Progressive Education Society's

Modern College of Engineering

Department of Computer Engineering

Curriculum Booklet

Third Year

2015 Pattern

Semester-I

Progressive Education Society's

Modern College of Engineering, Shivajinagar, Pune-05.

Department of Computer Engineering

Curriculum Booklet

2015 – Pattern

Class: TE Computer Engineering

Semester: I

Vision of the Institute

"To create a collaborative academic environment to foster professional excellence and ethical values"

Mission of the Institute

- To develop outstanding professionals with high ethical standards capable of creating and managing global enterprises.

- To foster innovation and research by providing a stimulating learning environment.

- To ensure equitable development of students of all ability levels and backgrounds.

- To be responsive to changes in technology, socio-economic and environmental conditions.

- To foster and maintain mutually beneficial partnerships with alumni and industry.

Vision of the Department

- To achieve excellence in the field of computing through quality education.

Mission of the Department

- To develop promising professionals in the field of computing.
- To provide exposure to emerging technologies and inculcate ethics.
- To strengthen association with alumni and industry.

Objectives of the Institute

- To develop infrastructure appropriate for delivering quality education

- To develop the overall personality of students who will be innovators and future leaders capable of prospering in their work environment.

- To inculcate ethical standards and make students aware of their social responsibilities.

- Promote close interaction among industry, faculty and students to enrich the learning process and enhance career opportunities.

- Encourage faculty in continuous professional growth through quality enhancement programs and research and development activities.

- Foster a healthy work environment which allows for freedom of expression and protection of the rights of all stakeholders through open channels of communication

Program Educational Objectives

The graduates of Computer Engineering Department will be,

PEO1: Capable of solving real world problems.

PEO2: Capable of working with multidisciplinary projects.

PEO3: Capable to adapt to changing technologies and life management skills.

PEO4: Able to exhibit professional and ethical responsibilities.

Program Specific Outcomes

Graduate of computer engineering program will demonstrate

- The ability to understand, analyze, develop and evaluate system based on various algorithmic approaches.

- The ability to pursue career in IT industries, to become an entrepreneur and have zest for higher studies.

- The ability to solve problems using engineering principles, tools and techniques.

Program Outcomes

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

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

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

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

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

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

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

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

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

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

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

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

Departmental Academic Planner: Student Activities

Year: 2020-2021   **Semester: I**

Progressive Education Society's
Modern College Of Engineering, Pune-05.

DEPARTMENT OF COMPUTER ENGINEERING

Departmental Academic Calendar
(Students Activities) (SE to BE)

Year: 2020-2021   **Term: I**

Sr. No.	Date	Activity
1.	13/06/20	Time Table display
2.	15/06/20	Registration and commencement of the academic semester. HOD's address.
3.	15/07/2020	Review of First Month Attendance.
4.	16 – 20/07/2020	Remedial Actions to be taken for low attendance category students and its follow-up.
5.	15/08/2020	Independence Day Celebration
6.	16/08/2020	Review of second month attendance.
7.	16//09/2020	Review of third month attendance.
8.	23-28/09/2020	End Term Feedback from Students.
9.	04/10/2020	Display of Submission Schedule.
10.	01 - 12/10/20	Mock Practical / Oral Exams and Final submission.
11.	14/10/2020	Final attendance review (Theory + Practical) (IVth).
12.	*16/10/20	Term End.
13.	*18/10/20 - 05/11/20	University Practical/Oral Exam.
14.	*14/11/20 - 07/12/20	University Theory Exam.
15.	*16/12/20	Second Term Commencement.

* Subject to Change as per the guideline from university.
**Individual staff can take more than one test as per their assessment tool planner.

Prof. Dr. Mrs. S.A.Itkar
(H.O.D.ComputerEngg.)

Note: - .Individual staff can take more assessment test as per their assessment tool planner.
-     SPPU Examination will be scheduled as per SPPU notification.

(Prof. Dr. Mrs. S .A. Itkar)
HOD

Course Structure

Savitribai Phule University of Pune
Third Year Computer Engineering (2015 Course)
(with effect from 2017-18)

Semester I

Course Code	Course	Teaching Scheme Hours / Week			Examination Scheme and Marks						Credit	
		Theory	Tutorial	Practical	In-Sem	End-Sem	TW	PR	OR	Total	TH/TUT	PR
310241	Theory of Computation	03	--	--	30	70	--	--	--	100	03	--
310242	Database Management Systems (DBMS)	03	--	--	30	70	--	--	--	100	03	--
310243	Software Engineering & Project Management	03	--	--	30	70	--	--	--	100	03	--
310244	Information Systems & Engineering Economics	03	--	--	30	70	--	--	--	100	03	--
310245	Computer Networks (CN)	04	--	--	30	70	--	--	--	100	04	--
310246	Skills Development Lab	--	02	04	--	--	50	--	50	100	02	02
310247	DBMS Lab	--	--	04	--	--	25	50	--	75	--	02
310248	CN Lab	--	--	02	--	--	25	50	--	75	--	01
									Total Credit		18	05
	Total	**16**	**02**	**10**	**150**	**350**	**100**	**100**	**50**	**750**	**23**	
310249	Audit Course 3										Grade	

310249-Audit Course 3 (AC3) Options:

AC3-I: Cyber Security   AC3-II: Professional Ethics and Etiquettes

AC3-III: Emotional Intelligence   AC3-IV: MOOC- Learn New Skills

AC3-V: Foreign Language (Japanese- Module 3)

Abbreviations:

TW: Term Work   TH: Theory   OR: Oral   TUT: Tutorial   PR: Practical   Sem: Semester

Progressive Education Society's
Modern College of Engineering
DEPARTMENT OF COMPUTER ENGINEERING

Curriculum

Name of the Subject – Theory of Computation

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	3	-	-

In-Sem	Theory	Total Marks	Credit
30	70	100	3

1.1 Course Objectives

1. To Study abstract computing models
2 To learn Grammar and Turing Machine
3 To learn about the theory of computability and complexity

1.2 Course Outcomes

- Interpret basic concepts of formal language theory and finite automata.
- Analyze and construct the finite automata for regular expression.
- Utilize Context Free Grammar to define language.
- Construct Turing machines for different languages.
- Build a Push down Automata for a given Context Free Language.
- Analyze the algorithmic problems into P and NP.

1.3 Syllabus

Unit	Course Contents	Hours
I	**Topics –Formal Language Theory and Finite Automata**	08
	Introduction to Formal language, introduction to language translation logic, Essentials of translation, Alphabets and languages, Finite representation of language, Finite Automata (FA): An Informal Picture of FA, Finite State Machine (FSM), Language accepted by FA, Definition of Regular Language, Deterministic and Nondeterministic FA(DFA and NFA), epsilon- NFA, FA with output: Moore and Mealy machines -Definition, models, inter-conversion. Case Study: FSM for vending machine, spell checker Unit	
II	**Topics – Regular Expressions (RE)**	07
	Introduction, Operators of RE, Building RE, Precedence of operators, Algebraic laws for RE, Conversions: NFA to DFA, RE to DFA Conversions: RE to DFA, DFA to RE Conversions: State/loop elimination, Arden's theorem Properties of Regular Languages: Pumping Lemma for Regular languages, Closure and Decision properties. Case Study: RE in text search and replace	
III	**Topics – Context Free Grammars (CFG) and Languages**	08
	Introduction, Regular Grammar, Context Free Grammar- Definition, Derivation, Language of grammar, sentential form, parse tree, inference, derivation, parse trees, ambiguity in grammar and Language- ambiguous Grammar, Simplification of CFG: Eliminating unit productions, useless production, useless symbols, and Є-productions, Normal Forms-Chomsky normal form, Greibach normal form, Closure properties of CFL, Decision properties of CFL, Chomsky Hierarchy, Application of CFG: Parser, Markup languages, XML and Document Type Definitions. Case Study- CFG for Palindromes, Parenthesis Match,	
IV	**Topics – Turing Machines (TM)**	08
	Turing Machine Model, Representation of Turing Machines, Language Acceptability by Turing Machines, Design of TM, Description of TM, Techniques for TM Construction, Variants of Turing Machines, The Model of Linear Bounded Automata , TM & Type 0 grammars, TM's Halting Problem.	
V	**Topics – Pushdown Automata(PDA)**	07
	Basic Definitions, Equivalence of Acceptance by Finite State & Empty stack, PDA & Context Free Language, Equivalence of PDA and CFG, Parsing &	

	PDA: Top-Down Parsing, Top-down Parsing Using Deterministic PDA, Bottom-up Parsing, Closure properties and Deterministic PDA.	
VI	**Topics – Undecidability& Intractable Problems**	**07**
	A Language that is not recursively enumerable, An un-decidable problem that is RE, Post Correspondence Problem, The Classes P and NP : Problems Solvable in Polynomial Time, An Example: Kruskal's Algorithm, Nondeterministic Polynomial Time, An NP Example: The Traveling Salesman Problem, Polynomial-Time Reductions NP Complete Problems, An NP Complete Problem: The Satisfiability Problem, Tractable and Intractable, Representing Satisfiability, Instances, NP Completeness of the SAT Problem, A Restricted Satisfiability Problem: Normal Forms for Boolean Expressions, Converting Expressions to CNF, The Problem of Independent Sets, The Node-Cover Problem.	

