
2.5	Business applications –	2
2.6	Law of Supply – Elasticity of Supply	2
3.1	<b>Theory of Production:</b> Production Function	1
3.2	Short run & Long run, Optimal Combination of Factors of Production.	1
4.1	<b>Revenue &amp; Cost Concepts:</b> Fixed Costs	1
4.2	Variable Costs - Unit Costs -	1
4.3	Cost Curves	1
4.4	Decision Making Costs	1
4.5	Break Even Analysis	2
4.6	Case Study	1
5.1	<b>Market Structure:</b> Different types of Markets	1
5.2	Different types of Markets	2
5.3	Pricing under Perfect Competition	1
5.4	Monopoly,	1
5.5	Monopolistic competition and Oligopoly	1
5.6	Case Study	2
	Total	36

#### Course Designers

Dr. S. Parthasarathy

spcse@tce.edu

T.Chandrakumar

tckcse@tce.edu

**14CAPH0 SOFTWARE ARCHITECTURE**

Category	L	T	P	Credit
PE	3	0	0	3

**Preamble**

This course aims at facilitating the students to introduce Software Architecture and understand various architectural styles and able to design an architecture for software product.

**Prerequisite**

- 14CA340 : Software Engineering

**Course Outcomes**

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

<b>CO1:</b> Understand the idea of Software Architecture	Remember & Understand
<b>CO2:</b> Develop an Architectural design from data	Apply & Analyze
<b>CO3:</b> Design a Software Architecture for an User Interface	Apply & Analyze

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	S	L	-	-	-	-	-	-	-
<b>CO2</b>	-	S	S	L	L	-	M	M	-
<b>CO3</b>	-	S	S	S	L	-	L	S	-

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	20	20
Understand	30	30	20	20
Apply	30	30	30	30
Analyze	20	20	30	30
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions****Understand the idea of Software Architecture (CO1):**

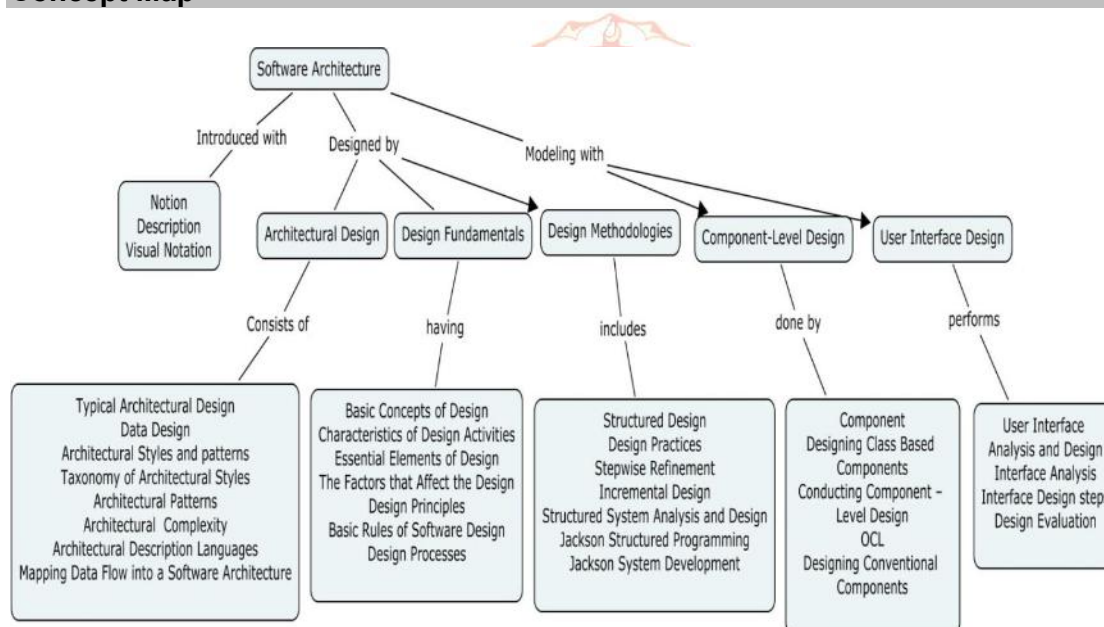
1. What are the notions of software architecture?
2. Give an example for a visual notation
3. List down the architectural complexities ?
4. Discuss about the different types of architectural styles and patterns?
5. Explain on how to map data flow into a software architecture?

**Develop an Architectural design from data (CO2):**

1. Using a DFD and a processing narrative, describe a computer based system that has distinct transform flow characteristics. Define flow boundaries and map the DFD into a software architecture?
2. Apply Stepwise refinement for an architectural design?
3. Apply different types of basic design principles for an architectural design?

**Design Software Architecture for a User Interface (CO3):**

1. Apply different types of Interface analysis for an application?
2. Analyze the user and task involved in an Interface?
3. Analyze the role of interfaces in a class based component-level design?

**Concept Map****Syllabus**

**Introduction To Architecture:** Notion of Software Architecture - Description of Software Architecture –Visual Notation – Examples **Architectural Design :** Typical Architectural Design – Data Design - Architectural Styles and patterns – Taxonomy of Architectural Styles - Architectural Patterns - Architectural Complexity - Architectural Description Languages - Mapping Data Flow into a Software Architecture **Design Fundamentals:** Basic Concepts of Design – Characteristics of Design Activities – Essential Elements of Design – The Factors that Affect the Design – Design Principles - Basic Rules of Software Design – Design Processes **Design Methodologies :** Structured Design – Design Practices – Stepwise Refinement – Incremental Design – Structured System Analysis and Design – Jackson Structured Programming – Jackson System Development **Modeling Component – Level Design :** Component-Designing Class Based Components – Conducting Component – Level Design – OCL –Designing Conventional Components **User Interface Design :** User Interface Analysis and Design – Interface Analysis – Interface Design steps – Design Evaluation.

**Text Book**

1. Len Bass, Paul Clements, and Rick Kazman, "Software Architecture in Practice", 2nd Ed. Addison-Wesley Longman, Inc., Reading, MA, 2009.

**Reference Books**

1. Jacobson, Ivar, Griss, Martin, Jonsson, and Patrik, "Software Reuse, Architecture, Process and Organization for Business Success", Addison-Wesley Longman, Inc., Harlow, UK, 2008.
2. Hong Zhu, "Software Design Methodology From Principles to Architectural Styles", Elsevier, 2005.
3. David Budgen, "Software Design", Second Edition, Pearson Education, 2004.
4. Mary Shaw David Garlan, "Software Architectural Perspectives on an emerging discipline ", EEE, PHI 1996.
5. John Robinson, "Software Design for Engineers and Scientists", Newnes, 2004.
6. R. S. Pressman, "Software Engineering", Sixth Edition, McGraw Hill Inc., 2005.
7. A. G. Sutcliffe, "Human Computer Interface Design", Second Edition Macmillan, 1995.

**Course Contents and Lecture Schedule**

S.No	Topics	No. of Lectures
1	<b>Introduction To Architecture</b>	
1.1	Notion of Software Architecture	1
1.2	Description of Software Architecture	1
1.3	Visual Notation- Examples	1
2	<b>Architectural Design</b>	
2.1	Typical Architectural Design	1
2.2	Data Design	1
2.3	Architectural Styles and patterns	1
2.4	Taxonomy of Architectural Styles	1
2.5	Architectural Patterns	1
2.6	Architectural Complexity	1
2.7	Architectural Description Languages	1
2.8	Mapping Data Flow into a Software Architecture	1
3	<b>Design Fundamentals</b>	
3.1	Basic Concepts of Design	1
3.2	Characteristics of Design Activities	1

3.3	Essential Elements of Design	1
3.4	The Factors that Affect the Design	1
3.5	Design Principles	1
3.6	Basic Rules of Software Design	1
3.7	Design Processes	1
4	<b>Design Methodologies</b>	
4.1	Structured Design	1
4.2	Design Practices	2
4.3	Stepwise Refinement	1
4.4	Incremental Design	1
4.5	Structured System Analysis and Design	1
4.6	Jackson Structured Programming	1
4.7	Jackson System Development	1
5	<b>Modeling Component – Level Design</b>	
5.1	Component	1
5.2	Designing Class Based Components	2
5.3	Conducting Component – Level Design	1
5.4	OCL	1
5.5	Designing Conventional Components	1
6	<b>User Interface Design</b>	
6.1	User Interface Analysis and Design	1
6.2	Interface Analysis	1
6.3	Interface Design steps	1
6.4	Design Evaluation	1
	<b>Total</b>	<b>36</b>

**Course Designers:**

Mrs. K. Murugeswari                      kmcse@tce.edu

Dr. D. Jeya Mala                              djmcse@tce.edu

**14CAPK0 CLOUD COMPUTING**

Category	L	T	P	Credit
PE	2	1	0	3

**Preamble**

This course is aimed at introducing cloud computing ,the services offered by the cloud, building cloud networks, virtualization, distributed storage and security.

**Prerequisite**

- 14CA330 : Computer Networks

**Course Outcomes**

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

<b>CO1:</b> Understand the evolution of cloud computing and the web services offered	Remember & Understand
<b>CO2:</b> Describe the building of a cloud network	Remember & Understand
<b>CO3:</b> Discuss the challenges and issues in virtualization , cloud security and cloud storage	Analyze
<b>CO4:</b> Provide solutions for cloud security and storage	Analyze

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	S	L	-	-	-	-	-	-	-
<b>CO2</b>	-	S	S	L	L	-	M	M	-
<b>CO3</b>	-	S	S	S	L	-	L	S	-
<b>CO4</b>	-	S	S	S	L	-	L	S	-

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	30	20	20	20
Understand	30	30	20	20
Apply	40	50	60	60
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions**

**Understand the evolution of cloud computing and the web services offered (CO1):**

1. What are the key characteristics of cloud computing?
2. What is a cloud data center?
3. List the benefits of virtualization?
4. What is data foot print reduction?



**Describe the building of a cloud network (CO2):**

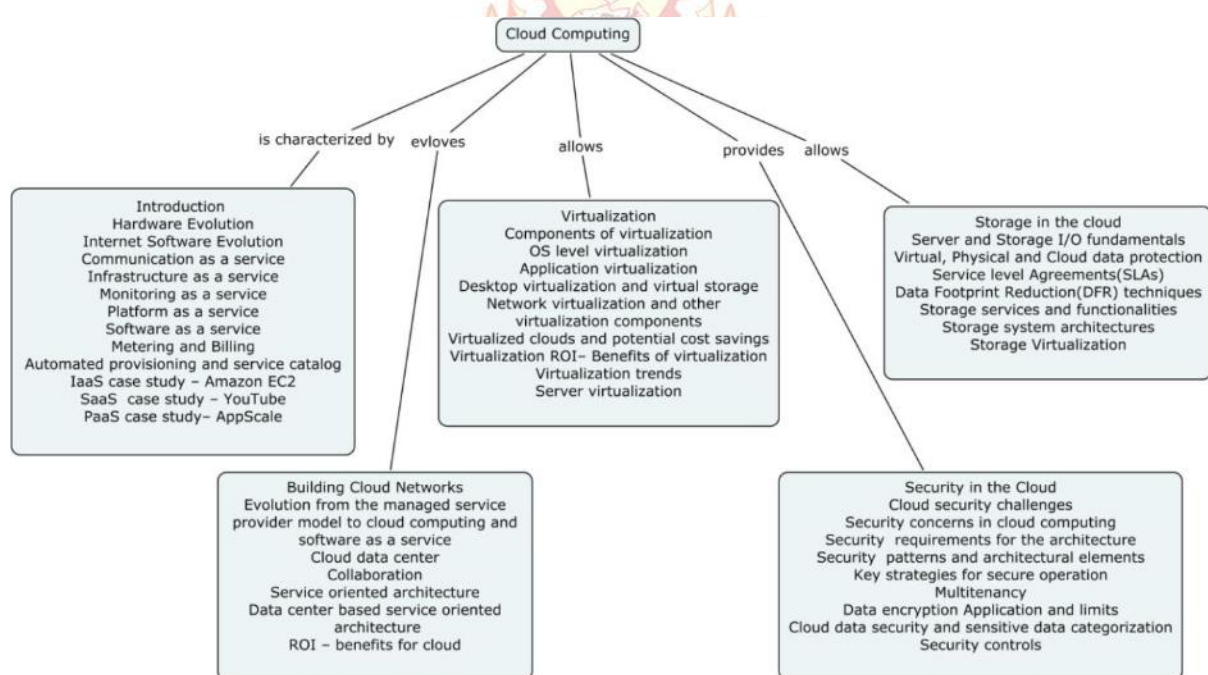
1. Describe in detail the web services delivered from the cloud?
2. Explain in detail about data center based service oriented architecture?
3. Explain how your company can build highly automated private cloud networks that can be managed from a single point?

**Discuss the challenges and issues in virtualization , cloud security and cloud storage (CO3):**

1. Consider Ubuntu virtual machine installed over a windows machine. Explain the SNAT and DNAT configuration that needs to be applied to enable the Ubuntu virtual machine communication with the Ubuntu virtual machine.
2. Discuss in detail the different types of virtualization?
3. What are the security challenges in cloud computing?

**Provide solutions for cloud security and storage (CO4):**

1. Explain sensitive data categorization to provide cloud data security?

**Concept Map****Syllabus**

**Introduction** - Hardware Evolution - Internet Software Evolution – Communication as a service – Infrastructure as a service – Monitoring as a service – Platform as a service – Software as a service – Metering and Billing – Automated provisioning and service catalog – IaaS case study – Amazon EC2 – SaaS case study – YouTube – PaaS case study – AppScale – **Building Cloud Networks** – Evolution from the managed service provider model to cloud computing and Software as a service - cloud data center – Collaboration - service oriented architecture – data center based service oriented architecture – ROI –



benefits for cloud – **Virtualization** – components of virtualization – OS level virtualization – Application virtualization – Desktop virtualization and virtual storage – Network virtualization and other virtualization components – virtualized clouds and potential cost savings – virtualization ROI – Benefits of virtualization – virtualization trends – Server virtualization – **Security in the Cloud** – Cloud security challenges – security concerns in cloud computing - security requirements for the architecture - security patterns and architectural elements – key strategies for secure operation – Multitenancy – Data encryption Application and limits – Cloud data security and sensitive data categorization- security controls – **Storage in the cloud** – Server and Storage I/O fundamentals – Virtual,physical and cloud data protection – Service level Agreements(SLAs) – Data Footprint Reduction(DFR) techniques – Storage services and functionalities – Storage system architectures – Storage Virtualization.

#### Reference Books

1. John Rittinghouse,James Ransome ,” Cloud Computing : Implementation, Management and Security”,CRC Press 2010.
2. Gail La Grouw, “ Getting to Cloud: Discovering New Business Opportunities with Cloud Computing”,Coded Vision Limited,2010.
3. Vi(J.R) Winkler,”Securing the Cloud: Cloud Computer Security Techniques and Tactics”,Elsevier 2011.
4. Greg Schulz,”Cloud and Virtual Data Storage Networking”,CRC Press 2012.