1.4 Text Books

T1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman, "Introduction to Automata Theory Languages and Computation", Addison-Wesley, ISBN 0-201-44124-1.

T2. H.L. Lewis, Christos H. Papadimitriou, "Elements of the Theory of Computation", Prentice Hall, ISBN-10: 0132624788; ISBN-13: 978-0132624787

1.5 Reference Books

hn Martin, "Introduction to Languages and The Theory of Computation", 2nd Edition, Mc Graw Hill Education, ISBN-13: 978-1-25-900558-9, ISBN-10: 1-25-900558-5

R2. Sanjeev Arora and Boaz Barak, "Computational Complexity: A Modern Approach", Cambridge University Pre ss, ISBN:0521424267 9780521424264

R3. Daniel Cohen, "Introduction to Computer Theory", Wiley & Sons, ISBN 9788126513345

R4. J. Carroll & D Long, "Theory of Finite Automata", Prentice Hall, ISBN 0-13-913708-4

R5. Kavi Mahesh, "Theory of Computation : A Problem-Solving Approach", Wiley India, ISBN10 8126533110

R6. Michael Sipser, "Introduction to the Theory of Computation", Cengage Learning, ISBN-13: 9781133187813

R7. Vivek Kulkarni "Theory of Computation", Oxford University Press, ISBN 0-19-808458

1.6 Reference Links

https://nptel.ac.in/courses/106104028/

http://www.jflap.org/

http://automatonsimulator.com/

<u>1.7 Teaching Plan</u>

Sr. No.	Unit	Broad Topic to be covered	Books Referred	Total Lectures Planned
1	I	Formal Language Theory and Finite Automata	T1,R1,R3	8
2	II	Regular Expressions (RE)	T1,R2,T2	7
3	III	Context Free Grammars (CFG) and Languages	T1,R3	8
4	IV	Turing Machines (TM)	T1,R4	8
5	V	Pushdown Automata(PDA)	T1,T2,R1	7
6	VI	Undecidability & Intractable Problems	T1, R6	7

1.8 Assessment Tools Details

Sr. No.	Assessment Tool	Marks	Marks scale down to
1	Test (T1 to T2)	Each of 15 Marks	30
2	Test T3 (MCQ)	50 Marks	50
	Total		80

1.9 Question Bank

UNIT I

1. Define proof by contra positive and induction principle

It is the other form of If then statement. The contra positive of the statement „"If H then C „"
is „"If not C
then not H""
Induction Principle
If S(i) is true for n = i ,then it is to be proved that for all n > i , S(n) implies S(n+1) then S(n)
is true for all n
$\geq$ i..

2 **Define Pumping lemma for regular language.**
Let L be a regular language. Then there exists a constant n such that for every string w in
L ,|w|>n, z = uvw
such that (i)|uv|<n, |v|>0 then uviw $\square\square$L for all i.

3 **State Arden's theorem.**
Let P and Q be two regular expressions over $\square\square$. If P does not contain null string $\square\square$over
$\square\square$then R=Q+RP, it has the solution R=QP* .

4 **Prove that L = { 0n12n / n $\square\square$1} is not regular**.
Let z = uvw = 0n12n, let v = 1m,u = 0n,w = 12n-m
uviw = 0n1mi12n-m,let I = 0 , then uw =0n12n-m$\square$L. Therefore L is not regular.

5 **Write RE which denotes the language L over the set $\square\square$= {a,b} such that all the
strings do not contain
the substring ab.**
RE = (b*a*).

6 **Write regular expressions for the following.**
(i)Binary numbers that are multiple of 2. **(0/1)*.**
(ii)Strings of a‟s and b‟s with no consecutive a‟s .**b* (abb*)(a / □)** (iii) Strings of a‟s and b‟s containing
consecutive a‟s. **(a/b)*aa(a/b)*.**

7.**How a Non deterministic finite state automaton (NFA) differs from a Deterministic finite state automaton (DFA).**

Solution:

DFA	NFA
On each input there is one and only one stae to which the automaton move from its current state	On each input the automaton can be in several states at once
Next state is completed by determining current state and current symbol	The state is only partially determined by the current state and current input symbol
The transition function returns only one state.(i.e) Q X Q □ □ : □	The transition function returns zero, one or more states.(i.e) Q X Q 2 : □ □ □

8.**Define the languages described by DFA and NFA.**
L(DFA) = { w / δ‟(q0,w) is in F}.It is the set of strings w that take the start state q0 to one of the accepting states.
L(NFA)= { w / δ‟(q0,w)∩F≠□}.It is the set of strings w such that δ‟(q0,w)contains at least one accepting state.

9.**Define the languages described by DFA and NFA.**
L(DFA) = { w / δ‟(q0,w) is in F}.It is the set of strings w that take the start state q0 to one of the accepting states.
L(NFA)= { w / δ‟(q0,w)∩F≠□}.It is the set of strings w such that δ‟(q0,w)contains at least one accepting state.

10.**Define extended transition function for a NFA.**
The extended transition function δ‟: Q□Σ* □2Q is defined as follows.
(i) **δ'(q, ε) = {q}**

(ii) Suppose w is of the form xa where a is the final symbol of w and x is the rest of w.
δ'(q,x)= {p1, p2, p3...pk}
k
U δ(pi,a) = {r1, r2, r3,.....rm}
i=1
Therefore **δ‟(q,w) ={r1, r2, r3,.....rm}**

11. **Define extended transition function for a □-NFA.**
The extended transition function δ‟: Q□Σ* □2Q is defined as follows.(i) δ‟(q, λ) = □ {q}
(ii)For any w□Σ* , a□Σ and q□Q , δ‟(q, wa) = □ □ δ(q,a).
p□ δ‟(q, y)

UNIT II

Q.1 (a) 10
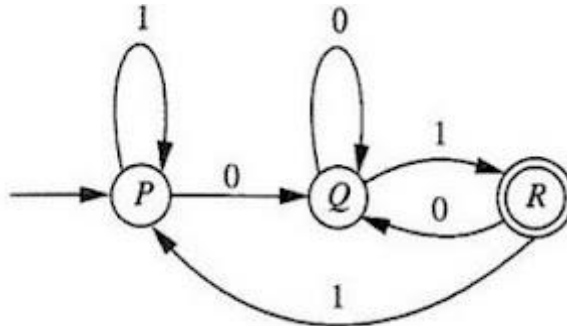
Find out Regular Expression for Given Finite Automaton.

Q.2 (a) Give the Recursive Definition of δ* for an NFA. 5
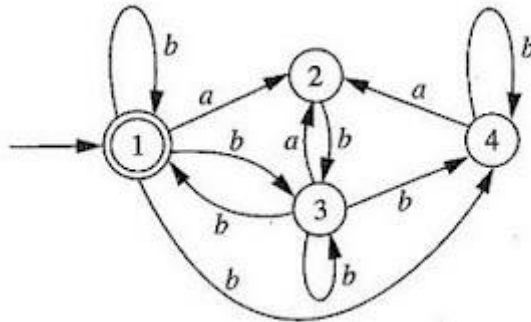
Using Subset Construction Draw FA for Given.

(b) If L subset of Σ* is a Language that is accepted by the NFA – Λ M=(Q, Σ, q0, A, δ), then there is an NFA M1=(Q1, Σ, q1, A1, δ1) that also accepts L. 5

(b) Define Acceptance by an NFA. 5
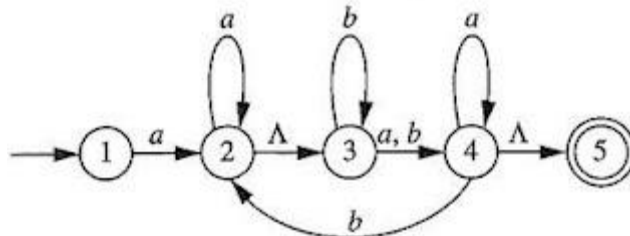
Check Whether the following strings are accepted by NFA or not.
(1) abab (2) aaabbb

Q.1 **(a)** Do as Directed.
    (i) Explain Relationship between DFA and NFA. **2**
    (ii) Write down Statement & Application of Kleene's Theorem Part - I. **2**
    (iii) Non Recursive Definition of δ^* for an NFA. **1**
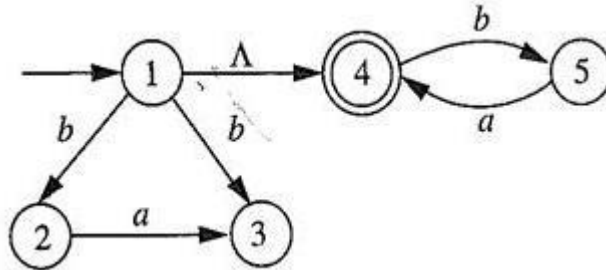**(b)** Prove that The Language accepted by any Finite Automata is Regular. **5**

Q.2 **(a)** Define δ^* for an NFA-Λ Recursively. **5**

Using Algorithm Draw an NFA accepting the same Language.

(b) Define Λ – Closure of a Set of States for NFA-Λ. **5**
A Transition table is given for an NFA- Λ with Seven States.

q	$\delta(q, a)$	$\delta(q, b)$	$\delta(q, \Lambda)$
1	ø	ø	{ 2 }
2	{ 3 }	ø	{ 5 }
3	ø	{ 4 }	ø
4	{ 4 }	ø	{ 1 }
5	ø	{ 6, 7 }	ø
6	{ 5 }	ø	ø
7	ø	ø	{ 1 }

Find: (i) $\Lambda(\{3,4\})$ (ii) $\delta^*(1, ab)$

(b) Convert Given NFA in to Equivalent DFA Using Subset Construction **5**
Method.
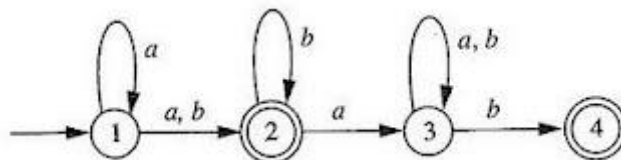
UNIT III

Q.1 **(a)** Do as Directed.
    (i) Define CFG. What is Meaning of Context Free? **2**
    (ii) List out steps to convert CFG in to CNF **2**
    (iii) Define Inherently Ambiguous. **1**
(b) Find out What Language is Generated by following CFG. **5**

15

(i) **S** → aT | bT | Λ.   **T** → aS | bS.
(ii) **S** → aA | bC | b.   **A** → aS | bB.   **B** → aC | bA | a.   **C** → aB | bS

Q.2 **(a)** Define Derivation Tree or Parse Tree.   **5**
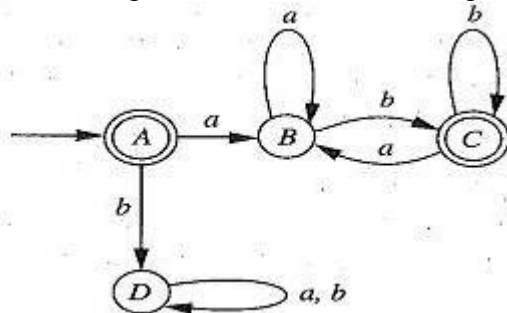Show that following grammar is Ambiguous and Find out Unambiguous grammar for same.
S → aaaaS | aaaaaaaS | Λ.

(b) Prove that The Context Free Grammar G1 with Productions   **5**
S1 → S1 + T | T
T → T * F | F
F → (S1) | a
is Ambiguous.

(b) Find out CFG for L = { x ∈ {0, 1}* | $n_0(x) = n_1(x)$ }   **5**
(a) Do as Directed.

Q.1

(i) List out Applications of CFG.   **2**
(ii) Find out CFG for Regular Expression : (011 + 1)* (01)*   **2**
(iii) Define Linear Grammar.   **1**
(b) Find out CFG for given Language.   **5**
(i) The Set of Odd-Length string in {a, b}* with middle Symbol a.
(ii) The Set of Odd-Length string in {a, b}* whose first, middle, and last Symbols are all the same.

Q.2 **(a)** Define Leftmost and Rightmost Derivation.   **5**
Show that following grammar is Ambiguous and Find out Unambiguous grammar for same.
S → A | B.   **A** → aAb | ab.   **B** → abB | Λ

(b) Define Nullable Variable and Unit Production.   **5**
Find out CFG with no Λ- Productions and no Unit Productions.
S → A | B | C
A → aAa | B
B → bB | bb
C → aCaa | D
D → baD | abD | aa

(b) Define Regular Grammar. Find a Regular Grammar generating L – {Λ}   **5**

Q.1 **(a)** Do as Directed.

(i)	Define Balanced Strings of Parentheses.	2
(ii)	Define CFL. List out Application of CFL.	3

(b) Find out CFG for 5

  --[if !supportLists]-->(1) <!--[endif]-->L = { $a^i b^j c^k$ | j=i or j=k }

  --[if !supportLists]-->(2) <!--[endif]-->L = { $a^i b^j$ | i < 2j }

Q.2 (a) Define An Ambiguous Grammar. 5
Show that following grammar is Ambiguous and Find out Unambiguous grammar for same.
$S \rightarrow ABA$. $A \rightarrow aA \mid \Lambda$. $B \rightarrow bB \mid \Lambda$

(b) Let G be the Context Free Grammar with Productions 5
$S \rightarrow S + S \mid S * S \mid (S) \mid a$
and Let G1 be the Context Free Grammar with Productions
$S1 \rightarrow S1 + T \mid T$
$T \rightarrow T * F \mid F$
$F \rightarrow (S1) \mid a$
Then L (G) = L (G1).

(b) Define CNF. Convert following CFG in to CNF. 5
$S \rightarrow AACD$.
$A \rightarrow aAb \mid \Lambda$
$C \rightarrow aC \mid a$
$D \rightarrow aDa \mid bDb \mid \Lambda$

UNIT IV

Q.1 (a) Do as Directed.
  (i) Give Difference:Top-down Approach Vs Bottom-up Approach. 2
  (ii) Specify the types of moves in PDA. 2
  (iii) Is NPDA and DPDA Equivalent? Give Example. 1

(b) Write a Short note on Pushdown Automaton. 5

Q.2 (a) Obtain the CFG for following PDA. 6

Move number	State	Input	Stack symbol	Move(s)
1	q_0	a	Z_0	(q_0, AZ_0)
2	q_0	b	Z_0	(q_0, BZ_0)
3	q_0	a	A	(q_0, AA)
4	q_0	b	A	(q_0, BA)
5	q_0	a	B	(q_0, AB)
6	q_0	b	B	(q_0, BB)
7	q_0	c	Z_0	(q_1, Z_0)
8	q_0	c	A	(q_1, A)
9	q_0	c	B	(q_1, B)
10	q_1	a	A	(q_1, Λ)
11	q_1	b	B	(q_1, Λ)
12	q_1	Λ	Z_0	(q_1, Λ)
(all other combinations)				none

Give the Corresponding Leftmost Derivation for String : bacab

(a) Do as Directed.

Q.1
  (i) Give Difference : DPDA Vs. NPDA 1
  (ii) Define Acceptance by PDA / String Accepted by PDA. 2
  (iii) Explain the Configuration/Instantaneous Description (ID) of PDA. 2

(b) Define PDA. 5
Construct PDA for Language L = { x ϵ {a, b}* | n_a (x) > n_b (x) }

17

Show the Sequence of Moves for Input String : bbabaa

Q.2 **(a)** Give Transition table and Transition Diagram for the Language of **6** Palindrome. Draw Computation Tree for Input String aba.

Q.1 **(a)** **Do as Directed.**
    (i) Give Difference : NFA Vs. PDA   **2**
    (ii) Write a Short note on Parsing / Parser.   **3**
  (b) **Define DPDA**. Construct DPDA for L = { xcx^r | x ϵ {a, b}* , c ϵ Σ* }   **5**
                                     OR
    Construct PDA for Context Free Grammar S $\rightarrow$ aSa | bSb | c.

Q.2 **(a)** **Define Top-down PDA Corresponding CFG.**
    Construct Top-down PDA for given CFG.
    S $\rightarrow$ a | aS | bSS | SSb | SbS.
    Show the Sequence of Moves for Input String : abbaaa

UNIT V

1. What do you mean by Universal TM?

Universal TM is a type of TM which is capable of doing anything that any other TM can do. That means universal TM is a TM that imitates any TM.

2. Features of Universal TM

• Universal TM can simulate any other turing machine. Universal TM is a single machine used to compute any computable sequence.

• Universal TM has an ability to manipulate an unbounded amount of data in finite amount of time

3. When a problem is said to be decidable and give an example of undecidable problem?

A problem whose language is recursive is said to be decidable. Otherwise the problem is

undecidable . i.e there is no algorithm that takes as input an instance of the problem and determines

whether the answer to that instance is yes or no. E.g. Halting problem

4. When a language is said to be recursively enumerable?

A language is recursively enumerable if there exists a Turing machine that accepts every string belonging to that language. And if the string does not belong to that language then

it can cause the turing machine to enter in an infinite loop
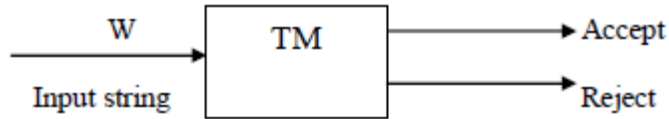
5. When a language is said to be recursive?

A language is said to be recursive if there exists a turing machine that accepts every string of the

language and every string is rejected if it is not belonging to that language.
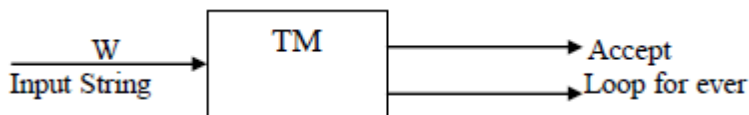
6. State two languages, which are not recursively enumerable

7. Define problem solvable in polynomial time.

A TM M is said to be of time complexity $T(n)$ if whenever M is given an input w of length n , M halts after making at most $T(n)$ moves, regardless of whether or not M accepts.

8. Define the classes P and NP.

P consists of all those languages or problems accepted by some TM that runs in some polynomial amount of time, as a function of its input length.NP is the class of languages or problems that are accepted by some nondeterministic TM"s with a polynomial bound on time taken along any sequence of nondeterministic choices.