#### Course Contents and Lecture Schedule

Module No.	Topics	No.of Lectures
1	<b>Introduction</b>	
1.1	Hardware Evolution, Internet Software Evolution	1
1.2	Communication as a service, Infrastructure as a service	1
1.3	Monitoring as a service, Platform as a service	1
1.4	Software as a service	1
1.5	Metering and Billing	1
1.6	Automated provisioning and service catalog	1
1.7	IaaS case study – Amazon EC2	1
1.8	SaaS case study – YouTube	1
1.9	PaaS case study– AppScale	1
2	<b>Building Cloud Networks</b>	
2.1	Evolution from the managed service provider model to cloud computing and software as a service	1
2.2	Cloud data center, Collaboration	1
2.3	Service oriented architecture, Data center based service oriented architecture	1
2.4	ROI – benefits for cloud	1

3	<b>Virtualization</b>	
3.1	Components of virtualization	1
3.2	OS level virtualization	1
3.3	Application virtualization	1
3.4	Desktop virtualization and virtual storage	1
3.5	Network virtualization and other virtualization components	1
3.6	Virtualized clouds and potential cost savings	1
3.7	Virtualization ROI– Benefits of virtualization	1
3.8	Virtualization trends, Server virtualization	1
4	<b>Security in the Cloud</b>	
4.1	Cloud security challenges	1
4.2	Security concerns in cloud computing	1
4.3	Security requirements for the architecture	1
4.4	Security patterns and architectural elements	1
4.5	Key strategies for secure operation, Multitenancy	1
4.6	Data encryption Application and limits	1
4.7	Cloud data security and sensitive data categorization	1
4.8	Case Study	1
5	<b>Storage in the cloud</b>	
5.1	Server and Storage I/O fundamentals	1
5.2	Virtual, Physical and Cloud data protection	1
5.3	Service level Agreements(SLAs)	1
5.4	Data Footprint Reduction(DFR) techniques	1
5.5	Storage services and functionalities	1
5.6	Storage system architectures, Storage Virtualization	1
5.7	Case Study	1
	Total	36

**Course Designers:**

Mrs. K. Murugeswari

[kmcse@tce.edu](mailto:kmcse@tce.edu)

Mr. R. Saravanan

[rsncse@tce.edu](mailto:rsncse@tce.edu)

<b>14CA470</b>	<b>WEB TECHNOLOGIES LABORATORY</b>	Category	L	T	P	Credit
		PC	0	0	2	2

### Preamble

Enable the students to know techniques involved to support web site developments.

### Prerequisite

- 14CA180 : RDBMS Laboratory
- 14CA280 : Client / Server Application Laboratory
- 14CA370 : Internet and Java Programming Laboratory

### Course Outcomes

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

**CO1:** Understand the enabling technologies for building web based applications.

**CO2:** Understand the different techniques for developing client/server applications.

**CO3:** Apply the techniques and features of the web server / client development to construct a web application based on Internet

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	S	S	M	S	S	S	-	S	S
<b>CO2</b>	S	M	S	S	M	-	S	S	S
<b>CO3</b>	-	-	M	S	S	S	-	S	S

S- Strong; M-Medium; L-Low

### List of Experiments

#### I-Static HTML

1. Develop a static pages using HTML of an online Departmental Store. The website should be user friendly and should have the following pages:

- \_ Home page
- \_ Registration and user login
- \_ User profile page
- \_ Items catalog
- \_ Shopping cart
- \_ Payment by credit card
- \_ Order confirmation

#### II-Dynamic HTML

1. Develop a page using Cascading Style Sheets
2. Develop a page using Object Model and Collections
3. Develop a page using Event Model
4. Develop a page using Filters and Transitions

### III-XML

5. creating xml documents,
6. xml style sheet,
7. xml document object model,
8. Xml query language

### IV-Scripting Language

Using javascript & vbscript

9. Develop a site for user authentication
10. Develop a site for creating a new email-id after checking the necessary validation

### V-ASP

11. Develop a page using Server side Activex components
12. Develop a page using File System objects
13. Develop a page using Session tracking
14. Develop a site for simple online reservation

### VI-JSP

15. Develop a page using request, response, session, application
16. Develop a site for simple online banking

#### Software required:

- Languages: Html, DHTML, XML, Java Script, VBScript, JSP, ASP.
- Browser (Internet Explorer, Netscape).
- User Interface Design tool (like Front Page, Visual Inter Dev)
- Web Server: IIS (or) PWS, Tomcat, IBM WSAD
- Backend tool (Oracle, Ms-Access, SQL Server, IBM DB2)

#### Course Designers:

Mr. R. Saravanan [rsncse@tce.edu](mailto:rsncse@tce.edu)

Mrs. K. Murugeswari [kmcse@tce.edu](mailto:kmcse@tce.edu)

<b>14CA480</b>	<b>SOFTWARE ENGINEERING LABORATORY</b>	Category	L	T	P	Credit
		PC	0	0	1	1

### Preamble

This course aims at facilitating the student to practice the Software Development Life Cycle (SDLC) phases for a given application

### Prerequisite

- 14CA340 : Software Engineering
- 14CA370: Internet and Java Programming Laboratory
- 14CA420 : Object Oriented Analysis and Design

### Course Outcomes

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

<b>CO1:</b> Apply SDLC to software development	Apply
<b>CO2:</b> Prepare SRS document and Design Documents for a given application	Understand, Apply
<b>CO3:</b> Develop software code for the given application	Understand, Apply
<b>CO4:</b> Test the developed code using unit and integration testing tools	Understand, Apply, Analyze

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	S	S	S	-	-	-	-	-	-
<b>CO2</b>	-	-	-	S	S	S	-	-	-
<b>CO3</b>	S	S	S	S	S	S	-	-	-
<b>CO4</b>	-	-	-	S	S	S	S	-	-

S- Strong; M-Medium; L-Low

### List of Experiments

- I. Study of various phases of different life cycle Models.**
  1. Study of Water Fall, Incremental, Evolutionary and Agile Models
- II. Planning and Analysis**
  2. Develop Time-line chart / Gantt and project table.
  3. Prepare SRS for the given domain problem.
  4. Using COCOMO model to estimate effort for the given domain problem.
  5. Calculate effort using FP oriented estimation model
  6. Analyze the Risk related to the project and prepare RMMM plan.
  7. Draw E-R diagram, DFD for the project.
  8. Develop Use Case (Primary) diagram using UML
- III. Software Design**
  9. Develop Use Case ( Secondary/ Detailed ) using UML
  10. Develop Class Diagram using UML
  11. Develop Interaction Diagrams using UML
  12. Develop State Chart and Activity Diagrams using UML

13. Develop Component, Package and Deployment Diagrams using UML

#### IV. Implementation of the Software

14.a Units / Components Development

14.b Integration of components and Results generation

#### V. Testing the Developed System

15.a.White Box Testing / Structural Testing - Design of the test cases for Unit Testing – JUnit / NUnit

15.b. Black Box Testing / Functional Testing - System / GUI Testing- WinRunner  
**Prepare FTR. version control and change control for software configuration items.**

16. Documentation of SCIs in SCM repository

#### Course Designers:

Dr. D. Jeya Mala

[djmcse@tce.edu](mailto:djmcse@tce.edu)

Mrs. D. Anitha

[anithad@tce.edu](mailto:anithad@tce.edu)



**14CA510****MOBILE APPLICATIONS**

Category	L	T	P	Credit
PC	4	0	0	4

**Preamble**

This course aims to develop scalable, good-looking enterprise-class applications for mobile handsets and other small footprint devices. The topics covered will focus on the tools and environments which exist to help develop mobile applications that run on mobile and wireless devices. This course has been developed for real-world, commercial scenarios based on industry requirement.

**Prerequisite**

- 14CA170: RDBMS Laboratory
- 14CA320: Internet and Java Programming
- 14CA360: Internet and Java Programming Laboratory
- 14CAPE0: Wireless Ad hoc Networks

**Course Outcomes**

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

- |  |            |
|--|------------|
| <b>CO1:</b> Define the basic principles of Mobile techniques                               | Remember   |
| <b>CO2:</b> Describe the wap architecture with its different techniques                    | Understand |
| <b>CO3:</b> An ability to apply different mobile technologies to solve Mobile applications | Apply      |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	L	L	L	L	L	L	L	L	L
<b>CO2</b>	M	L	L	M	L	L	L	L	L
<b>CO3</b>	M	M	M	S	L	L	L	M	L

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	30	30	30	30
Understand	30	30	30	30
Apply	40	40	40	40
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0



### Course Level Assessment Questions

#### Define the basic principles of Mobile techniques (CO1):

1. Remember
2. Define WML authoring
3. Describe session tracking
4. Write the meaning of Configurable converter.
5. List out any 4 Wireless device constraints
6. What do you mean by conversion by source modification?

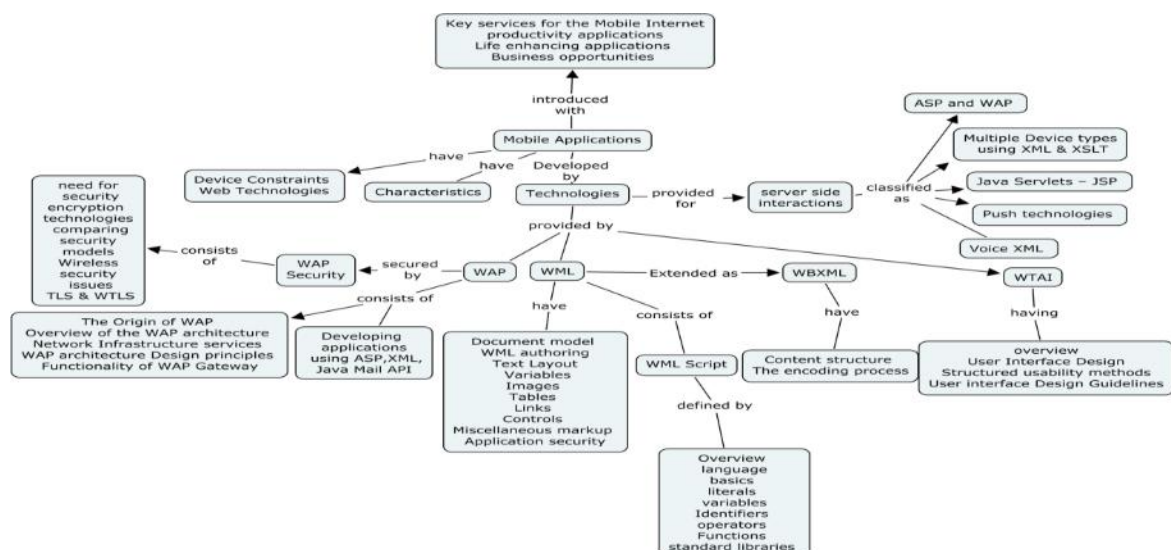
#### Describe the wap architecture with its different techniques (CO2):

1. Generate a wml code using Timer event
2. Describe the meaning of Wireless Binary Extensible markup language?
3. What do you mean by ActiveX Data Object
4. List out the the business opportunities of Mobile Application.
5. Compare wap technology with web technology
6. Explain the key services for the Mobile Internet.
7. Explain the Wap architecture design principles
8. Explain the Functionality of wap gateway
9. Distinguish symmetric ciphers with asymmetric ciphers
10. Explain the architecture of voice XML with the overview voice xml markup language.

#### An ability to apply different mobile technologies to solve Mobile applications (CO3)

1. How will you support Multiple device types using XML and XSLT
2. Construct the architecture of wireless telephony application with its interface & state Model.
3. Write a wml program for currency conversion
4. List out the guideline to design a WML Application.
5. What do you mean by structured usability methods?
6. Create a mobile Application for online ticket reservation using wml, wml script and Jsp/asp. (Front end validation and back end retrieval is must)
7. Construct Document structure & Encoding process of wireless binary extensible markup language
8. Prepare the architecture of E-mail System with its protocol and write a program for E-mail system using javax mail package.

### Concept Map





## Syllabus

**Introduction**–Key services for the Mobile Internet – productivity applications – Life enhancing applications – Business opportunities – WAP Versus WEB. Characteristics of the Mobile Internet – Wireless Device Constraints – Web Technologies – the Origin of WAP – Overview of the WAP architecture – Network Infrastructure services – WAP architecture Design principles – Functionality of WAP Gateway.

**Wireless Markup Language** – document model – WML authoring – Text Layout – Variables – Images – Tables – Links – Controls – Miscellaneous markup – application security – Wireless Binary Extensible Markup Language – Content structure – the encoding process.

**WML Script & WTAI** – Overview – language basics – literals – variables – Identifiers – operators – Functions – standard libraries – WTAI – overview – User Interface Design – Structured usability methods – User interface Design Guidelines.

**ASP and WAP** – ADO (Activex Data Objects) – Multiple Device types using XML & XSLT – XML, XSLT, XHTML –

**Java Servlets – JSP** – Converting existing websites to WAP – WAP and e-mail – Java Mail API – J2ME – vCard.

WAP Security – need for security – encryption technologies – comparing security models – Wireless security issues – TLS & WTLS.

**Push technologies** – push model – push framework – problems – Wireless Telephony applications (WTA) – WTA state model – fundamentals – WTA Interface – Scenarios –

**Voice XML** – Introduction –elements of implementation – Overview.

## Reference Books

1. Sandeep Singal, Thomas Bridgman et al., “The Wireless Application protocol: Writing applications for the Mobile Internet”, Pearson Education, 3rd edition, 2006.
2. Charles Arehart, Nirmal Chidambaram et al., “Professional WAP”, WROX Press Ltd., 2000.

## Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
<b>1</b>	<b>Introduction</b>	
1.1	Key services for the Mobile Internet	2
1.2	productivity applications	1
1.3	Life enhancing applications	1
1.4	Business opportunities	1
1.5	WAP Versus WEB.	1
<b>2</b>	<b>Mobile Internet</b>	
2.1	Characteristics of the Mobile Internet	1
2.2	Wireless Device Constraints	1
2.3	Web Technologies	1
2.4	the Origin of WAP	1
2.4.1	Overview of the WAP architecture	1
2.4.2	Network Infrastructure services	1
2.4.3	WAP architecture Design principles –	1
2.4.4	Functionality of WAP Gateway	1
<b>3</b>	<b>Wireless Markup Language</b>	
3.1.1	Document model	1
3.1.2	WML authoring, Text Layout, Variables, Images	1

Module No.	Topic	No. of Lectures
3.1.3	Tables, Links, Controls	1
3.2	Miscellaneous markup	1
3.3	application security	1
3.4	Wireless Binary Extensible Markup Language –	1
3.4.1	Content structure.	1
3.4.2	encoding process	1
3.5	WML Script & WTAI – Overview	1
3.5.1	language basics, literals, variables, Identifiers, operators	1
3.5.2	Functions, standard libraries	1
3.5.3	WTAI – overview	1
3.5.4	User Interface Design	1
3.5.5	Structured usability methods	1
3.5.6	User interface Design Guidelines	1
<b>4</b>	<b>Other Technologies</b>	
4.1.	ASP and WAP	1
4.1.1	ADO (Activex Data Objects)	1
4.2	Multiple Device types using XML & XSLT	1
4.2.1	XML, XSLT, XHTML	1
4.3	Java Servlets	1
4.4	JSP	1
4.5	Converting existing websites to WAP	1
4.6	WAP and e-mail	1
4.7	Java Mail API – vCard.	2
4.8	J2ME	2
<b>5</b>	<b>WAP security, push technologies, voice XML</b>	
5.1.1	WAP Security – need for security – encryption technologies –	1
5.1.2	Comparing security models – Wireless security issues – TLS & WTLS.	1
5.2	Push technologies – push model – push framework – problems implementation – Overview.	1
5.3	Wireless Telephony applications (WTA) – WTA state model – fundamentals – WTA Interface – Scenarios –	1
5.4	Voice XML – Introduction –elements of	1
	Total	46

### Course Designers:

Mr. R. Saravanan

[rsncse@tce.edu](mailto:rsncse@tce.edu)

Mrs. K. Murugaswari

[kmcse@tce.edu](mailto:kmcse@tce.edu)

**14CA520 BUSINESS PROCESSES**

Category	L	T	P	Credit
PC	4	0	0	4

**Preamble**

To enable the students to learn the concepts in business process management, business modeling and principles of management to enable them to develop a software solution to manage business process complexities.

**Prerequisite**

- 14CA410 : Electronic Commerce and Electronic Business

**Course Outcomes**

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

**CO1:** To know and understand the concepts of organization structures, modern business process and practices.

**Understand**

**CO2:** To gain working knowledge of Business Accounting, Regulatory aspects of business and business practices in IT Fields.

**Analyze**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1.	S	S	M	-	S	S	M	S	S
CO2.	S	-	S	S	S	S	M	S	S

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	20	20
Understand	20	20	30	30
Apply	30	30	30	30
Analyse	30	30	20	20
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions**

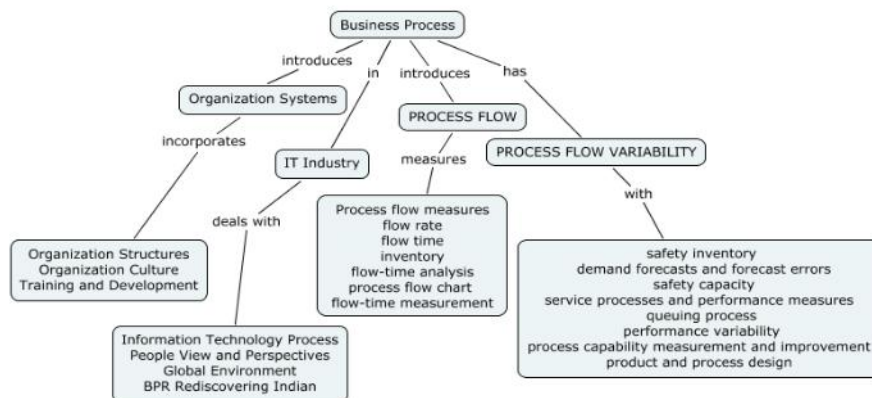
To know and understand by the students concepts of organization structures, modern business process and practices (CO1):

1. Name some applications of computer science which enable an organization to improve its performance.
2. Compare Organization Structure and Culture.
3. What is meant by the term "Reengineering"?
4. What is an Information System?
5. What is Electronic Data Interchange (EDI)?
6. What is forward engineering?
7. What is Enterprise Application Integration (EAI)?

To gain working knowledge of Business Accounting, Regulatory aspects of business and business practices in IT Fields (CO2):

1. Define the term "Organizational effectiveness". How would you assess the organizational effectiveness of a government organization?
2. Explain the various technologies that aid the BPR.
3. What will be the future trends and issues in management?
4. How do you analyze demand forecasts and forecast errors.
5. Analyze about the Managing Change in the Global Environment

### Concept Map



### Syllabus

**Organizational System**-Types of Business Organizations-organizational Structures-Elements-Definition-Complexity-Formulation-Size-Outcomes-Explanations of Structures-IT Industry and Organizational Structures-Technology-creating and sustaining Culture-Learning Culture- Forms; Selection Practices-Training and development program-purpose of performance evaluation-methods of performance evaluation-Case Studies. **BPR AND IT INDUSTRY** -BPR and Information Technology Process-People View and Perspectives-Empowering People through IT-Managing Change in the Global Environment-BPR Rediscovering Indian Paradigm-Need of Reengineering-Case Studies.

**Process Flow Measurement**-Process flow measures-flow rate-flow time-inventory-flow-time analysis-process flow chart-flow-time measurement-CPM-managing flow-time-flow-rate and capacity analysis-resources and resource pools-flow-rate measurement-process capacity-inventory analysis. **Process Flow Variability**-Managing flow variability-safety inventory-demand forecasts and forecast errors-optimal services level-lead time demand variability-safety capacity-service processes and performance measures-queuing process-buffer capacity-synchronization and capacity and demand-process control and capability-performance variability-process capability measurement and improvement-product and process design-process synchronization and improvement.

### Text Book

1. Richard H.Hall, "Organizations-Structures, Processes and Outcomes", Pearson Education, 2004

### Reference Books

1. M.S.Jayaraman et. Al, "Business Process Reengineering", Tata Mc Graw Hill Publications, 2001
2. Ravi Kalakota and Marcia Robinson, "E-Business; Roadmap for Success; Pearson Education, 2000.

### Course Contents and Lecture Schedule

Module No.	Topics	No.of Lectures
1.1	<b>ORGANIZATIONAL System</b> - Types of Business Organizations	1
1.2	Organizational Structures	1
1.3	Elements-Definition; Selection Practices	1
1.4	Complexity	1
1.5	Formulization-Size -Outcomes-Explanations of Structures	1
1.6	IT Industry and Organizational Structures	1
1.7	creating and sustaining Culture	1
1.8	Learning Culture- Training and development program	1
1.9	Purpose of performance evaluation-methods of performance evaluation	1
1.10	Case Studies	1
2.1	<b>BUSINESS PROCESS MANAGEMENT IN INFORMTION TECHNOLOGY (IT)</b>	2
2.2	People View and Perspectives	1
2.3	Empowering People through IT	1
2.4	Managing Change in the Global Environment	1
2.5	BPR Rediscovering Indian Paradigm	1
2.6	Need of Reengineering-Case Studies.	1
2.7	Business Process Outsourcing (BPO)	1
3.1	<b>PROCESS FLOW MEASUREMENT</b>	2
3.2	Process flow measures	1
3.3	flow rate - flow time	1
3.4	inventory - flow-time analysis	1
3.5	process flow chart	1
3.6	managing flow-time	1
3.7	flow-rate and capacity analysis	1

3.8	resources and resource pools	1
3.9	flow-rate measurement	1
3.10	process capacity - inventory analysis	1
4.1	<b>PROCESS FLOW VARIABILITY</b>	2
4.2	Managing flow variability	1
4.3	safety inventory - demand forecasts and forecast errors	2
4.4	optimal services level	1
4.5	lead time demand variability	1
4.6	safety capacity - service processes and performance measures	1
4.7	queuing process - buffer capacity	1
4.8	synchronization and capacity and demand	1
5.1	<b>process control and capability</b>	2
5.2	performance variability -- product and process design	1
5.3	process capability measurement and improvement	1
5.4	process synchronization and improvement.	1
5.5	Case Study	2
	Total	45

### Course Designers

Mr. T.Chandrakumar [tckcse@tce.edu](mailto:tckcse@tce.edu)

Dr. S.Vijayalakshmi [svlcse@tce.edu](mailto:svlcse@tce.edu)

**14CA530 SOFTWARE QUALITY AND TESTING**

Category	L	T	P	Credit
PC	3	1	0	4

**Preamble**

This course aims at facilitating the student to learn the best practices followed in industries to do effective software testing and quality management activities.

**Prerequisite**

- 14CA340 : Software Engineering
- 14CA420: Object Oriented Analysis and Design

**Course Outcomes**

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

- CO1:** Understand the basic concepts and the processes that lead to software quality and testing **Understand**
- CO2:** Design test cases using Requirements, Design Documents and Source Code **Apply**
- CO3:** Analyze and apply test minimization and optimization technique **Apply, Analyze**
- CO4:** Analyze the test adequacy criteria to complete the testing process **Analyze**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	M	S	M	M	M	-	S	S	S
CO2	L	S	L	S	L	-	M	S	S
CO3	M	S	M	S	L	-	M	S	S
CO4	M	S	L	S	L	-	S	S	S

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	10	10	10	20
Understand	10	10	10	30
Apply	20	20	10	30
Analyse	10	10	20	20
Evaluate	0	0	0	0
Create	0	0	0	0



### Course Level Assessment Questions

**Understand the basic concepts and the processes that lead to software quality and testing (CO1):**

1. Define: Quality and Software testing.
2. What are the phases involved in PDCA life cycle in continuous quality improvement? Explain.
3. List the various types of products based on their criticality.
4. What are software quality audits?
5. Define: Error, Defect and Failure.
6. What are the challenges involved in developers becoming testers?
7. Discuss the factors affecting the cost of testing.

**Design test cases using Requirements, Design Documents and Source Code (CO2):**

1. What is white box testing? Consider the following program code. Construct a control flow chart and a control flow graph for it and list down all the independent paths in it. Also, identify infeasible paths in it.

a. begin

```

int x, y,z;
input(x,y);
if(x>0)  && (y>0)
    z=pow(x,y)
else    if (x<0) && (y>0)
    z=pow((-x),y);
else    if(x>0) && (y<0)
    z=pow(x,(-y));
        else if(x<0) && (y<0)
            z=0;
while(y>0){
    z+=1;
    y--;}
if(z>0) {
    z-=1;}

```

2. An application takes two inputs x and y where  $x \leq y$  and  $-5 \leq y \leq 4$ . Apply Equivalence partitioning to (i) Partition the input domain using uni-dimensional and multidimensional partitioning. (ii) Derive test sets based on the partitions created in (i)
3. Consider an 'Online Product Purchase System'. Apply Category Partition method in it to derive test cases.

4. Illustrate cause-effect graphing by constructing a CE-Graph and a Decision table for the following requirement: (8)

5. Consider a Income Tax Calculation System. The employee's income tax is calculated based on two constraints: (i) Gender (ii) Gross Pay / Annum

There are two genders : Male, Female

If the Gender is Male and the Gross Pay/Annum < 1,50,000 then No Tax

If the Gender is Male and the Gross Pay/Annum > 1,50,000 and <2,50,000 then 12% Tax

If the Gender is Male and the Gross Pay/Annum > 2,50,000 and <3,50,000 then 18% Tax

If the Gender is Male and the Gross Pay/Annum > 3,50,000 then 20% Tax

If the Gender is Female and the Gross Pay/Annum < 1,90,000 then No Tax

If the Gender is Female and the Gross Pay/Annum > 1,90,000 and <3,00,000 then 10% Tax



If the Gender is Male and the Gross Pay/Annum > 3,00,000 and <4,50,000 then 12% Tax  
 If the Gender is Male and the Gross Pay/Annum > 4,50,000 then 18% Tax.

6. Consider the “Withdraw amount” module in an ATM application. Analyze this scenario and generate test cases by using BVA.

**Analyze and apply test minimization and optimization techniques (CO3):**

1. How test optimization helps to minimize the number of test cases needed in regression testing?
2. What is cook time?
3. What is a build?
4. Apply regression testing to identify the side effects in a software after release.
5. Show how test selection is done using execution trace with an example.
6. Classify the different test minimization techniques applied in regression testing with an example.

**Analyze the test adequacy criteria to complete the testing process (CO4):**

1. Consider the following code and which test adequacy criteria are satisfied by the given test set : Test set T={t1:<x= -3, y= -2>, <x=2, y= -4>}

```
begin
int x,y;
if(x<0) && (y<0)
printf("Both x and y are 0");
else
printf("x or y is 0 or non zero");
end;
```

2. Consider the following code. Given that, the test suite T contains {n=3 for all test cases t1:<a=2,b=3,c=2>, t2:<a=1,b=2,c=-1>, t3:<a=-1,b=2,c=-4>}. Find out the MC/DC percentage of T by considering feasible and infeasible conditions in the code:

```
void main()
{
int a, b, c,d, n;
scanf("%d",&n);
while(n>0)
{
scanf("%d,%d,%d", &a,&b,&c);
if (a>b) && (b>c) d=a+b;
else if(a>c) && (c>b)
{ d=a+c;
if (c>a && (b>c)) d+=b;
}
else d=0;
n-=1;
}
printf("Calculated Value is %d",d);
}
```

3. Explain mutation testing in detail and construct at least five 1st order mutants for the following code and find out mutation score for the following test suite:
4. Given that, the test suite T contains {n=3 for all test cases t1:<a=2,b=3,c=2>, t2:<a=1,b=2,c=-1>, t3:<a=-1,b=2,c=-4>}

```
void main()
{
int a, b, c,d, n;
```

```

scanf("%d",&n);
while(n>0)
{
    scanf("%d,%d,%d", &a,&b,&c);
    if (a>b) && (b>c) d=a+b;
    else if(a>c) && (c>b)
        { d=a+c;
          if (c>a && (b>c)) d+=b;
        }
    else d=0;
    n-=1;
}
printf("Calculated Value is %d",d);
}

```

5. Calculate Linear Code Sequence and Jump Coverage of the test cases derived from the following program based on the LCSAJs in it:

```

begin
//compute pow(x,y)
int x,y,p;
input(x,y);
p=1;
count = y;
while(count >0){
p=p*x;
count-=1;
}
output(p);
end