9. Define NP complete problem.

A language is NP-complete if the following statements are true.(i)L is in NP (ii)For every language

L" in NP there is a polynomial time reduction of L" to L.

10. What are tractable problems?.

The problems which are solvable by polynomial time algorithms are

called tractable problems. For eg. The complexity of the Kruskal"s algorithm is o(e+m) where e , the no. of edges and m the Number of nodes.

11. What are the properties of recursive and recursively enumerable languages?.

(i)The complement of a recursive language is recursive,(ii)The union of two recursive languages

are recursive. (iii)The union of two recursively enumerable languages are recursively enumerable.(iv)If a language L and are both recursively enumerable then L is recursive.

12. When do you say a problem is NP -hard?

A problem is said to be NP -hard if an algorithm for solving it can be translated into a problem

which is NP problem. Thus NP -hard is a algorithm for a problem which is atleast as hard as any

NP problem. Example -Sum of subset problem, travelling salesman problem.

13. State two languages, which are not recursively enumerable.

•Diagonalization language is not recursively enumerable

•The partially decidable language or undecidable languages are not recursively enumerable.

14. Define Primitive Recursive function

The set PR of primitive recursive function is defined as follows.

1. All initial functions are elements of PR

2. For every k >= 0 and m>= 0, if f : Nk--> N and g1, g2, ... gk: Nm--> N are elements of PR, then he function f(g

g1, g2,...gk) obtained from f and g1, g2,...gk by composition is an element of PR.

3.For every n >= 0, every function : g : N n--> N in PR, and every function h : N n+1--> N

obtained from g and h by primitive recursion is in PR.

15. Define intractable problems

A problem that cannot be solved by a polynomial-time algorithm. The lower bound is exponential.

Examples of intractable problems (ones that have been proven to have no polynomial-time

algorithm)

•Towers of Hanoi: we can prove that any algorithm that solves this problem must have a worst

20

-case running time that is at least 2n− 1.

• List all permutations (all possible orderings) of n numbers.

16. Define Bounded quantification

Let P be an (n+1) -place predicate. The bounded existential quantification of P is the (n+1)

-place predicate Ep defined by Ep(X, k) = (there exists y with $0 \leq y \leq k$ such that P(X, y) is true)

The bounded universal quantification of P is the (n+1) -place predicate Ap defined by

Ap(X, k) = (for every y satisfying $0 \leq y \leq k$, P(X, y) is true).

17. Define Polynomial Time reduction

• A polynomial-time reduction is a method of solving one problem by means of a hypothetical

Subroutine for solving a different problem (that is, a reduction), that uses polynomial time

excluding the time within the subroutine.

• The three most common types of polynomial-time reduction, are polynomial-time many-

one reductions, truth-table reductions, and Turing reductions.

18. Give two properties of recursively enumerable sets which are undecidable

The language accepted by a TM is called Recursively Enumerable language(RE). Every non trivial

property of RE is undecidable. Such properties are

1. Whether the language accepted by TM is regular.

2. Whether the language accepted by TM is context free language.

19. Show that union of recursive language is recursive

L1and L2 are recusive language. Then there exists a machine M1 that accepts L1as well as machine

M2that accepts L

2. We can simulate a machine M that accepts the language L such that L = L1 U L2. Then construct M which accepts if M1 accepts. If M1 does not accept then M2 simulates M. That means if M2 accepts then M accepts, if

M2 rejects M also rejects. Thus M accepts the language L = L1 U L2 which is recursive.

20. Define posts correspondence problem.

An instance of posts correspondence problem consists of two lists A = w1,w2, w3,...wk, B = x1,x2, ...x

k of strings over some alphabet Σ.This instance of PCP has a solution if there is any sequence of ntegers i

1,i2,...imwith m ≥1 such that .The sequence i1,i2,...imis a solution to this instance of PCP.

21. Define modified posts correspondence problem.

Given lists A and B of k strings each from

Σ*, say A = w1,w2, w3,...wk, B = x1,x2, x3,...xk does there exist a sequence of integers i1,i2,...ir

such that w1, = .The sequence i1,i2,...iris a solution to this instance of MPCP.

UNIT VI

1. When we say a problem is decidable? Give an example of undecidable problem.
2. What is recursively enumerable language?
3. Mention the difference between P and NP problems.
4. How to prove that the Post Correspondence problem is Undecidable.
5. Mention the difference between decidable and undecidable problems.
6. What is universal turing machine
7. Define multiple turing machine.
8. Give example for NP-complete problems.
9. State when a problem is said to be decidable and give an example of an undecidable problem.
10. What is a universal Language Lu?
11. When is a Recursively Enumerable language said to be Recursive?
12. Define NP-hard and NP-complete problems.
13. Is it true that the language accepted by a non deterministic Turing Machine is different from recursively enumerable language?
14. Distinguish between PCP and MPCP. What are the concepts used in UTMs?
15. Prove that the halting problem is undecidable.

2. Subject - Database Management System

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	3 hrs	1hr	4hrs

Online/ In-sem	Theory	Practical	Oral	Term-work	Total Marks	Credit
30	70	50	-	25	175	5

2.1 Course Objective

1. To introduce various advance techniques in Database Management Systems.
2. To describe different database architecture and analyses the use of appropriate architecture in real time environment.
3. To be able to explain the concept of NoSQL, Big data.
4. To manipulate a database using SQL.
5. Develop the logical design of the database using data modeling concepts such as entity-relationship diagrams.
6. List and explain the fundamental concepts of a relational database system.
7. Be familiar with the basic issues of transaction processing and concurrency control.

2.2 Course Outcomes

- Illustrate the basic concepts of DBMS and Construct E-R Model.
- Develop queries using Structure Query Language SQL and PL/ SQL for creation and manipulation of Database.
- Analyze and apply the concepts of normalization in relational database System.
- Demonstrate Database Transactions and Transaction Management.
- Explain different database architecture.

2.3 Syllabus

Unit	Course Contents	Hours
I	**Introduction**	**07**
	Introduction to Database Management Systems, Purpose of Database Systems, Database-System Applications, View of Data, Database Languages, Database System Structure, Data Models, Database Design and ER Model: Entity, Attributes, Relationships, Constraints, Keys, Design Process, Entity Relationship Model, ER Diagram, Design Issues, Extended E-R Features, converting E-R & EER diagram into tables.	
II	**SQL AND PL/SQL**	**07**
	SQL: Characteristics and advantages, SQL Data Types and Literals, DDL, DML, DCL, TCL, SQL Operators, Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updating using Views, Indexes, SQL DML Queries: SELECT Query and clauses, Set Operations, Predicates and Joins, Set membership, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries. PL/SQL: concept of Stored Procedures & Functions, Cursors, Triggers, Assertions, roles and privileges , Embedded SQL, Dynamic SQL.	
III	**Relational Database Design**	**08**
	Relational Model: Basic concepts, Attributes and Domains, CODD's Rules, Relational Integrity: Domain, Referential Integrities, Enterprise Constraints, Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Algorithms for Decomposition, 2NF, 3NF, BCNF, Modeling Temporal Data.	
IV	**Database Transactions and Query Processing**	**08**
	Basic concept of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules, Concurrency Control: Need, Locking Methods, Deadlocks, Time- stamping Methods, Recovery methods : Shadow-Paging and Log-Based Recovery, Checkpoints, Query Processing, Query Optimization, Performance Tuning.	
V	**Parallel and Distributed Databases**	**07**
	Introduction to Database Architectures: Multi-user DBMS Architectures, Case study- Oracle Architecture. Parallel Databases: Speedup and Scale up, Architectures of Parallel Databases. Distributed Databases: Architecture of	

	Distributed Databases, Distributed Database Design, Distributed Data Storage, Distributed Transaction: Basics, Failure modes, Commit Protocols, Concurrency Control in Distributed Database.		
VI	**<u>NoSQL Database</u>**		**08**
	Introduction to NoSQL Database, Types and examples of NoSQL Database- Key value store, document store, graph, Performance, Structured verses unstructured data, Distributed Database Model, CAP theorem and BASE Properties, Comparative study of SQL and NoSQL, NoSQL Data Models, Case Study- unstructured data from social media. Introduction to Big Data, HADOOP: HDFS, MapReduce.		

2.4 Text Books:

Sr.No		Text Books
1	T1	Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", McGraw Hill Publishers, ISBN 0-07-120413-X, 6th edition
2	T2	Connally T, Begg C., "Database Systems", Pearson Education, ISBN 81-7808-861-4
3	T3	Pramod J. Sadalage and Martin Fowler, "NoSQL Distilled", Addison Wesley, ISBN- 10: 0321826620, ISBN-13: 978-0321826626

2.5 Reference Books:

Sr.No		Text Books
1	R1	C J Date, "An Introduction to Database Systems", Addison-Wesley, ISBN: 0201144719
2	R2	2. S.K.Singh, "Database Systems : Concepts, Design and Application", Pearson, Education, ISBN 978-81-317-6092-5
3	R3	3. Kristina Chodorow, Michael Dirolf, "MangoDB: The Definitive Guide" ,O'Reilly Publications, ISBN: 978-1-449-34468-9.
4	R4	4. Adam Fowler, "NoSQL For Dummies", John Wiley & Sons, ISBN-1118905628 5. Kevin Roebuck, "Storing and Managing Big Data - NoSQL, HADOOP and More", Emereopty Limited, ISBN: 1743045743, 9781743045749

2.6 Reference Web Links/ Research Paper/ Referred Book other than Mention in Syllabus:

https://onlinecourses.nptel.ac.in
https://academy.oracle.com
https://www.w3schools.com
https://www.tutorialspoint.com

2.7 Teaching Plan

Sr. No.	Unit	Broad Topics to be Covered	Total Lecture Planned
1	I	Introduction	07
2	II	SQL AND PL/SQL	07
3	III	Relational Database Design	08
4	IV	Database Transactions and Query Processing	08
5	V	Parallel and Distributed Databases	07
6	VI	NoSQL Database	08
Total Lectures			**45**

2.8 Assessment Tools Details

Sr. No.	Assessment Tool	Marks	Marks scale down to
1	Problem Solving Exercise(PSE1 and PSE2)	Each of 10 marks	20
2	Conceptual Writing (CW1 and CW2)	Each of 10 marks	20
3	Test 1	20 marks	20
4	Test 2,Test 3	Each of 20 marks	40
		Total	100

Assessment Tools

1. Problem Solving Exercise(PSE1 and PSE2)
2. Conceptual Writing (CW1 and CW2)
3. Test 1 and Test 3
4. Test 2

26

2.9 Assessment Tool Planner

Sr. No.	Units	Co No.	Assessment Tool	Marks	Schedule
1	1	CO1	PSE1(Problem Solving Exercise)	10	First week of July
2	2	CO3	PSE2 (Problem Solving Exercise) Part A	5	3rd week of August
3	1,2,6	CO1, CO3	Test 1	20	2nd week of August
	6	CO3	PSE2 (Problem Solving Exercise) Part B	5	1st week of October
4	3,4,5	CO2, CO4, CO5	Test 2 (MCQ)	20	1st week of October
5	4	CO4	CW1(Conceptual Writing 1)	10	3rd week of September
6	5	CO5	CW2 (Conceptual Writing 2)	10	last week of September
7	3,4,5	CO2, CO4, CO5	Test 3	20	2nd week of October

2.10 Practical Assessment

Practical Assessment

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Lab Assignments (LA1 to LA13)	13 (each of 5 marks)	65
2	Mini Project	1 (of 10 marks)	10
3	Mock Practical (MPR)	01	50
		Total	**125**

2.11 Question Bank

Unit 1

1. Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.
2. Construct appropriate tables for the above ER Diagram

    Car insurance tables:

    person (driver-id, name, address)

    car (license, year,model)

    accident (report-number, date, location)

participated(driver-id, license, report-number, damage-amount) .
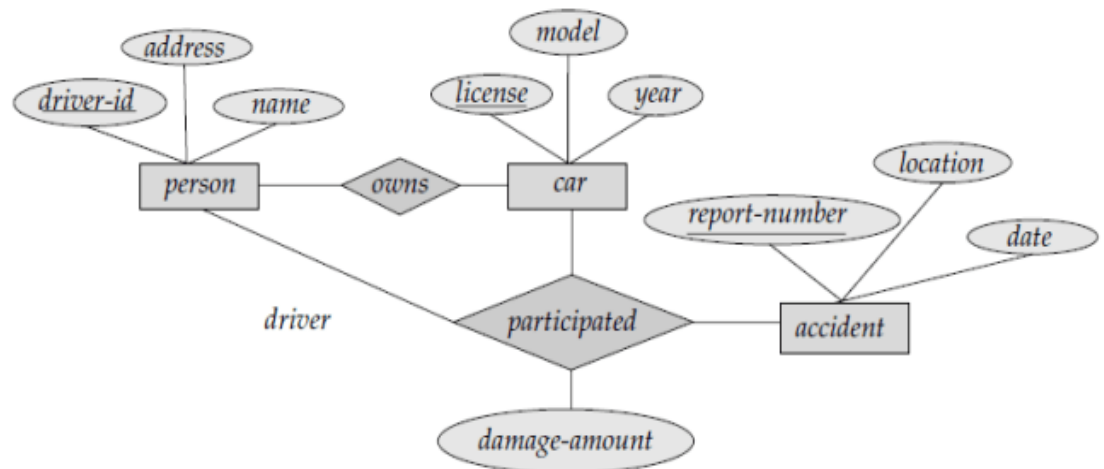
E-R diagram for a Car-insurance company.

3. A university registrar's office maintains data about the following entities: [10]

4. A weak entity set can always be made into strong entity set by adding to its attributes; the primary key attributes of its identifying entity set. Outline what sort of redundancy will result if we do so while converting into tables. [5]

5. What are the disadvantages of File processing?

6. What is DBMS? Explain advantages and disadvantages of DBMS.

7. What are the different components of DBMS?

8. Explain different types of databases.

9. Explain Data anomalies.

10. What are the functions of DBMS?

11. Explain Hierarchical Data Model.

12. Explain Network Data Model.

13. Explain Relational Database Model.

14. Explain Entity Relationship Model.

15. Explain The Object Oriented Model.

16. Explain Data abstraction or 3 schema architecture.

17. Explain basic notations of ER diagram

18. What are the different types of Entities?

19. Explain different types of Attributes.

20. Explain degree of relationships.

21. What are the database design challenges?

22. For the database system to be usable, it must retrieve data efficiently. The need of efficiency has led designers to use complex data structures to represent data in the database. Developers hides this complexity from the database system users through several levels of abstraction. Explain those levels of abstraction in detail.

23. Explain 1. Participation Constraints 2. Mapping Cardinalities.

24. Draw ER for Online Book store and Convert it into tables. (At-least 4 entities)

Unit 2

1. What is a Table and explain its characteristics?

2. Explain different types of keys available in Relational Model.

3. Explain Database Integrity rules.

4. Explain different Relational set operators.

5. Explain different types of joins.

6. What are the different types of Relationships in DBMS?

7. What is INDEX?

8. Explain Codd's Relational database rules.

9. Schema definition for supplier-and-parts database. keys are underlined.[5]

10. Any database system to be good relational database system, codds have proposed 12 rules, explain any 2 rules proposed by codd with example.

11. Write a trigger for after insert for table Library (bid, bname, doi, status) to update the number of copies (noc) according to ISSUE & RETURN status.
    Increase the noc if status is RETURN, Decrease noc if status is ISSUE.

12. Write PL/SQL function to find percentage of the students from table *Student (rollno, name, Marks1, Marks2, Marks3, Marks4, Marks5).*
    Consider the following database.

    Doctor (Doctor_no, Doctor_name, Address, City).
    Hospital (Hospital_no, Name, Street, City).
    Doc_Hosp (Doctor_no, Hospital_no, Date).
    Construct the following Queries in SQL.

29

1) Find out all Doctors who have visited to Hospital in same city in which they live.

2) Find to which Hospital "Dr. Joshi" has visited.

3) Count no. of Doctors visited to "Shree Clinic" on 1st March 2014.

13. Write the PL/SQL block of code to calculate the factorial value of a number.   [**5**]

14. Write a trigger for overdraft withdrawal from account: [5]

Instead of allowing negative account balances, the bank deals with overdrafts by creating a loan in the amount of the overdraft giving this loan a loan number identical to the account number of the overdrawn account setting the account balance to zero. The condition for executing the trigger is an update to the account relation that results in a negative balance value.

15. Write a PL/SQL block for following requirement and handle the exceptions

Roll no. of student will be entered by user. Attendance of roll no. entered by user will be checked in Student table. If attendance is less than 75% then display the message "Term not granted" and set the status in Student table as "D". Otherwise display message "Term granted" and set the status in Student table as "ND".

16. Write PL/SQL code block that raise a user defined exception when business rule is violated. Business Rule for client - master table specifies when the value of bal - due field is less than 0 handle the exception

17. The organization has decided to increase the salary of employees by 10% of existing salary, whose existing salary is less than Rs. 10000/- Write a PL/SQ block to update the salary as per above requirement, display an appropriate message based on the no. of rows affected by this update (using implicit cursor status variables).

18. Consider following database :**Student (Roll_no, Name, Address)**,
Subject (Sub_code, Sub_name), **Marks (Roll_no, Sub_code, marks)**

Write following queries in SQL :

i) Find average marks of each student, along with the name of student.

ii) Find how many students have failed in the subject "DBMS".

iii) Find the Address of students who have failed in TOC.

Unit 3

1. Explain what is normalization? Explain with example requirements of Third Normal Form.

2. Explain with example the concept of referential integrity constraint (e.g. Foreign key in SQL). Also discuss the situations when referential integrity constraint is getting violated by Insert, Update and delete operations on table.

3. One of the rule designed by codd's for good relational database management system is integrity independence, which states that all integrity constraints can be independently modified without the need of any change in the application. Justify the significance of rule in relational database management system.

4. What is Normalization? Explain its advantages.

5. Explain 1,2,3,4 NF.

6. Write about Denormalization

Unit 4 and 5

1. What is Scheduler and explain its functions?

2. What is a transaction and explain its properties?

3. Explain about transaction log.

4. Explain concurrency control with locking method. Explain with examples.

5. What are the difference concurrent control problems? Explain with examples.

6. Explain the Concept of Conflict Serializability. Decide whether following schedule is conflict serializable or not. Justify your answer.