```



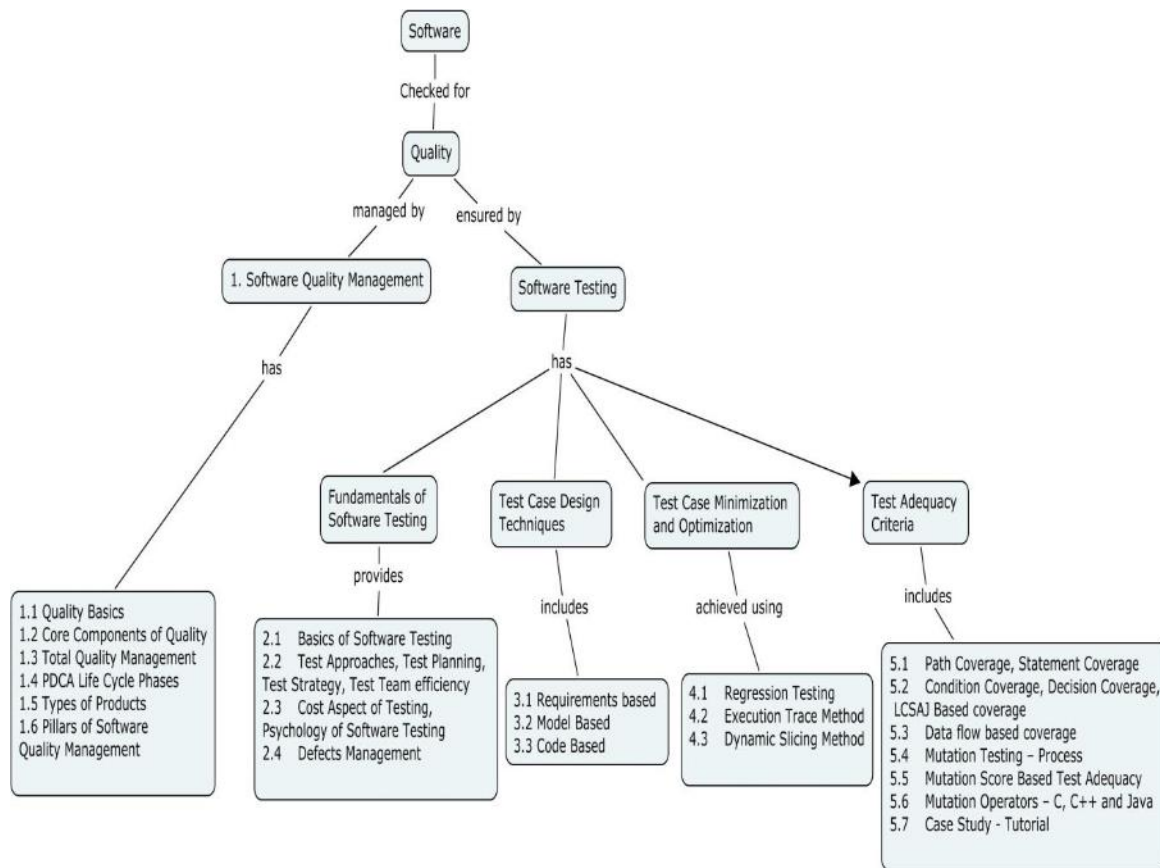
6. Calculate the block coverage and condition coverage for the Test set  $T=\{t1:<y= -3, n= -2>, <y=2, n= -4>, <y=2, n=2> \}$

```

main()
{
    int x,y,n,prod;
    read y,n;
    x=1; prod=y;
    while(n>0)
    {
        prod=x*y;
        display (x,y,prod);
        x+=1;
        n-=1;
    }
    if (prod<1) display("Error in input");
    else display("Final Value=",prod);
}

```

## Concept Map



## Syllabus

**Software Quality Management** - Basics of Quality, Core Components of Quality, Total Quality Management, PDCA Life Cycle Phases of continuous quality improvement, Types of Products based on criticality, Pillars of Software Quality Management, **Fundamentals of Software Testing**- Basics of Software Testing, Test Approaches, Test Planning, Test Strategy, Test Team efficiency, Cost Aspect of Testing, Psychology of Software Testing, Defects Management, **Test Case Design Techniques**- Requirements based test case generation , Equivalence Portioning, Boundary value analysis, Category Partition method, Cause effect graphing, **Model Based Test Case Generation** –Finite State Machine based test case generation – W-Categorization, UIO Sequence method, Code Based Test Case Generation CFG, PDG, CDG, DDG, **Test Case Minimization and Optimization** - Regression Testing, Execution Trace Method, Dynamic Slicing Method, Test Adequacy Criteria - Path Coverage, Statement Coverage, Condition Coverage, Decision Coverage, LCSAJ Based coverage, Data flow based coverage, Mutation Testing - Mutation Testing Process, Mutation Score Based Test Adequacy, Mutation Operators – C, C++ and Java, Case Study – Tutorial

## Reference Books

1. Limaye M.G., "Software Testing Principles, Techniques and Tools", Second Reprint, TMH Publishers, 2010.
2. Aditya P.Mathur, "Foundations of Software Testing", 1<sup>st</sup> Edition, Pearson Education, 2008.
3. Srinivasan Desikan, Gopalswamy Ramesh, "Software Testing – Principles and Practices", 7<sup>th</sup> Reprint, Pearson Education, 2009.

**Course Contents and Lecture Schedule**

<b>Module No.</b>	<b>Topic</b>	<b>No. of Lectures</b>
<b>1</b>	<b>Software Quality Management</b>	
1.1	Basics of Quality	1
1.2	Core Components of Quality	1
1.3	Total Quality Management	1
1.4	PDCA Life Cycle Phases of continuous quality improvement	2
1.5	Types of Products based on criticality -Tutorial	1
1.6	Pillars of Software Quality Management - Tutorial	1
<b>2</b>	<b>Fundamentals of Software Testing</b>	
2.1	Basics of Software Testing	2
2.2	Test Approaches, Test Planning, Test Strategy, Test Team efficiency	2
2.3	Cost Aspect of Testing, Psychology of Software Testing	2
2.4	Defects Management - Tutorial	1
<b>3</b>	<b>Test Case Design Techniques</b>	
3.1	Requirements based test case generation - Equivalence Portioning, Boundary value analysis, Category Partition method, Cause effect graphing	4
	Tutorial	2
3.2	Model Based Test Case Generation –Finite State Machine based test case generation – W-Categorization, UIO Sequence method	4
	Tutorial	2
3.3	Code Based Test Case Generation - CFG, PDG, CDG, DDG	1
<b>4</b>	<b>Test Case Minimization and Optimization</b>	
4.1	Regression Testing	2
4.2	Execution Trace Method	1
4.3	Dynamic Slicing Method	1
	Tutorial	2
<b>5</b>	<b>Test Adequacy Criteria</b>	
5.1	Path Coverage, Statement Coverage	1
5.2	Condition Coverage, Decision Coverage, LCSAJ Based coverage	2
5.3	Data flow based coverage	1
	Tutorial	4
5.4	Mutation Testing – Process	1
5.5	Mutation Score Based Test Adequacy	2
	Tutorial	1
5.6	Mutation Operators – C, C++ and Java	2
5.7	Case Study - Tutorial	1
	Total	48

**Course Designers:**

Dr. D.Jeya Mala  
Dr. S.Parthasarathy

[djmcse@tce.edu](mailto:djmcse@tce.edu)  
[spcse@tce.edu](mailto:spcse@tce.edu)

**14CAPL0****NETWORK SECURITY**

Category	L	T	P	Credit
PE	2	1	0	3

**Preamble**

Network Security is the discipline which studies the theoretical, practical and managerial aspects of securing Information against threats when it transmits over the network. The course will enable the students to understand, develop, and deploy countermeasures to mitigate the risks inherent in the transmission, storage and retrieval of sensitive information over the network.

**Prerequisite**

- 14CA110 : Mathematical foundations of computer science
- 14CA330 : Computer Networks

**Course Outcomes**

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

**CO1:** Understand threats and vulnerabilities of information systems including databases, networks, applications, internet-based communication, web services, and mobile technologies.

**Remember & Understand**

**CO2:** Deploy measures that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation.

**Apply**

**CO3:** Determine the strength of a given algorithm used for security service.

**Apply & Analyze**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	L	-	-	-	-	-	-	-
CO2	-	S	S	L	L	-	M	M	-
CO3	-	S	S	S	L	-	L	S	-

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	10	10
Understand	40	30	30	30
Apply	30	40	50	50
Analyse	10	10	10	10
Evaluate	0	0	0	0
Create	0	0	0	0

### Course Level Assessment Questions

**Understand threats and vulnerabilities of information systems including databases, networks, applications, internet-based communication, web services, and mobile technologies (CO1):**

1. Define Confidentiality, Integrity and Non repudiation.
2. What is Crypt analysis?
3. Explain Brute force attack with an example.
4. Distinguish between diffusion and confusion.
5. Enlist the differences between active and passive attacks.
6. Differentiate MAC and Hash functions.
7. How does public key cryptosystem provide authentication?

**Deploy measures that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation (CO2):**

1. Apply Hill cipher to the message "TCE" with key  
17 7 5 ; 21 18 21 ; 12 2 19
2. Apply Vignere cipher to message DONKEY with key "DIVINE".
3. Perform encryption and decryption using RSA algorithm for the following:  
(a)  $n=33$ ,  $M=5$  (b)  $n=55$ ,  $M=9$  (c)  $n=77$ ,  $M=8$  (d)  $n=143$ ,  $M=7$  (e)  $n=527$ ,  $M=2$
4. Given a message TO and a key K, apply the Feistel cipher for 3 rounds. Use ASCII Hex representation for the alphabets.

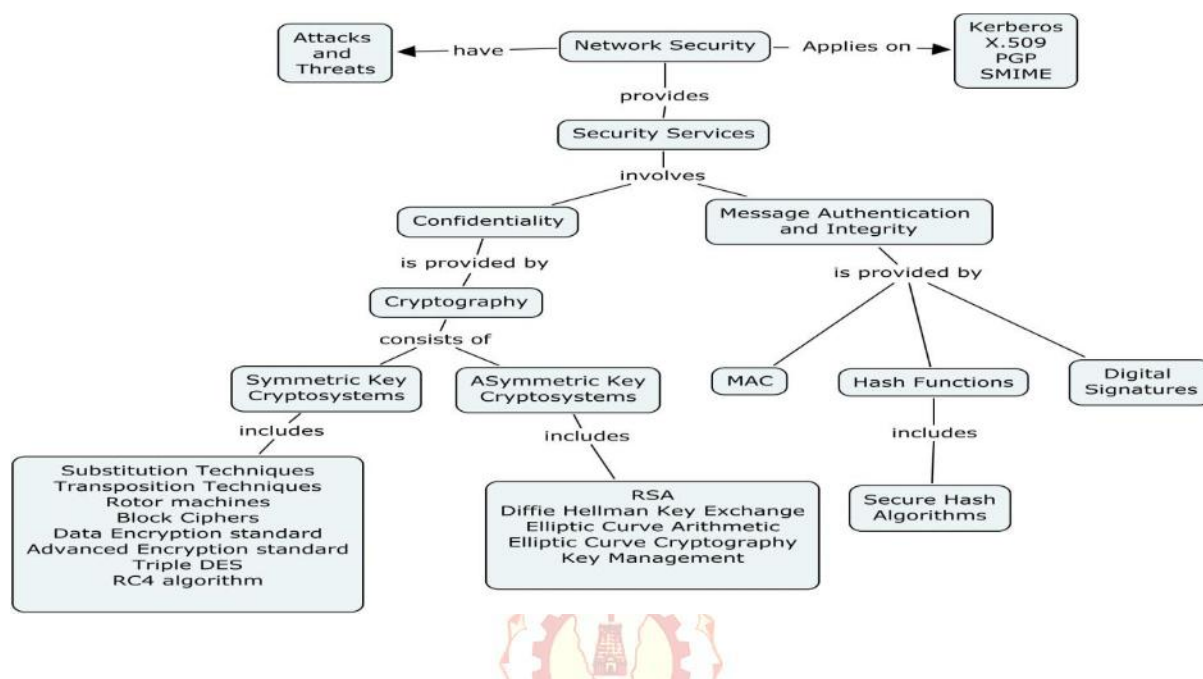
**Determine the strength of a given algorithm used for security service (CO3):**

1. Analyze the key management issues involved in symmetric key cryptosystems with respect to public key Cryptosystems.
2. Can the following matrix be used as key in Hill cipher? Justify your answer.  

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$
3. You intercept the message 'FBRTLWUGATEPHBNXSW' which was encoded using a Hill Cipher System with a 3 X 3 key matrix in a 26 letter alphabetic system. The last nine letters are the sender's signature 'JAMESBOND'. Find the enciphering matrix, deciphering matrix and read the message.



## Concept Map



## Syllabus

**Basics of security- Attacks and Threats:** Security Architecture , Active and passive attacks, Services and Mechanisms, Model for network security **Symmetric Key Cryptosystems:** Model, Substitution Techniques, Transposition Techniques, Rotor machines, Block Ciphers, Data Encryption standard, Advanced Encryption standard, Triple DES, RC4 algorithm **ASymmetric Key Cryptosystems:** RSA, Diffie Hellman Key Exchange, Elliptic Curve Cryptography, Key Management **Message Authentication and Integrity:** Message Authentication code, Hash functions – Secure Hash Algorithm, Digital Signatures **Applications:** Kerberos, X.509, PGP, SMIME – Watermarking.

## Text Book

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson, 5<sup>th</sup> Edition, 2012.

## Reference Books

1. Behrouz A. Forouzan, "Cryptography and Network Security", TMH 2007.
2. Atul Kahate, "Cryptography and Network Security", TMH, 2<sup>nd</sup> edition, 2009

## Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
<b>1</b>	<b>Introduction</b>	
1.1	Basics of Network Security	2
1.2	Attacks and Threats	1
1.3	Security Services and mechanisms	1
<b>2</b>	<b>Symmetric Key Cryptosystems</b>	
2.1	Substitution Techniques	2

2.2	Transposition Techniques	2
2.3	Rotor machines	1
2.4	Block Ciphers	1
2.5	Data Encryption standard	2
2.6	Advanced Encryption standard	1
2.7	Triple DES	1
2.8	RC4 algorithm	1
<b>3</b>	<b>ASymmetric Key Cryptosystems</b>	
3.1	RSA	2
3.2	Diffie Hellman Key Exchange	1
3.3	Elliptic Curve Arithmetic	1
3.4	Elliptic Curve Cryptography	2
3.5	Key Management	2
<b>4</b>	<b>Message Authentication and Integrity</b>	
4.1	MAC	2
4.2	Hash Functions	1
4.2.1	Secure Hash Algorithms	2
4.3	Digital Signatures	2
<b>5</b>	<b>Applications</b>	
5.1	Kerberos	2
5.2	X.509	1
5.3	PGP	1
5.4	SMIME	1
5.5	Watermarking	1
	Total	<b>36</b>

#### Course Designers:

Mrs. K. Murugeswari

[kmcse@tce.edu](mailto:kmcse@tce.edu)

Mr. R. Saravanan

[rsncse@tce.edu](mailto:rsncse@tce.edu)



**14CAPM0****JAVA TECHNOLOGIES**

Category	L	T	P	Credit
PE	3	0	0	3

**Preamble**

One of the roles of the IT professional is to design and build systems and integrate them into an organization. The role of the IT professional is to select, deploy, integrate and administer platforms or components to support the organization's IT infrastructure. This course covers the skills in the fundamentals of hardware and software and how they integrate to form essential components of IT systems. It also enables the students to develop components of IT Systems.

**Prerequisite**

- 14CA320: Internet and Java Programming

**Course Outcomes**

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

<b>CO1:</b> Define the basic concepts of Java technologies	<b>Remember</b>
<b>CO2:</b> Understand the working principle of Java Virtual Machine, structure of Class Files and Android architecture, platform Framework and emulator	<b>Understand</b>
<b>CO3:</b> Apply the main components of Android APIs to develop Android Applications	<b>Apply</b>
<b>CO4:</b> Create a database in SQLite and access it through Android platform	<b>Create</b>

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	L	L	L	L	L	L	L	L	L
<b>CO2</b>	M	L	L	M	L	L	L	L	L
<b>CO3</b>	M	M	M	S	L	L	L	M	L
<b>CO4</b>	M	M	M	S	L	L	L	M	L

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	20	30
Understand	40	40	30	30
Apply	30	30	40	40
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	10	10	10	0

### Course Level Assessment Questions

#### Define the basic concepts of Java technologies (CO1):

1. When the JVM creates a frame?
2. Why is it important to maintain system compatibility for older applications?
3. What is the name of the interface used to represent collections that maintain non-unique elements in order? Select the one correct answer.  
Collection  
Set  
SortedSet  
List  
Sequence
4. What will be the output from the following program?  

```
import java.util.*;
public class Iterate {
public static void main(String[] args) {
List l = new ArrayList();
l.add("A"); l.add("B"); l.add("C"); l.add("D"); l.add("E");
ListIterator i = l.listIterator();
i.next(); i.next(); i.next(); i.next();
i.remove();
i.previous(); i.previous();
i.remove();
System.out.println(l);
};
};
```
5. Count the number of words in a sentence "This is a sample" using map API?
6. Why write a Class Loader?
7. Why we need a mobile operating system?

#### Understand the working principle of Java Virtual Machine, structure of Class Files and Android architecture, platform Framework and emulator (CO2):

1. Write java program to create a class "student" and derive the corresponding class structure.
2. Implement a simple event driven Java program using the Swing libraries
3. Write a java program to find out the list of students who have scored more than 80 percentage in a subject "Operating Systems" using JDBC.
4. Write an Android application to display the exam results in a table layout.
5. Define an intent object and invoke the components of Android platform.
6. How do you add sound and vibrate in your application using Android platform.

#### Apply the main components of Android APIs to develop Android Applications (CO3):

1. Write a Java program to develop a basic shopping cart application that would allow the program user to add items to a shopping cart while browsing through a list of priced items. Once the user stops browsing and filling the cart, the program should produce the list of items ordered along with quantity and extended prices (price \* quantity) plus an order total.  
 Input  
 Item file: A list of a dozen or more authentic priced items for sale (e.g. 401 Levi 501 19.95).  
 Item orders from keyboard or screen selection: User item choices including the quantity of each item to be purchased.  
 Output:

List of priced items for sale;

View of the shopping cart;

Final order.

Processing:

Provide an interface that allows the user to browse through a list of items for sale, choose an item and specify quantity to add to the cart, view the cart, allow more items to be added and items to be deleted from the cart, and choose to check out and view the final order with a detailed list of items ordered and the total amount to pay.

2. Design a user interface to demonstrate the various features of a product “car” using java2D.
3. Create a service named “MyService” to provide time service and define its life cycle. Create an Activity to interact with the created Service.
4. There are 20 staffs in the IT department. When a meeting is scheduled, a message “Meeting” is to be sent to all staffs. Implement a Broadcast Receiver in Android platform.
5. Design an Interactive interface to collect the information from a user in the registration form by using Alert Dialog and Progress Dialog components.

Create an interface to perform the following tasks

Enter the Name of the book and ISBN number and click on Add Book.

Data will be added to Sqlite database.

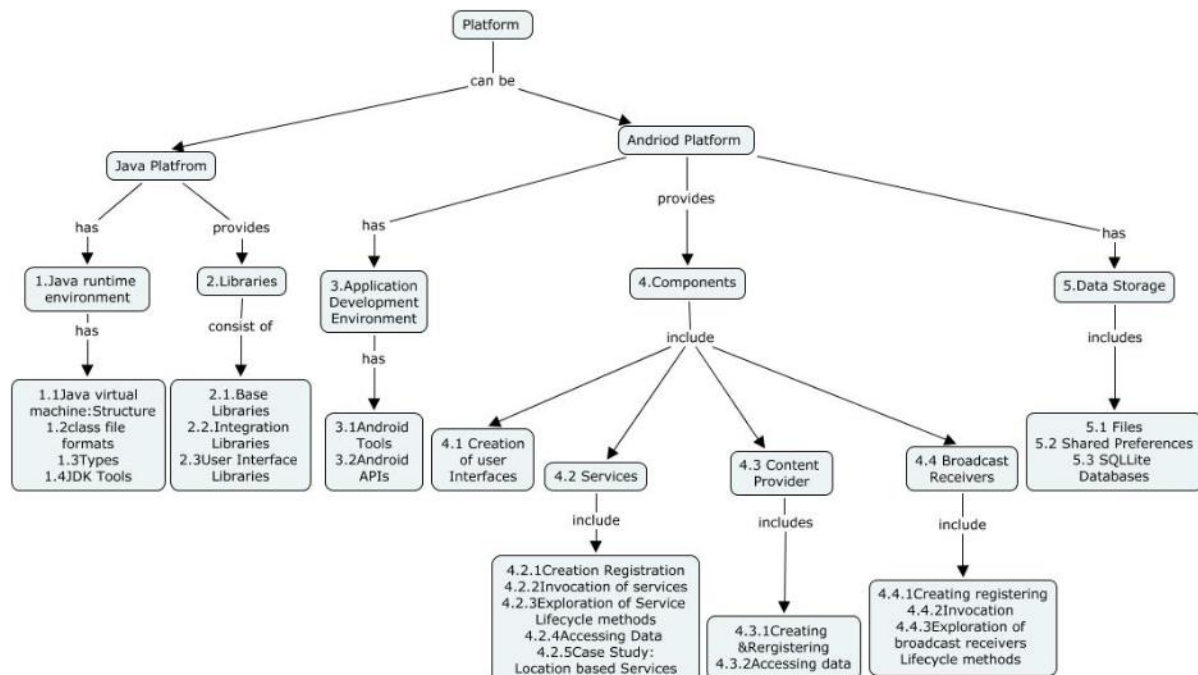
Add multiple entries into database.

Click on Show Books to view the contents added so far.

Click on Delete All Books button to delete the contents of database



## Concept Map



## Syllabus

**Java Platform -** Java runtime environment - Java virtual Machine : Structure, Class file formats, Types : Server VM and Client VM , Java Vs .NET, JDK Tools : Basic Tools, Security Tools, Java Deployment Tools, Java Plug-in Tools Java Profiler, Java ANT, Java meet

**Libraries: Base Libraries:** Collections Framework, Reflection, Java Archive (JAR) Files, Logging, Monitoring and Management, Package Version Identification Integration Libraries: Java Database Connectivity (JDBC) API, Java Naming and Directory Interface (JNDI) API User Interface Libraries: Springs, Java 2D Graphics and Imaging, Sound, Accessibility

**Android Platform:** Architecture, Application Development Environment, Android Tools: DDMS, Emulator, ADB, ADT, AVD, Android APIs – Creation of User Interfaces Android Services: Creation, registration, invocation of services, Exploration of Service Lifecycle methods, Definition and use of a service interface,

**Content Providers:** Creating and registering a content provider, Accessing data from content provider JDK Case Study: Location based Services

**Broadcast Receivers:** Creating and registering broadcast receivers, Invocation of broadcast receivers, Exploration of broadcast receivers Lifecycle methods

**Data Storage Mechanisms:** Files, Shared Preferences, SQLite database: Creating SQLite Database, Using databases in Android applications.

## Reference Books

1. The Java™ Virtual Machine Specification”, Tim Lindholm, Frank Yellin, second edition, Sun Microsystems Press 2001
2. “Java: The Complete Reference, Seventh Edition”, Herbert Schildt, McGraw-Hill Publications 2004
3. Professional Android Application Development, Reto Meier, Wrox, November 2008

4. Beginning Android, Mark Murphy, Apress, June 2009
5. Pro Android, Sayed Y Hashimi, Apress, June 2009
6. Android – Application Development, Rick Rogers et.al, O'Reilly, May 2009
7. “Hello, Android”, Introducing Google’s Mobile Development Platform, Ed Burnette, The Pragmatic Bookshelf, 2008

#### Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
<b>1</b>	<b>Java Platform</b>	
1.1	Java virtual Machine : Structure	2
1.2	Class file formats	2
1.3	Types : Server VM and Client VM	1
1.4	JDK Tools: Basic Tools, Security Tools, Java Deployment Tools, Java Plug-in Tools, Java Profiler, Java ANT	2
<b>2</b>	<b>Libraries</b>	
2.1	Base Libraries	
2.1.1	Collections Framework, Reflection, Java Archive (JAR) Files	2
2.1.2	Logging, Monitoring and Management	1
2.1.3	Package Version Identification	1
2.2	Integration Libraries	
2.2.1	Java Database Connectivity (JDBC) API	1
2.2.2	Java Naming and Directory Interface (JNDI) API	1
2.3	User Interface Libraries	
2.3.1	Springs	1
2.3.2	Java 2D Graphics and Imaging	1
2.3.3	Sound , Accessibility	1
<b>3</b>	<b>Android Application Development Environment</b>	
3.1	Architecture	1
3.2	Application Development Environment	1
3.3	Android Tools: DDMS, Emulator, ADB, ADT, AVD	2
3.4	Android APIs	2
<b>4</b>	<b>Android Components</b>	
4.1	Creation of User Interfaces	1
4.2	Services	
4.2.1	Creation, registration	1
4.2.2	Invocation of services	1
4.2.3	Exploration of Service Lifecycle methods	1
4.2.4	Accessing data	1
4.2.5	Case Study: Location Based Services	
4.3	Content Providers	
4.3.1	Creating and registering a content provider	1
4.3.2	Accessing data from content provider	1

Module No.	Topic	No. of Lectures
4.4	Broadcast Receivers	
4.4.1	Creating and registering broadcast receivers	1
4.4.2	Invocation of broadcast receivers	1
4.4.3	Exploration of broadcast receivers Lifecycle methods	1
<b>5</b>	<b>Data Storage Mechanisms</b>	
5.1	Files	2
5.2	Shared Preferences	2
5.3	SQLite database	
5.3.1	Creating SQLite Database	2
5.3.2	Using databases in Android applications	2
	Total	40

### Course Designers:

Mr. R. Saravanan

[rsncse@tce.edu](mailto:rsncse@tce.edu)

Dr. D. Jeyamala

[djmcse@tce.edu](mailto:djmcse@tce.edu)



**14CAPN0****CUSTOMER RELATIONSHIP  
MANAGEMENT**

Category	L	T	P	Credit
PE	3	0	0	3

**Preamble**

The Customer Relationship Management (CRM) course is designed to introduce students to both CRM fundamentals and the utilization of technology in managing customers. The curriculum will introduce students to CRM concepts and functionality for professionals whose organizations utilize CRM or want to gain an understanding of the role of CRM in service management.

**Prerequisite**

- 14CA410 : E-Commerce

**Course Outcomes**

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

**CO1:** Explain key concepts, technologies and best practices of CRM **Understand**

**CO2:** Present a view of the organization of business and its integration with CRM **Understand**

**CO3:** Differentiate CRM value proposition for different vertical markets **Apply**

**CO4:** Practice CRM customer data acquisition, management, research, analysis and use **Apply**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	-	-	-	-	-	-	-	-	-
CO2	-	L	-	-	-	M	M	L	L
CO3	-	L	M	-	M	S	M	L	M
CO4	L	S	S	M	M	S	S	M	M

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	30	30	20	20
Understand	30	30	20	20
Apply	40	40	60	60
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0



**Course Level Assessment Questions**

Explain key concepts, technologies and best practices of CRM (CO1):

1. What is termed as industry segment?
2. What is significance of Customer Relationship?
3. How is time managed within the sales department? Single user or group calendar? Scheduling email? Others?

**Present a view of the organization of business and its integration with CRM (CO2):**

1. How are contracts and warranties managed in Organizations?
2. Explain the executive information system followed in an Organization for the different departments.
3. Discuss the role of CRM managers.
4. What is the executive information system followed in a telecommunication company for the above departments?
5. If you have a telemarketing department, how are call lists assembled, how are orders taken?

Differentiate CRM value proposition for different vertical markets (CO3):

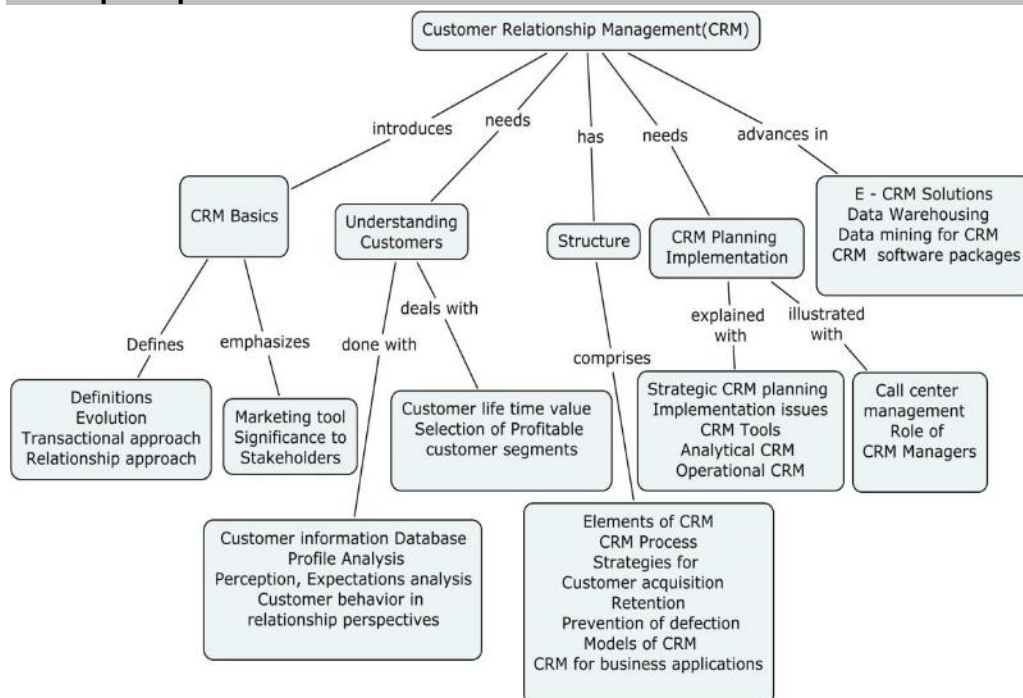
1. List out the criteria for selecting profitable customers.
2. Draw the differences between analytical CRM and operational CRM.

Practice CRM customer data acquisition, management, research, analysis and use (CO4):

1. Discuss on the software support for Customer Relationship Management?
2. Write down the strategies for customer acquisition.
3. How could Data Mining helpful in the process of Customer Relationship management?
4. Discuss of application of E-CRM solutions to an online auction Organization.
5. How does your customer service department function in terms of incident assignment, tracking, reporting, problem management and resolution, and other functions?