T1	T2
read (A)	
write (A)	
	read (A)
	write (A)
read (B)	
write (B)	
	read (B)
	write (B)

7. Explain Data Replication and Data Fragmentation in Distributed Data Storage.

8. State and explain in brief the ACID Properties. During execution of transaction, a transaction passes through several states, until it finally commits or aborts. List all possible sequences of states through which a transaction may pass. Explain why each state transition occurs.

9. Explain the Two Phase lock Protocol for concurrency control. Also explain its two versions: strict two phase lock protocol and rigorous two phase lock protocol.

10. Explain in details two important issues Speedup and Scaleup in Parallel Databases. Also explain which factors work against efficient parallel operation and can diminish both speedup and scale up.

11. To ensure atomicity despite failures we use Recovery Methods, Explain in detail Log-Based Recovery method.

12. What benefit does rigorous two-phase locking provide? How does it compare with other forms of two - phase locking?

13. Suppose a transaction T_i issues a read command on data item Q. How time - stamp based protocol decides whether to allow the operation to be executed or not using time - stamp based protocol of concurrency control.

14. Transaction during its execution should be in one of the different states at any point of time, explain the different states of transactions during its execution.

15. A transaction may be waiting for more time for an Exclusive (X)lock on an item, while a sequence of other transactions request and are granted as Shared (S) lock on the same item. What is this problem? How it is solved by two phase lock protocol?

16. In both, Shared nothing parallel architecture and distributed system architecture resources are not shared, then how shared nothing parallel systems are different than distributed systems? Also explain in brief other parallel system architecture

17. How two phase commit protocol to ensure the atomicity in distributed transaction, handles the following failures:

   Failure of participating site

   Failure of coordinator

   Failure due to network partition

18. What are different Parallel Database Architectures? Explain with their advantageous and disadvantageous.

Unit 6

1. Explain the difference SQL Vs NoSQL.

2. Enlist and explain any three NoSQL Database types.(examples expected)

3. Explain the HDFS and MapReduce in HADOOP with example.

4. Explain the concept of NoSQL Database and state its advantages over RDBMS.

5. State and Explain:

    i)   CAP Theorem

    ii)   BASE properties

6. Analyze the use of NoSQL databases in current social networking environment also explain need of NoSQL databases in social networking environment over RDBMS.

7. Analyze the use of NoSQL databases in current social networking environment also explain need of NoSQL databases in social networking environment over RDBMS.

8. BASE Transactions ensures the properties like Basically Available, Soft State, and Eventual Consistency. Explain each property with its significance. How soft state of system is depend on Eventual consistency property.

9. Explain Aggregation pipelining in mongodb.

3. Subject – Software Engineering& Project Management

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	3	- -	- -

Online/ In-sem	Theory	Practical	Oral	Term-work	Total Marks	Credit
30	70	NA	NA	NA	100	03

3.1Course Objectives

1. To introduce various Software Engineering Paradigms.

2. To explain details about analysis of a software to be developed and to teach the various diagrams.

3. To teach the importance of architecture and design.

4. To teach them the types of testing and explain how to write test cases.

5. To explain the importance of Software quality

3.2 Course Outcomes

- Choose the process model, analyze the software requirements.
- Design a software system and explain the architecture, user interface, components for a software system.
- Determine risks and estimate the project cost and schedule for Software being developed.
- Explain a testing strategy for software system and write test cases.

3.3 Syllabus

<table>
<tr><td colspan="3" align="center">UNIT – I</td></tr>
<tr><td colspan="3">Topics –
Software Engineering Fundamentals: Nature of Software, Software Engineering Principles, The Software Process, Software Myths. Process Models :A Generic Process Model, Prescriptive Process Models: The Waterfall, Incremental Process(RAD), Evolutionary Process, Unified Process, Concurrent. Advanced Process Models & Tools: Agile software development: Agile methods, Plan-driven and agile development, Extreme programming Practices, Testing in XP, Pair programming. Introduction to agile tools: JIRA, Kanban, Case Studies: An information system (mental health-care system), wilderness weather system</td></tr>
<tr><td colspan="2">Outcomes – At the end of this unit students will be able to -</td><td>No. of Lectures – 07</td></tr>
<tr><td>Sr. No.</td><td align="center">Learning Outcome</td><td>Bloom's Level</td></tr>
<tr><td>1</td><td>List and Explain framework activities</td><td>L1,L2</td></tr>
<tr><td>2</td><td>Explain role of software engineering.</td><td>L2</td></tr>
<tr><td>3</td><td>Apply the main aspects of software engineering.</td><td>L3</td></tr>
</table>

<table>
<tr><td colspan="3" align="center">UNIT – II</td></tr>
<tr><td colspan="3">Topics –
Requirements Engineering: User and system requirements, Functional and non-functional requirements, Types & Metrics, A spiral view of the requirements engineering process. Software Requirements Specification (SRS): The software requirements Specification document, The structure of SRS, Ways of writing a SRS, structured & tabular SRS for an insulin pump case study, Requirements elicitation & Analysis: Process, Requirements validation, Requirements management. Case Studies: The information system. Case study - Mental health care patient management system (MHC-PMS).</td></tr>
<tr><td colspan="2">Outcomes – At the end of this unit students will be able to -</td><td>No. of Lectures – 08</td></tr>
<tr><td>Sr. No.</td><td align="center">Learning Outcome</td><td>Bloom's Level</td></tr>
<tr><td>1</td><td>Explain the phases of requirement engineering</td><td>L2</td></tr>
<tr><td>2</td><td>Model the software requirements for the software being developed.</td><td>L3</td></tr>
<tr><td>3</td><td>Analyze the software requirements for a software system to be developed.</td><td>L4</td></tr>
</table>

<table>
<tr><td colspan="2" align="center">UNIT – III</td></tr>
<tr><td colspan="2">Topics –
Design Process & quality, Design Concepts, The design Model, Pattern-based Software Design. Architectural Design :Design Decisions, Views, Patterns, Application Architectures, Modeling Component level Design: component, Designing class based components, conducting component-level design, User Interface Design: The golden rules, Interface Design steps & Analysis, Design Evaluation, Case Study: Web App Interface Design</td></tr>
<tr><td>Outcomes – At the end of this unit students will be able to -</td><td>No. of Lectures – 08</td></tr>
</table>

Sr. No.	Learning Outcome	Bloom's Level
1	List the golden rules of User Interface Design	L1
2	Compare pattern based design.	L2
3	Apply the process of analysis and design solution to a given problem using one or more patterns.	L3
4	Develop the design for a software system based on the type of system to be developed.	L3

UNIT – IV

Topics –

Project Management Concepts: The Management Spectrum, People, Product, Process, Project, The W5HH Principle, Metrics in the Process and Project Domains, Software Measurement : size & function oriented metrics(FP & LOC), Metrics for Project and Software Quality, P**roject Estimation :**Observations on Estimation, Project Planning Process, Software Scope and feasibility, Resources: Human Resources, Reusable software, Environmental Resources. Software Project Estimation, Decomposition Techniques, Empirical Estimation Models: Structure, COCOMO II, Estimation of Object-oriented Projects, Specialized Estimation.**Case Study:** Software Tools for Estimation, **Project Scheduling:** Basic Concepts, Defining a Task Set for the Software Project, Defining Task Network, Scheduling with time-line charts, Schedule tracking Tools:- Microsoft Project, Daily Activity Reporting & Tracking (DART).

Outcomes – At the end of this unit students will be able to -		No. of Lectures – 08
Sr. No.	Learning Outcome	Bloom's Level
1	Explain Management Spectrum	L2
2	Apply the empirical estimation models for a given case.	L3
3	Estimate the software product by using different software metrics.	L5

UNIT – V

Topics –

Project Risk Management: Risk Analysis & Management: Reactive versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Risks Monitoring and Management, The RMMM plan for case study project. **Software Configuration Management:**The SCM repository, SCM process, Configuration management for WebApps, **Case study:** CVS and Subversion Tools, Visual Source Safe from Microsoft & Clear Case. **Maintenance & Reengineering:** Software Maintenance, Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering

Outcomes – At the end of this unit students will be able to -		No. of Lectures – 07
Sr. No.	Learning Outcome	Bloom's Level
1	Define Risk and explain types of software risk	L1,L2
1	Identify risks for software being developed.	L3
2	Evaluate the quality of software product using Reengineering process.	L5

	UNIT – VI	
Topics – Introduction to Software Testing, Principles of Testing, Testing Life Cycle, Phases of Testing, Types of Testing, Verification & Validation, Defect Management, Defect Life Cycle, Bug Reporting, GUI Testing, Test Management and Automation.		
Outcomes – At the end of this unit students will be able to -		**No. of Lectures** – 07
Sr. No.	**Outcome**	**Bloom's Level**
1	Select type of testing to be done.	L1
2	Explain principles of testing.	L2
3	Write the test cases for software product.	L3

3.3 Teaching Plan

Unit No.-I:

Pre-requisites:- Fundamentals of Programming Languages.