## Concept Map



## Syllabus

**Introduction** Definitions - Concepts and Context of relationship Management – Evolution - Transactional Vs Relationship Approach –CRM as a strategic marketing tool – CRM significance to the stakeholders. **Understanding Customer** Customer information Database – Customer Profile Analysis - Customer perception, Expectations analysis – Customer behavior in relationship perspectives; individual and group customer's - Customer life time value – Selection of Profitable customer segments. **CRM Structure** Elements of CRM – CRM Process – Strategies for Customer acquisition – Retention and Prevention of defection – Models of CRM – CRM road map for business applications. **CRM Planning and Implementation** Strategic CRM planning process – Implementation issues – CRM Tools - Analytical CRM – Operational CRM – Call center management – Role of CRM Managers **TRENDS in CRM** E - CRM Solutions – Data Warehousing – Data mining for CRM – Open source CRM tools – CRM analytics.

## Reference Books

1. G.Shainesh, Jagdish, N.Sheth, Customer Relationships Management Strategic Prespective, Macmillan 2010.
2. Alok Kumar et al, Customer Relationship Management : Concepts and applications, Biztantra, 2011
3. H.Peeru Mohamed and A.Sahadevan, Customer Relation Management, Vikas Publishing 2008
4. Kumar, Customer Relationship Management - A Database Approach, Wiley India, 2007
5. Buttle, Francis. Customer Relationship Management, (2<sup>nd</sup> Edition). Elsevier Publishing, 2009.

## Course Contents and Lecture Schedule

Module	TOPIC	No. of
--------	-------	--------

BOS meeting approved: 19-11-2014

Approved in 49<sup>th</sup> Academic Council Meeting on 04-12-2014

No.		Lectures
<b>1. Introduction to Customer Relation Management</b>		
1.1	Definitions - Concepts and Context of relationship Management	1
1.2	Evolution	2
1.3	Transactional Vs Relationship Approach	2
1.4	CRM as a strategic marketing tool	1
1.5	CRM significance to the stakeholders	2
<b>2. Understanding Customers</b>		
2.1	Customer information Database	1
2.2	Customer Profile Analysis	2
2.3	Customer perception, Expectations analysis	2
2.4	Customer behavior in relationship perspectives; individual and group customer's	1
2.5	Customer life time value	1
2.6	Selection of Profitable customer segments	1
<b>3. CRM Structure</b>		
3.1	Elements of CRM	1
3.2	CRM Process	1
3.3	Strategies for Customer acquisition	1
3.4	Retention and Prevention of defection	1
3.5	Models of CRM	1
3.6	CRM road map for business applications	1
<b>4. CRM Planning and Implementation</b>		
4.1	Strategic CRM planning process	1
4.2	Implementation issues	1
4.3	CRM Tools	1
4.4	Analytical CRM – Operational CRM	1
4.5	Call center management	2
4.6	Role of CRM Managers	1
<b>5. TRENDS in CRM</b>		
5.1	E - CRM Solutions	1
5.2	Data Warehousing	1
5.3	Data mining for CRM	1
5.4	Open source CRM tools	2
5.5	CRM Analytics	2
	Total	<b>36</b>

**Course Designers:**

Dr. A. John Sanjeev Kumar

[ajscse@tce.edu](mailto:ajscse@tce.edu)

Mrs. D. Anitha

[anithad@tce.edu](mailto:anithad@tce.edu)

**14CAPQ0****ENTERPRISE RESOURCE  
PLANNING**

Category	L	T	P	Credit
PE	3	0	0	3

**Preamble**

Students will learn ERP and its related technologies to design an integrated software system for an enterprise.

**Prerequisite**

None

**Course Outcomes**

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

**CO1:** Understand ERP concepts & Develop web-based ERP applications.

**CO2:** Conduct business cycles using the ERP simulation game.

**CO3:** Demonstrate the ability to configure ERP processes.

**CO4:** Conduct analysis using business intelligence tools

**Understand****Apply****Apply****Analyze****Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1.	S	S	-	S	S	S	M	S	S
CO2.	-	S	S	S	S	S	M	-	S
CO3.	S	-	M	S	S	S	M	-	M
CO4.	M	-	S	S	S	M	M	S	S

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	20	20
Understand	20	20	20	20
Apply	30	30	30	30
Analyse	30	30	30	30
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions**

Understand ERP concepts & Develop web-based ERP applications (CO1):

1. Define ERP
2. What is meant by BPR?
3. Define Data warehousing
4. What is supply chain?
5. What is EDI?
6. What is 'SAP AG'?
7. What is 'Baan'?

8. What is 'Oracle'?
9. Name the modules of ERP.
10. What is meant by e-commerce?

Conduct business cycles using the ERP simulation game (CO2):

1. List the reasons for growth of ERP.
2. Explain the advantages of ERP.
3. What is meant by Re-engineering?
4. List the sub-systems of HR module.
5. Explain Oracle ERP Product.
6. Explain ERP and Internet.

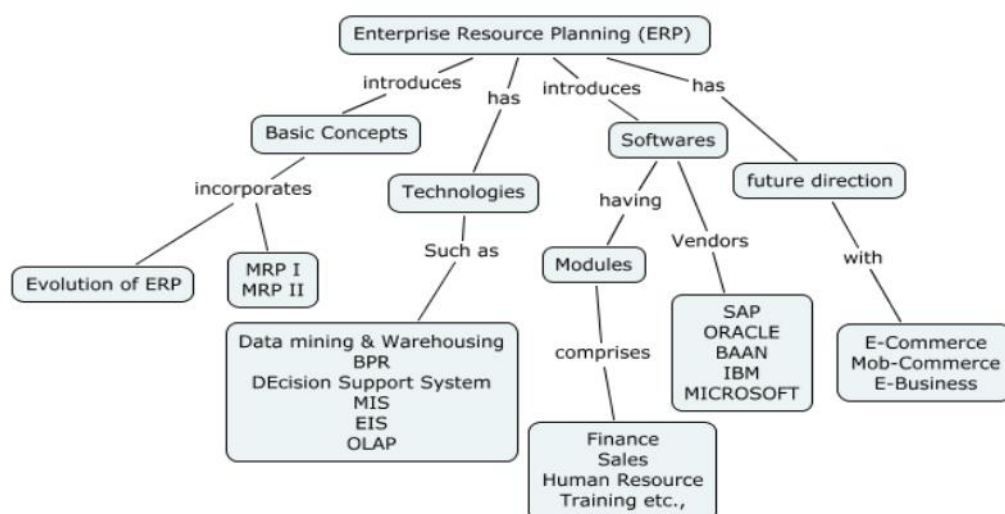
Demonstrate the ability to configure ERP processes (CO3):

1. Explain Integrated Data Model and how it applies to ERP.
2. Elucidate the different phases of BPR.
3. Explain supply chain management
4. With the help of diagram explain ERP system and apply it for School management.
5. How will you apply order management in sales and distribution module
6. Suggest any four future directions in ERP.

Conduct analysis using business intelligence tools (CO4):

1. There is no linkage with the ERP, BPR and IT of the system. Are you agreed with the system. Justify the answer.
2. What is business engg? And explain the process of business engg. Explain the direct and indirect benefits of ERP.
3. Analyze the SWOT Analysis of PeopleSoft and Oracle Apps.
4. Web Enabling and Market Snapshot feature of ERP-Analyze.
5. What are the necessary actions to be taken after ERP implementation?
6. Explain technologies used in data mining

## Concept Map



## Syllabus

Introduction - **Enterprise Resource Planning (ERP)** - Basic concepts-Evolution of ERP - Materials Requirements Planning (MRP) - Manufacturing Resource Planning (MRP II) - Business modeling. ERP and its related technologies - Data Mining-Data Warehousing-Business Process Reengineering-Decision Support System (DSS)-Management Information System (MIS) - Executive Information System (EIS)-OLAP. **Supply Chain Management (SCM)** - ERP from a manufacturing perspective-Distribution requirements planning (DRP)-Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM)-Made to Order-Made to Stock-Assemble to Order-Engineer to Order-Configure to Order - Master production schedule. ERP Software- selection process-issues-risks factors-ERP Products. Benefits of ERP software-Limitations of ERP software. **Challenges**- ERP implementation-Success and failure factors of an ERP implementation-ERP implementation choices-Formulation of ERP team-Role of consultants. Modules in an ERP package - Finance-Sales & distribution-Plant maintenance - Human resource management - Materials management-Quality management – Training & Maintenance. **Future directions of ERP**-Electronic commerce, Mobile commerce and Electronic business using ERP-ERP using Internet, Intranet and Extranet. Case Studies of ERP implementation-Problems-challenges and opportunities for the enterprises-ERP software solution for the enterprise-Solutions-Performance indicators of an ERP package.

#### Text Book

1. "Enterprise Resource Planning", Alexis Leon, TataMcGraw-Hill, 2007

#### Reference Books

1. "Enterprise Resource Planning", Bret Wagner, Ellen Monk, Cengage Learning, 3rd Edition, 2009.
2. "Enterprise Resource Planning–Concepts and Practice", Vinod Kumar Garg and N. K. Venkita Krishnan, Prentice-Hall, India, 2003.

#### Course Contents and Lecture Schedule

Module. No	Topics	No.of Lectures
1.1	<b>Introduction</b> - Enterprise Resource Planning (ERP)	1
1.2	Basic concepts	1
1.3	Evolution of ERP	1
1.4	Materials Requirements Planning (MRP)- Manufacturing Resource Planning (MRP II)	1
1.5	Business modeling	1
2.1	<b>ERP and its related technologies</b>	1
2.2	Data Mining-Data Warehousing	1
2.3	Business Process Reengineering	
2.4	Decision Support System (DSS)	1
2.5	Management Information System (MIS)	1
2.6	Executive Information System (EIS)	1
2.7	OLAP	1
3.1	<b>Supply Chain Management (SCM)</b>	1

3.2	ERP from a manufacturing perspective	1
3.3	Distribution requirements planning (DRP)	1
4.1	Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) Made to Order and Made to Stock	1
4.2		
4.3	Assemble to Order-Engineer to Order-Configure to Order	1
4.4	Master production	1
5.1	<b>ERP Software-</b> selection process	1
5.2	Issues and risks factors	1
5.3	ERP Products	1
5.4	Benefits of ERP software	1
5.5	Limitations of ERP software	1
6.1	<b>Challenges-</b> ERP implementation	1
6.2	Success and failure factors of an ERP implementation	1
6.3	ERP implementation choices	1
6.4	Formulation of ERP team-Role of consultants.	1
7.1	<b>Modules</b> in an ERP package	1
7.2	Quality management	1
7.3	Finance-Sales & distribution-Plant maintenance	1
7.4	Human resource management & Materials management	1
7.5	Training & Maintenance	1
8.1	<b>Future directions of ERP</b>	1
8.2	Electronic commerce	1
8.3	Mobile commerce and Electronic business using ERP-	1
8.4	ERP using Internet, Intranet and Extranet.	1
8.5	Case Study	
	Total	<b>36</b>

### Course Designers

Dr.S.Parthasarathy

[spcse@tce.edu](mailto:spcse@tce.edu)

Mr. T.Chandrakumar

[tckcse@tce.edu](mailto:tckcse@tce.edu)



**14CAPR0****BUSINESS PROCESS  
RE-ENGINEERING**

Category	L	T	P	Credit
PE	3	0	0	3

**Preamble**

To enable the students to gain knowledge in business process re-engineering and develop business models to improve the performance of an organization.

**Prerequisite**

None

**Course Outcomes**

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

- |   |                   |
|---|-------------------|
| <b>CO1:</b> Know the current state of Business Process Reengineering  | <b>Understand</b> |
| <b>CO2:</b> Apply the origami process and purchase order process based on Computer Aided Process Reengineering.                   | <b>Apply</b>      |
| <b>CO3:</b> Analyze the concepts of TQM and CPI, modern business Process and practices.   | <b>Analyze</b>    |
| <b>CO4:</b> Analyze working knowledge of Business Accounting, Regulatory aspects of business and business practices in IT Fields. | <b>Analyze</b>    |

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	L	M	L	M	M	L	L	L	L
CO2	S	M	S	M	S	M	L	L	M
CO3	S	S	M	M	S	L	L	M	M
CO4	S	M	S	S	S	M	L	L	L

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	10	10	10	10
Understand	30	30	30	30
Apply	40	40	40	40
Analyse	20	20	20	20
Evaluate	0	0	0	0
Create	0	0	0	0

**Course Level Assessment Questions****Know the current state of Business Process Reengineering CO1):**

1. List out the process parameters?
2. What is the goal of CPI and TQM?
3. Define origami process?
4. What do you mean by CAPR method of documentation?
5. What do you mean by process drivers?
6. What do you mean by conditional processing?

BOS meeting approved: 19-11-2014

Approved in 49<sup>th</sup> Academic Council Meeting on 04-12-2014

7. What do you mean by iconic blocks?
8. Define hierarchical lock libraries.
9. What is software support process?

**Apply the origami process and purchase order process based on Computer Aided Process Reengineering (CO2):**

1. Explain the origami Process at level 1 and purchase order process at first Attempt?
2. How to apply TQM to level 1 Process? Explain
3. How to apply Process Drivers and Process Metrics in defined processes
4. Describe the migration of the origami process in level 2 to level 3 and purchase Process third attempt at reengineering?
5. Describe BPR modeling and simulation terminology and techniques.
6. How to CAPRE tools where utilized in simulating software development schedules?

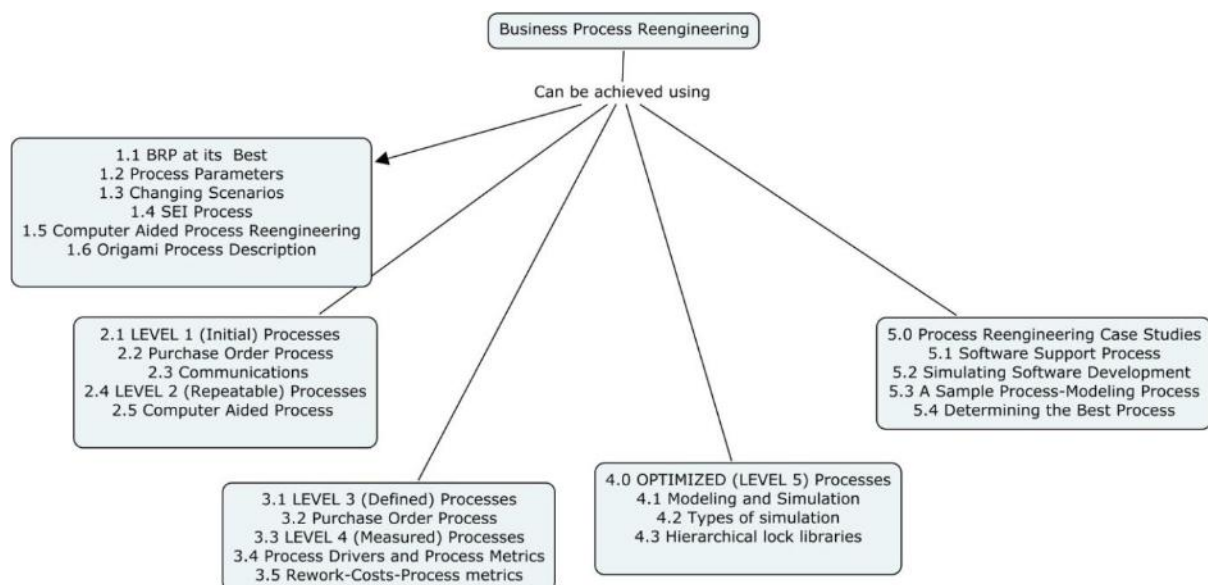
**Analyze the concepts of TQM and CPI, modern business Process and practices (CO3):**

1. Briefly explain SEI process maturity model?
2. Give short notes of purchase order process reengineering?
3. What are the functionalities of process reengineering facilitator?
4. What do you mean by process metrics?
5. What are the uses of Activity or Delay block?
6. What is requirements-based analysis?
7. How can you use modeling and simulation to determine schedules?