Lecture No.	Details of the Topic to be covered	Mode of Delivery
1	Software Engineering Fundamentals: Nature of Software, Software Engineering Principles, The Software Process	Chalk and Talk
2	'Myth' Terminology ,Software Myths, Introduction to Process Models	Chalk and Talk
3	Introduction to Generic Process Model, Prescriptive Process Models, Difference between Generic Process Model, Prescriptive Process Models ,The Waterfall: Advantages, Applications. Incremental	Chalk and Talk
4	.Incremental Process(RAD), Evolutionary Process, Unified Process, Concurrent, their difference, Applications.	Chalk and Talk
5	Advanced Process Models & Tools: Agile software development: Agile methods, Plan-driven and agile development.	Chalk and Talk
6	Extreme programming Practices, Testing in XP, Pair programming. Introduction to agile tools: JIRA, Kanban tools.	Chalk and Talk
7	. Case Studies: An information system (mental health-care system), wilderness weather system	Chalk and Talk ,PPT

Unit No.-II:

Pre-requisites:- Fundamentals of Programming Languages.

Lecture No.	Details of the Topic to be covered	Mode of Delivery
1	What is mean by Requirement, Requirements Engineering: User requirements and system requirements with Example.	Chalk and Talk
2	.Functional and non-functional requirements with example, Types & Metrics Introduction.	Chalk and Talk
3	Types & Metrics in detail explanation, A spiral view of the requirements engineering process.	Chalk and Talk
4	Software Requirements Specification (SRS): The software requirements Specification document with example.	Chalk and Talk
5	The structure of SRS, Ways of writing a SRS, structured & tabular SRS.	Chalk and Talk
6	Case study for an insulin pump, Requirements elicitation & Analysis: Process.	Chalk and Talk
7	Requirements validation, Requirements management.	Chalk and Talk
8	Case Studies: The information system. Case study - Mental health care patient management system (MHC-PMS).	Chalk and Talk

Unit No.-III: Design Engineering

Pre-requisites:- Fundamentals of Programming Languages.

1. Compare pattern based design.

2. Apply the process of analysis and design solution to a given problem using one or more patterns.

3. Develop the design for a software system based on the type of system to be developed.

Lecture No.	Details of the Topic to be covered	Mode of Delivery
1	Introduction to Design and Design Engineering, Introduction to Design Process & Design quality.	Board and PPT
2	Introduction to Design Concepts, quality attributes Design concepts: Abstraction, Architecture.	Board and PPT

3	Design concepts: Pattern, Modularity, Information Hiding, Functional Independence, Refinement.	Board and PPT
4	Design concepts: Refactoring, Design Classes. Design Model, Pattern based software design, design decisions, views.	Board and PPT
5	Patterns, Application architectures, Difference between views and patterns.	Board and PPT
6	Introduction to Modeling Component level Design: component, Designing class based components.	Board and PPT
7	Conducting component-level design, Introduction to User Interface Design: The golden rules,	Board and PPT
8	Interface Design steps & Analysis, Design Evaluation, Case Study: Web App Interface Design.	Board and PPT

Unit No.-IV: Project Management: Process, Metrics, And Estimations & Risks

Pre-requisites:- **Fundamentals of Programming Languages.**

Lecture No.	Details of the Topic to be covered	Mode of Delivery
1	Project Management Concepts: The Management Spectrum, People, Product, Process, Project	Board and PPT
2	The W5HH Principle, Metrics in the Process and Project Domains, Software Measurement : size & function oriented metrics(FP & LOC).	Board and PPT
3	Metrics for Project and Software Quality, Project Estimation: Observations on Estimation.	Board and PPT
4	Project Planning Process, Software Scope and feasibility.	Board and PPT
5	Resources: Human, reusable software, Environmental Resources, Software Project Estimation, Decomposition Techniques.	Board and PPT
6	Empirical Estimation Models: Structure, COCOMO II, Estimation of Object-oriented Projects, Specialized Estimation.	Board and PPT

7	Project Scheduling: Basic Concepts, Defining a Task Set for the Software Project, Defining Task Network.	Board and PPT
8	Scheduling with time-line charts, Schedule tracking Tools:-Microsoft Project, Daily Activity Reporting & Tracking (DART)	Board and PPT

Unit No.-V: Project Management: Risk Management, Configuration Management, Maintenance & Reengineering

Lecture No.	Details of the Topic to be covered	Mode of Delivery
1	What is Risk, Project Risk Management: Risk Analysis & Management: Reactive versus Proactive Risk Strategies, Software Risks, and Risk Identification.	Board and PPT
2	Risk Projection, Risk Refinement, Risk Mitigation, Risks Monitoring.	Board and PPT
3	Risk Management, The RMMM plan for case study project Software Configuration Management.	Board and PPT
4	The SCM repository, SCM process, Configuration management for WebApps.	Board and PPT
5	Case study: CVS and Subversion Tools, Visual Source Safe from Microsoft & Clear Case. Maintenance & Reengineering: Software Maintenance, Software Supportability.	Board and PPT
6	Reengineering, Business Process Reengineering, Software Reengineering,	Board and PPT
7	Reverse Engineering, Restructuring, Forward Engineering.	Board and PPT
8	What is Risk, Project Risk Management: Risk Analysis & Management: Reactive versus Proactive Risk Strategies, Software Risks, and Risk Identification.	Board and PPT

Unit No.-VI: Software Testing

Lecture No.	Details of the Topic to be covered	Mode of Delivery
1	What is 'Testing' and 'Software Testing', Principles of Testing,	Board and PPT
2	Testing Life Cycle, Phases of Testing with example.	Board and PPT
3	Types of Testing-White Box Testing ,Black Box testing etc.	Board and PPT
4	What is mean by Verification & What is mean by Validation, Difference between them.	Board and PPT
5	Defect Management, Defect Life Cycle, Bug Reporting.	Board and PPT
6	GUI Testing, Test Management and Automation.	Board and PPT

3.4 Assessment Tools Details

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Assignments A1 to A3	(Each of 10 marks)	30
2	Kahoot grade	(Each of 10 marks)	10
3	Case Study (C1)	(Each of10 marks)	10
4	Internal Tests (T1 to T3)	(T1-10 marks + T2-20 marks + T3-20 marks)	60
5	MCQ(M1 to M2)	(Each of 10 marks)	20
		Total	100

Detail Schedule/Plan of conduction of assessment tool.

Units	Co No.	Assessment Tool	Marks	Schedule
I	C303.1	Kahoot	10	1st week of June

		Test1	10	4th week of July
II & III	C303.2	Assignment1	10	1st Week of August
		Test 2	20	3rd week of August
IV& V	C303.3	Assignment2	10	2nd week of Sept
		Test 3	20	3th week of Sept
VI	C303.4	Assignment3	10	4th week of Sept
		Case Study	10	1st week of Oct

3.5 Question Bank

UNIT I

1. Explain the evolving role of software.
2. Define software and explain the various characteristics of software
3. Explain "Software myth"? Discuss on various types of software myths and the true aspects of these myths.
4. Discuss about software Engineering? Explain the software engineering layers?
5. Explain in detail the capability Maturity Model Integration (CMMI)
6. Describe with the help of the diagram discuss in detail waterfall model. Give certain reasons for its failure.
7. Explain briefly on (a) the incremental model (b) The RAD Model
8. Explain the Spiral model in detail.
9. Describe With the help of the diagram explain the concurrent development model.
10. Explain unified process? Elaborate on the unified process work products.
11. Explain specialized process models.
12. Explain different software applications.
13. Explain the paradigms do you think would be most effective? Why?
14. Explain product and process are related.
15. Explain personal and team process models.
16. Explain process frame work activities.

42

17. Explain the purpose of process assessment

18. Explain changing nature of software in detail

19. Explain and contrast perspective process models and iterative process models

20. Explain about the evolutionary process models

21. Describe the law of conservation of familiarity in your own words. Suggest a few ways to build software to stop deterioration due to change.

22. Try to develop a task set for the communication activity

23. Which of the software engineering paradigms presented in this chapter do you think would be most effective? Why?

24. Define software engineering. Explain the failure curve of software. Explain in detail the following software myths: Management myths, Customer myths.

25. Explain software spiral process model.

26. Explain in detail extreme programming.

27. Explain the umbrella activities of software process in detail.

28. The RAD model is often tied to CASE tools. Research the literature and provide a summary of a typical CASE tool that supports RAD.

29. Propose a specific software project that would be amenable to the incremental model. Present a scenario for applying the model to the software.

30. As you move outward along the process flow path of the spiral model, what can you say about the software that is being developed or maintained?

31. Describe the concurrent development model in your own words.

32. Which is more important—the product or the process?

33. Define software engineering. Explain the failure curve of software.

34. Explain in detail extreme programming.

35. Explain the umbrella activities of software process in detail.

UNIT II

1. Write short notes on user requirements.

2. Compare functional requirements with non-functional requirements

3. Discuss system requirements in a detail manner

4. Explain requirement engineering process.

5. Discuss briefly how requirement validation is done?

6. Discuss your knowledge of how an ATM is used , develop a set of

7. use-cases that could serve as a basis for understanding the

8. requirements for an ATM system.

9. Describe four types of non-functional requirements that may be placed on a system. Give examples of each of these types of requirement.