**Analyze working knowledge of Business Accounting, Regulatory aspects of business and business practices in IT Fields (CO4):**

1. How it will differ from Deming's theories of continuous improvement and sense's theories of casual analysis?
2. Briefly explain the different types of simulation like discrete, Continuous and Hybrid simulations?
3. Explain Applications of Computer Aided Process Reengineering with illustrated example.

**Concept Map**





## Syllabus

**Introduction to BPR (Business Process Reengineering)**-BPR at its Best-Process Parameters-Disturbing Plot-Changing Scenarios. A New Perspective on Change in Business-The state of Business Process Reengineering-Computer Aided Process Reengineering-The SEI Process Maturity Model-Deming's Theories of Continuous Improvement-Sense's Theories of Causal Analysis-Process Examples-Origami Process Description-Purchase Order Process Description. **LEVEL 1 (Initial) Processes:-** The Origami Process at Level 1-The Purchase Order Process: First Attempt at Reengineering. TQM-Appling it to Level 1 Processes. Communications:- The foundation of Process Reengineering. **LEVEL 2 (Repeatable) Processes:-** Migration of the Origami Process to Level 2-Purchase Order Process: Second attempt at Reengineering-The Computer Aided Process Reengineering Method of Documentation. **LEVEL 3 (Defined) Processes:-** Migration of the Original Process to Level 3-Purchase Order Process: Third Attempt at Reengineering. **LEVEL 4 (Measured) Processes:-** Measuring the Origami Process-Purchase Order Process: Fourth Attempt at Reengineering-Process Drivers and Process Metrics-Input to Tasks-Staff Required for the task-Time Required to perform the task-Conditional Processing-Task Initiation-Rework-Costs-Process metrics. **OPTIMIZED (LEVEL 5) Processes:-** Origami Process Migration to Level 5. Modeling and Simulation Terminology and Techniques:- An Overview-Visual Paradigm-Icons-Iconic Blocks-Types of Simulation-Discrete & Continuous-Hybrid Simulation – Object Orientation – Requirements – Based Analysis - Hierarchical lock libraries-Open Architecture. **Process Reengineering Case Studies**-Applications of Computer Aided Process Reengineering-Software Support Process-Simulating Software Development Schedules-A Sample Process-Modeling Process-Determining the Best Process. Case Studies on BPR for different business sectors – Comparison of CMM Levels with BPR Levels.

## Reference Books

1. Gregory A.Hansen, "Automating Business Process Reengineering", Prentice Hall, 2005.
2. Dennis E. Wisnosky and Rita C. Feeney, "A Practical Guide to BPR Project Management", Wisdom Systems, Inc.; Book and CD-ROM edition (June 12, 2001)
3. G. Darnton and M. Darnton, Business Process Analysis, Intern. Thompson Business Press, Boston, MA, 2007

## Course Contents and Lecture Schedule

MODULE No.	Topics	No. of Lectures
<b>1</b>	<b>Introduction to BPR (Business Process Reengineering)</b>	1
1.1	BPR at its Best	1
1.2	Process Parameters-Disturbing Plot	1
1.3	Changing Scenarios.	1
1.4	A New Perspective on Change in Business	1
1.5	The state of Business Process Reengineering Computer Aided Process Reengineering-	1
1.6		
1.7	The SEI Process Maturity Model-Deming's Theories of Continuous Improvement-Sense's Theories of Causal Analysis.	1

1.8	Origami Process Description	1
1.9	Purchase Order Process Description.	1
<b>2</b>	<b>LEVEL 1 (Initial) Processes:-</b> The Origami Process at Level 1	1
2.1	The Purchase Order Process: First Attempt at Reengineering.	1
2.2	TQM-Applying it to Level 1 Processes.	1
2.3	Communications:- The foundation of Process Reengineering.	1
2.4	<b>LEVEL 2 (Repeatable) Processes:-</b> Migration of the Origami Process to Level 2	1
2.5	Purchase Order Process: Second attempt at Reengineering	1
2.6	The Computer Aided Process Reengineering Method of Documentation.	1
<b>3</b>	<b>LEVEL 3 (Defined) Processes:-</b> Migration of the Original Process to Level 3-	1
3.1	Purchase Order Process: Third Attempt at Reengineering.	1
3.2	<b>LEVEL 4 (Measured) Processes:-</b> Measuring the Origami Process-	1
3.3	Purchase Order Process: Fourth Attempt at Reengineering	1
3.4	Process Drivers and Process Metrics	1
3.5	Input to Tasks-Staff Required for the task	1
3.6	Time Required to perform the task- Conditional Processing-Task Initiation	1
3.7		
3.8	Rework-Costs-Process metrics.	1
<b>4</b>	<b>OPTIMIZED (LEVEL 5) Processes:-</b> Origami Process Migration to Level 5.	1
4.1	Modeling and Simulation Terminology and Techniques:- An Overview-	1
4.2	Visual Paradigm-Icons-Iconic Blocks	1
4.3	Types of Simulation-Discrete & Continuous-Hybrid Simulation	1
4.4	Object Orientation – Requirements – Based Analysis -	1
4.5	Hierarchical lock libraries-Open Architecture.	1
<b>5</b>	<b>Process Reengineering Case Studies-</b> Applications of Computer Aided Process Reengineering	1
5.1	Software Support Process Simulating Software Development Schedules	1
5.2		

5.3	A Sample Process-Modeling Process	1
5.4	Determining the Best Process.	1
5.5	Case Studies on BPR for different business sectors	1
5.6	Comparing CMM levels with BPR levels	1
	Total	36

**Course Designers:**

Dr.S.Vijayalakshmi

[svlcse@tce.edu](mailto:svlcse@tce.edu)

Dr.A.John Sanjeev Kumar

[ajscse@tce.edu](mailto:ajscse@tce.edu)

**14CAPS0****SOFT COMPUTING**

Category	L	T	P	Credit
PE	2	1	0	3

**Preamble**

Soft Computing represents a collection or set of computational techniques in computer science and engineering, which investigate, simulate, and formalize the human ability to make rational decisions in an environment of uncertainty, imprecision, partial truth, and approximation. The course is designed to introduce students to soft computing concepts and techniques and foster their abilities in designing and implementing soft computing based solutions for real-world problems.

**Prerequisite**

- 14CA230 : Design and Analysis of Algorithms
- Programming in C/C++/Java

**Course Outcomes**

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

**CO1:** Identify and describe soft computing techniques and their roles in building intelligent machines **Understand**

**CO2:** Analyze and apply the ideas of fuzzy sets, fuzzy logic in developing fuzzy inference systems **Analyze**

**CO3:** Apply the knowledge of unsupervised and supervised neural networks in approaching real world problems **Analyze**

**CO4:** Apply genetic algorithms to combinatorial optimization problems **Apply**

**CO5:** Recognize the feasibility of applying a soft computing methodology for specific problem **Evaluate**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	L	-	-	-	-	-	-	-	-
CO2	S	S	S	M	S	M	L	M	-
CO3	S	S	S	M	S	M	L	M	-
CO4	S	S	S	M	S	M	L	M	-
CO5	S	S	S	M	S	M	S	M	L

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests			Terminal Examination
	1	2	3	
Remember	20	20	10	10
Understand	40	20	20	20
Apply	40	40	40	40
Analyse	0	20	20	20
Evaluate	0	0	10	10
Create	0	0	0	0

### Course Level Assessment Questions

Identify and describe soft computing techniques and their roles in building intelligent machines (CO1):

1. What are the advantages of using Soft Computing?
2. Identify the major categories of soft computing techniques.
3. Give few applications that uses soft computing techniques and explain them in detail.
4. How is Artificial Intelligence and soft computing interrelated?
5. Explain in detail about the dependency between machine learning and soft computing.
6. Is soft computing strictly a part of software solutions? Give reasons.

**Analyze and apply the ideas of fuzzy sets, fuzzy logic in developing fuzzy inference systems (CO2):**

1. Give some common applications of fuzzy logic?
2. What are the different methods of De-fuzzification?
3. What are the parameters to be considered for the design of membership function?
4. Find the fuzzy max and fuzzy min of A and B  
Let  $A = \{(x1, 0.2), (x2, 0.7), (x3, 0.4)\}$  and  $B = \{(y1, 0.5), (y2, 0.6)\}$  be two fuzzy sets defined on the universe of discourse  $X = \{x1, x2, x3\}$  and  $Y = \{y1, y2, y3\}$  respectively. Find the Cartesian product of the A and B and fuzzy relation R.
5. A realtor wants to classify the houses he offers to his clients. One indicator of comfort of these houses is the number of bedrooms in them. Let the available types of houses be represented by the following set.  
 $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$   
The houses in this set are described by u number of bedrooms in a house. The realtor wants to describe a "comfortable house for a 4-person family," using a fuzzy set. Derive a solution for this.
6. Analyze how a MATLAB fuzzy tool box could be used to produce a fuzzy inference system based on Mamdani and Sugeno fuzzy models.

Apply the knowledge of unsupervised and supervised neural networks in approaching real world problems (CO3):

1. What are the types of learning?
2. Mention the linear and non-linear activation functions used in ANN.
3. What is perceptron?
4. What is feed forward network? Give example.
5. Compare Supervised neural networks with unsupervised neural networks.
6. Explain multilayer perceptron with its architecture. How is it used to solve XOR Problem?
7. A two layer network is to have four inputs and six outputs. The range of the outputs is to be continuous between 0 and 1. What can you tell about the network architecture? Specifically,
  - (a) How many neurons are required in each layer?
  - (b) What are the dimensions of the first-layer and second layer weight Matrices? (Hidden layer neurons are 5)
  - (c) What kinds of transfer functions can be used in each layer?

Apply genetic algorithms to combinatorial optimization problems (CO4):

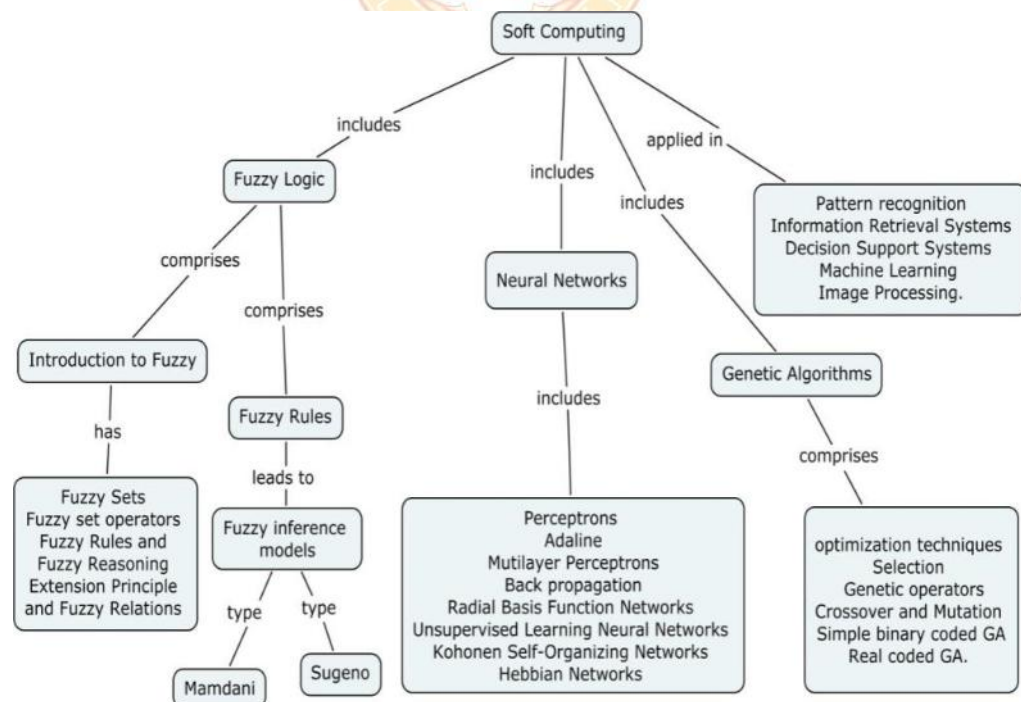
1. Define: optimization
2. Mention the different methods selection.

3. What are the genetic operators used in GA?
4. Analyze the different methods of generating the population in genetic algorithms and make a comparison study.
5. Probe two different scenarios where binary coded and real coded GA apply themselves.
6. Perform two generations of simple binary coded and real coded genetic algorithm to solve the following optimization problem. Maximize  $f(x) = |x| \sin(x)$   $-5 \leq x \leq 5$ ,  $x$  is real number. Use proportionate selection, single point crossover, and binary mutation for simple GA and proportionate selection, Arithmetic crossover, and Gaussian mutation for RGA. Use population size of six for both SGA and RGA. Evaluate the performance of SGA and RGA after two generations.

**Recognize the feasibility of applying a soft computing methodology for specific problem (CO5):**

1. Analyze the application of Soft computing in Image Processing.
2. Justify and give suggestion of improving IR systems with Soft Computing techniques.
3. Consider a character recognition problem from a given handwritten text. Justify the use of Neural networks and genetic algorithms in getting the needed output.
4. Consider a 4 input, 1 output parity detector. The output is 1 if the number of inputs is even. Otherwise, it is 0. Is this problem linearly separable? Justify your answer.

**Concept Map**





### Syllabus

**INTRODUCTION TO SOFT COMPUTING** : Introduction – Artificial Intelligence – Applications – Techniques. **FUZZY SET THEORY** Introduction to Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Fuzzy set operators – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Fuzzy Modeling. **OPTIMIZATION TECHNIQUES**: Introduction to optimization techniques - Genetic Algorithms - Selection - Genetic operators- Crossover and Mutation –Simple binary coded GA-Real coded GA – Heuristics Techniques. **NEURAL NETWORKS**: Introduction - Supervised Learning Neural Networks – Perceptrons - Adaline – Mutilayer Perceptrons – Back propagation - Radial Basis Function Networks – Unsupervised Learning Neural Networks – Kohonen Self-Organizing Networks – Hebbian Networks **APPLICATIONS OF SOFT COMPUTING**: Decision Support Systems – Machine Learning.

### Reference Books

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing- A Computational Approach to Learning and Machine Intelligence", Prentice-Hall of India, 2009.
2. Hans-Jürgen Zimmermann, "Fuzzy Set Theory - and Its Applications", Springer, 4th edition, 2012.
3. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Education., 2007.
4. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 2008.
5. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2007.
6. S.N.Sivanandam • S.N.Deepa, "Introduction to Genetic Algorithms", Springer, 2007.

### Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
<b>1. Introduction &amp; Fuzzy Set Theory</b>		
1.1	Introduction to Soft Computing	1
1.2	Artificial intelligence	1
1.3	Basic applications and techniques	1
1.4	Fuzzy sets – Basic Definition and Terminology	1
1.5	Fuzzy Set operators	1
1.6	Fuzzy Rules and Fuzzy Reasoning	2
1.7	Extension Principle and Fuzzy Relations	1
1.8	Fuzzy Inference Systems – Mamdani Fuzzy Models	1
1.9	Sugeno Fuzzy Models – Fuzzy Modeling	1
<b>2. Optimization Techniques</b>		
2.1	Introduction to optimization techniques	2
2.2	Genetic Algorithms	1
2.3	Selection - Genetic operators	1
2.4	Crossover and Mutation	1
2.5	Simple binary coded GA-Real coded GA.	2
2.6	Heuristics Techniques	3
<b>3. Neural Networks</b>		



3.1	Introduction - Supervised Learning Neural Networks	1
3.2	Perceptrons - Adaline	1
3.3	Multilayer Perceptrons	1
3.4	Back propagation	2
3.5	Radial Basis Function Networks	1
3.6	Unsupervised Learning Neural Networks	1
3.7	Kohonen Self-Organizing Networks	4
3.8	Hebbian Networks	1
<b>4 . Applications of soft computing</b>		
4.1	Decision Support Systems	4
4.2	Machine Learning	3
	Total	<b>36</b>

**Course Designers:**

Mrs. D. Anitha

[anithad@tce.edu](mailto:anithad@tce.edu)

Mrs. K. Murugeswari

[kmcse@tce.edu](mailto:kmcse@tce.edu)

<b>14CA570</b>	<b>COBOL PROGRAMMING LABORATORY</b>	Category	L	T	P	Credit
		PC	0	0	2	2

**Preamble**

This course is designed to give students a basic understanding of COBOL Programming and it will help them quickly get up to speed developing efficient COBOL programs.

**Prerequisite**

None

**Course Outcomes**

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

**CO1:** Code and compile COBOL programs with no syntax errors .

**CO2:** Analyze program specifications and design accurate and efficient COBOL program: to meet those specifications

**Mapping with Programme Outcomes**

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1</b>	S	S	M	S	S	S	-	S	S
<b>CO2</b>	S	M	S	S	M	-	S	S	S

S- Strong; M-Medium; L-Low

**List of Experiments**

- 1. Beginners Programs** - Simple programs using ACCEPT, DISPLAY and some arithmetic verbs. – Discount Calculation
- 2. Selection and Iteration** - Selection (IF, EVALUATE) and Iteration (PERFORM) example programs. – Count of Students based on their Gender.
- 3. Sequential Files** - Programs that demonstrate how to process sequential files. – Employee Pay Report Calculation.
- 4. Sorting and Merging** - Examples that use INPUT Procedure's and the SORT and MERGE verbs – Students Marks Processing.
- 5. COBOL Tables** - Example programs using tables. – Income Tax Calculation.
- 6. CALLing sub-programs** - Example programs that Demonstrate contained, and external, sub-programs. – Purchase Requirement Report Preparation.
- 7. The COBOL Report Writer** - Example programs using the COBOL Report Writer. – Report on Yahoo.com Web Site.
- 8. Master and Transaction Files** - Example programs that show how to process Master and Transaction files. – Stock Maintenance.
- 9. String handling** - Example programs that show how to use Reference Modification, INSPECT and UNSTRING. – Cable Operator Schemes.
- 10. Project**

**Course Designers:**

Dr. S. Vijayalakshmi [svlcse@tce.edu](mailto:svlcse@tce.edu)

Mr. T. Chandrakumar [tckcse@tce.edu](mailto:tckcse@tce.edu)

14CA580	<b>APPLICATIONS DEVELOPMENT LABORATORY</b>	Category	L	T	P	Credit
		PC	0	0	1	1

### Preamble

This course aims at facilitating the student to practice the development of different kinds of applications ranging from simple desktop application to mobile based application development.

### Prerequisite

- 14CA340 : Software Engineering
- 14CA370 : Internet and Java Programming Laboratory
- 14CA420 : Object Oriented Analysis and Design
- 14CA470 : Web Technologies Laboratory

### Course Outcomes

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

**CO1:** Develop Software based on Customers Requirement ranging from Desktop to mobile applications **Understand, Apply**

**CO2:** Test the developed code using unit and integration testing tools **Apply, Analyze**

### Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	S	S	S	S	S	-	-
CO2	-	-	-	S	S	S	S	-	-

S- Strong; M-Medium; L-Low

### List of Experiments

1. Desktop Application Development – Address Book Maintenance
  - a. Data Base Design
  - b. Module Development
  - c. Testing the application
2. Client / Server Application Development – Hospital Management System
  - a. Data Base Design
  - b. Module Development
  - c. Testing the application
3. Web Application Development – Online Airlines Reservation System
  - a. Data Base Design
  - b. Module Development
  - c. Testing the application
4. Web Service Development – Credit Card Validation
  - a. Service Creation
  - b. Service Registration
  - c. Service Invocation
5. Mobile Application Development – Phone Book Maintenance
  - a. Data Base Design
  - b. Module Development
  - c. Testing the application

### Course Designers:

Dr. D. Jeya Mala [djmcse@tce.edu](mailto:djmcse@tce.edu)

Mrs. D. Anitha [anithad@tce.edu](mailto:anithad@tce.edu)

**Preamble**

This course aims at providing introduction on using Big Data and familiarizing industrial practices on using different tools and techniques for Big Data Analytics.

**Prerequisite**

- 14CA150 : Database Management Systems

**Course Outcomes**

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

**CO1:** explain the Big data framework and differentiate from standard data streams **Understand**

**CO2:** analyze and select suitable tools and techniques for big data analytics **Analyze**

**Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	-	M	-	S	M	-	-	--	-
CO2	S	S	M	S	S	S	S	M	L

S- Strong; M-Medium; L-Low

**Assessment Pattern**

Bloom's Category	Terminal Examination
Remember	20
Understand	20
Apply	40
Analyse	20
Evaluate	0
Create	0

**Course Level Assessment Questions**

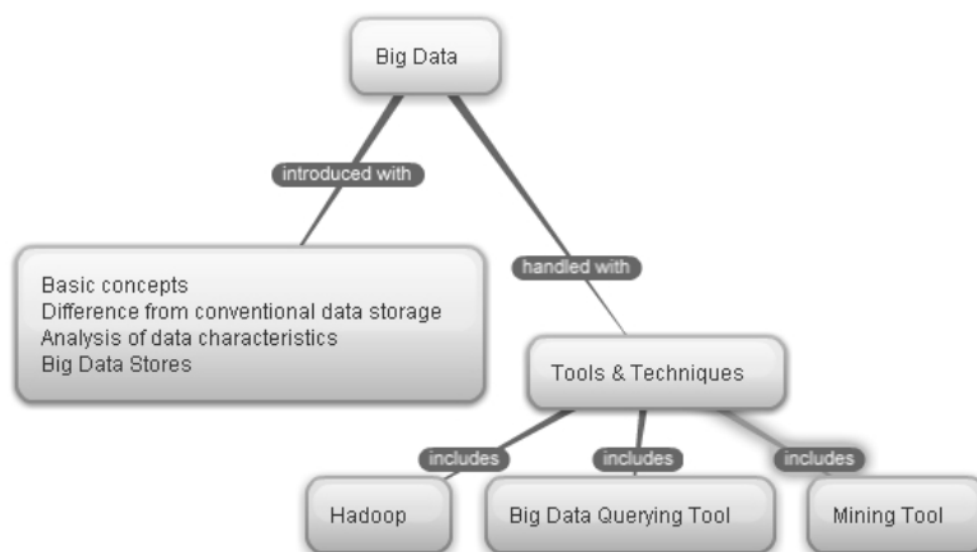
Explain the Big data framework and differentiate from standard data streams (CO1):

1. Write down the significance of Bigdata.
2. Give short notes on data floating on online shopping websites.
3. Explain about the support provided by Hadoop framework for Bigdata Processing.
4. NOSQL – State the need.
5. Give a detailed description on databases supporting Big Data processing.

Analyze and select suitable tools and techniques for big data analytics (CO2):

1. Discuss the methods of abstracting Hadoop Mapreduce jobs with Pig.
2. HIVEQL is a helpful tool in Big data processing – State valid reasons.
3. Explain the role of Mahout in extracting information from Bigdata of online stores.

## Concept Map



## Syllabus

**Introduction to Big Data** - Defining Big Data, Delivering business benefit from Big Data, Analyzing data characteristics, Overview of Big Data stores **Tools and Techniques for analytics** - Abstracting Big Data, Performing AdHoc querying, Creating business value from extracted data

## Reference Books

1. Zikopoulos, Paul, and Chris Eaton. *Understanding big data: Analytics for enterprise class hadoop and streaming data*. McGraw-Hill Osborne Media, 2011.
2. Franks, Bill. *Taming the big data tidal wave: Finding Opportunities in Huge data streams with advanced Analytics*. Vol. 56. John Wiley & Sons, 2012.

## Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
1.	<b>Introduction to Big Data</b>	
1.1	Defining Big Data	1
1.2	Delivering business benefit from Big Data	1
1.3	Analyzing data characteristics	1
1.4	Overview of Big Data stores	1
2.	<b>Tools and Techniques to analyze big data</b>	
2.1	Abstracting Big Data	1
2.2	Performing AdHoc querying	2
2.3	Creating business value from extracted data	3

## Course Designers:

1. Mr.T. Hariharasudhan      gotoharry@gmail.com
2. Mrs. D.Anitha              anithad@tce.edu

<b>14CAP20</b>	<b>SOFTWARE TESTING TOOLS AND PRACTICES</b>	Category	L	T	P	Credit
		OC	1	0	0	1

### Preamble

This course aims at providing industrial practices on using automated software testing tools determine the quality of a Software product

### Prerequisite

- 14CA530 : Software Quality and Testing
- 14CA480: Software Engineering Laboratory

### Course Outcomes

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

**CO1:** Use techniques, skills, and modern engineering tools to test the software under given constraints Apply

**CO2:** Work on multidisciplinary teams of different problem domains Analyze, Apply

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
<b>CO1.</b>	M	S	S	S	M	-	-	-	-
<b>CO2.</b>	-	-	-	-	S	S	S	S	S

S- Strong; M-Medium; L-Low

### Assessment Pattern

Bloom's Category	Terminal Examination
Remember	20
Understand	20
Apply	40
Analyse	20
Evaluate	0
Create	0

### Course Level Assessment Questions

**Use techniques, skills, and modern engineering tools to test the software under given constraints (CO1):**

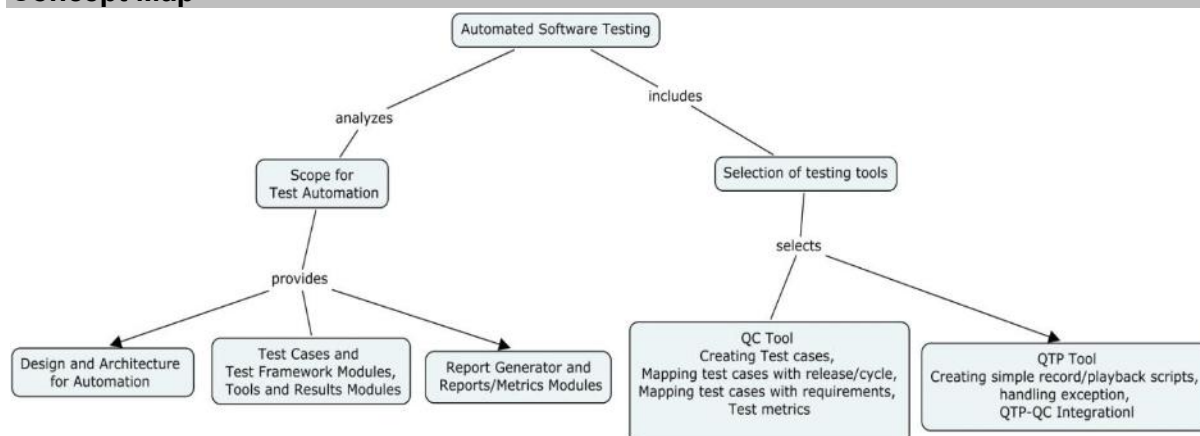
1. List the skills needed for automation.
2. What is a test case?
3. How QTP helps in generating automated test scripts?
4. Map the test cases generated using QC tool with customer stated requirements.
5. How QTP and QC results be integrated to generate a test report?

**Work on multidisciplinary teams of different problem domains (CO2):**

1. How automation is done for Extreme Programming Model?
2. For a medical domain having an application called 'Online Health Care System', devise test cases and test scripts using QTP and QC.
3. How a testing team establishes defect management activities with development team?
4. When will you use capture and playback scripts?

5. In critical online business transactions, how for automation helps in identifying vulnerable attacks by hackers and other malicious attacks?

### Concept Map



### Syllabus

**Software Test Automation:** Skills Needed for Automation- Scope of Automation : Management Aspects in Automation, Design and Architecture for Automation : Test Cases and Test Framework Modules, Tools and Results Modules- Report Generator and Reports/Metrics Modules, Generic Requirements for Test Tool/Framework : Selecting a Test Tool, Automation for Extreme Programming Model, Challenges in Automation -QTP/QC Tools: QC Tool: Creating Test cases, Mapping test cases with release/cycle, Mapping test cases with requirements, Test metrics, QTP Tool: Creating simple record/playback scripts, handling exception, QTP-QC Integration

### Reference Books

1. Srinivasan Desikan, Gopalswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2<sup>nd</sup> Edition, 2007

### Course Contents and Lecture Schedule

Module No.	Topic	No. of Lectures
1.	<b>Software Test Automation</b>	
1.1	Scope of Automation	1
1.2	Design and Architecture for Automation	1
1.3	Automation for Extreme Programming Model, Challenges in Automation	1
1.4	Test Cases and Test Framework Modules, Report Generator and Reports/Metrics Modules, Generic Requirements for Test Tool/Framework	1
2.	<b>Selecting a Test Tool</b>	
2.1	QC Tool: Creating Test cases, Mapping test cases with release/cycle, Mapping test cases with requirements, Test metrics	3
2.2	QTP Tool: Creating simple record/playback scripts, handling exception, QTP-QC Integration	3

### Course Designers:

- |    |                        |                              |
|----|------------------------|------------------------------|
| 1. | Mr. Srinivasan Desikan | srinivasan.desikan@gmail.com |
| 2. | Dr. D. Jeya Mala       | djmcse@tce.edu               |