10. Explain the kinds of system requirements

11. Explain functional requirement.

12. Explain non-functional requirement.

13. Explain domain requirements.

14. What are kinds of non-functional requirements.

15. Explain example of functional requirement.

16. Explain user requirements in detail.

17. Explain system requirement in detail

18. Explain the term stake holder

19. Explain requirement validation.

20. Explain requirement review.

21. Explain SRS document and explain along with its contents.

22. Explain interface specification in detail.

23. Discuss how requirements are elicited and validated in software project?

24. Discuss how feasibility studies are important in requirement engineering process.

25. Identify and briefly describe four types of requirements that may be defined for computer based system.

26. List out plausible user requirements for the following functions

27. a)cash dispensing function in a bank ATM

28. b)spelling check and correcting function in a word processor

29. Suggest how an engineer responsible for drawing up a system requirements specification might keep track of the relationship between functional and non-functional requirements.

30. Suggest who might be stakeholders in a university student record system. Explain why it is almost inevitable that the requirements of different stakeholders will conflict in some way.

31. What is requirement analysis? Explain requirement analysis tasks and principles.

32. Mention any two non-functional requirements on software to be developed.

33. What is known as SRS review? How is it conducted?

34. Distinguish between expected requirements and excited requirements.

35. What is meant by software prototyping?

36. What are the non-functional requirements of software?

37. Requirement elicitation with an example.

38. What is software specification? Write down the software requirement specification document for online railway ticket booking system.

39. What minimum features are required to be present in a good SRS?

40. How is SRS for a development project arrived at?

41. Narrate the importance of software specification of requirements. Explain a typical SRS structure and its parts.

UNIT IV

1. Define the meaning of software design. Explain design fundamentals for software design.

2. Explain the quality attributes, considered in software design.

3. Explain why design is important in design engineering.

4. Discuss analysis and design model.

5. Describe quality attributes and its guidelines.

6. List the design concepts.

7. Justify the importance of refactoring.

8. Give short notes on low coupling.

9. Define software architecture with its importance.

10. Explain taxonomy of architectural styles.

11. Write short notes on architecture patterns.

12. Define component.

13. Write short notes on coupling.

14. List out the steps for conducting component level design.

15. Write a short notes on cohesion.

16. Design the class based components.

17. List out the golden rules for interface design.

18. Write a short notes on interface design steps.

19. Describe design evaluation.

20. List out all the design issues.

21. Explain process in user interface design.

22. Explain a two level process? Why should system design be finished before the detailed design, rather starting the detailed design after the requirements specification? Explain with the help of a suitable example.

23. Discuss briefly the following fundamental concepts of software design:
    a. Abstraction ii) Modularity iii) Information hiding.

24. Explain briefly the following:
    a. Coupling between the modules
    b. The internal Cohesion of a module.

25. Discuss the fundamental principles of structured design. Write notes on transform analysis.

26. Explain software architecture in a detail manner.

27. Explain software design? Explain data flow oriented design

28. What are the goals of the user interface design.

29. Discuss briefly about the golden rules for the user interface design

30. Discuss interface design steps in a brief manner.

31. Explain how the design is evaluated.

32. Explain design processing along with its quality.

33. What are the design concepts in software engineering?

34. Explain pattern based software design in a detail manner.

35. Elaborate model for the design.

36. Discuss architectural styles and patterns.

37. Explain with a neat diagram of architectural design.

38. Elaborate modeling component level design.

39. Describe mapping data flow into a software architecture.

40. Explain the guide lines of component level design.

41. Describe the way of conducting a component level design.

42. State how do we assess quality of a software design?

43. Suggest a design pattern that you encounter in a category of everyday things.

44. Provide examples of three data abstractions and the procedural abstractions that can be used to manipulate them.

45. Explain design concept:

46. Architecture,

47. Modularity,

48. Pattern.

49. What do you mean by the term Cohesion and Coupling in the context of software design? How are these concepts useful in arriving at good design of a system?

    a. Explain design concept: Refinement.

50. What do you understand by refactoring? Explain Refactoring.

51. Give the importance of refactoring in improving quality of software.

52. Differentiate between abstraction and refinement.

53. Discuss Architectural patterns in details.

54. What do you mean by software architecture? Explain in details.

55. Explain Object oriented view, conventional view and process related view in detail.

56. Write a note on: Designing class based components.

57. What do you understand by Interface Design? Explain Interface Design.

58. What are the types of User Interface? Explain in detail.

59. Write down the characteristics of good user interface.

60. What are the design principles and guidelines?

61. Write a note on: Golden Rules.

62. What are the design principles for reducing the user's memory load in user interface design?

63. What is the necessity of a good User Interface?

64. What are the rules that keep in mind while designing a User Interface?

65. Explain the User Interface design process?

66. Justify "The analysis and design process for User Interface is iterative".

67. Describe the User Interface analysis and design process with diagram and explain interface design element.

68. Explain the User Interface design steps.

69. What do you mean by application accessibility and internationalization in User Interface design?

70. Explain in detail user interface design issues.

71. Highlights the principles specific to the design of a Web Application Interface.

72. Enlist and explain the Web Application Interface principles in detail.

UNIT IV

1. Explain the role of People, Product and Process in project management.

2. Explain the term People in project management spectrum.

3. Explain the term in brief: Stakeholders.

4. What are the categories of stakeholders? What are the characteristics of effective project manager?

5. What is W5HH principle? Explain in detail.

6. Explain in detail software process and project metrics.

7. Explain Size oriented metrics. What are the software quality factors? Explain in detail.

8. Explain any four quality measures of software.

9. What is the need of software quality?

10. What is software quality?

11. Explain different McCall's quality factors.

12. Explain the following quality factors:

13. Maintainability

14. Reusability.

15. Explain ISO 9126 Quality Factors.

16. What is the concept of Software Reusability?

17. Explain different measures of software reliability and availability.

18. Explain in detail the concept of Software Sizing.

19. Explain: problem based estimation.

20. Explain with an example LOC Based Estimation.

21. Explain with an example Process Based Estimation.

22. Explain with an example Use Case Based Estimation.

23. Explain the quality attributes considered in software design.

24. Write a note on:

25. Human Resources

26. Reusable Resources

27. Environmental Resources.

28. What is mean by the term "Software Project Estimation"? Explain in detail.

29. Write a note on:

30. Problem Decomposition

31. Process Decomposition

32. Explain in detail the Empirical Estimation models and structure of Empirical Estimation models.

33. Explain with an example The COCMO II Model.

34. Explain with an example The Software Equation.

35. Explain the concept "Estimation of object oriented projects" in detail.

36. Explain in detail Estimation for Agile Development.

37. Explain in detail Estimation for Web Engineering Projects.

38. What is project scheduling? What are basic principles of project scheduling?

39. What is time line chart? How it is used in scheduling of software project?

40. Explain the Earn value analysis in project scheduling.

UNIT V

1. Define reactive and proactive risk strategies.

2. List out the generic subcategories of predictable risks.

3. Define risk components

4. List out the conditions for risk refinement

5. Demonstrate quality concepts

6. Give a short notes on formal technical reviews

7. List out review guidelines

8. Describe six sigma for software

9. Define SQA plan

10. Write a short notes on ISO 9000 quality standards

11. Give the formulae for measures of reliability and availability

12. Define software safety

13. Define risk projection

14. Define software risks and what are the types of software risks

15. Describe risk components and drivers

16. Define risk refinement

17. What does RMMM stands in RMMM plan

18. Define software reliability

19. Define quality and quality control in quality management

20. Give a short notes on risk identification

21. Define software reliability along with its terms.

22. Explain risk projection in detail

23. Explain seven principals of risk management

24. Explain software reviews in brief. Explain six sigma for software engineering

25. Explain quality management with their terms.

26. Demonstrate risk identification

27. Describe developing a risk table.

28. Quality and reliability are related concepts but are fundamentally different in number of ways. Discuss them.

29. Explain you have been given the responsibility for improving quality of software across your organization. What is the first thing that you should do? what's next

30. Some people argue that an FTR should assess programming style as well as correctness is this a good idea? Discuss why?

31. Demonstrate is it possible to assess the quality of software if the customer keeps changing what it is supposed to do?

32. Create a risk table for the project that if you are the project manager for a major software company. you have been asked to lead a team that's developing "next generation "word- processing software.

33. Explain about software risks?

34. Elaborate the concepts of Risk management Reactive vs Proactive Risk strategies

35. Explain about RMMM Plan?

36. Explain about Quality concepts?

37. Explain software quality assurance

38. Explain about formal technical reviews

39. Explain in detail ISO 9000 quality standards

40. Discuss risk refinement?

41. Compare reactive with proactive risk strategies

42. Discuss software reliability?

43. Briefly explain about formal approaches to SQA

44. Demonstrate statistical SQA

45. What are the types of risks? Explain in brief.

46. Explain the principles of risk managem management in detail.

47. What are the different categories of risk .Explain risk management process in detail.

48. Write short note on : Risk Identification.

49. Explain the risk identification and assessment process for software project.

50. What is risk identification? What are the different categories of risks?

51. Explain the concept Risk Table in detail with an example.

52. Explain the concept Risk refinement.

53. What is Risk Mitigation Monitoring and Management (RMMM) ? Write note on it.

54. Write short note on: RMMM.

55. Explain the RMMM plan for WMITS.

56. Describe the Risks for WMITS.

57. Describe Risk Mitigation, Monitoring and Management for WMTS.

58. Define SCM.

59. What is software configuration management?

60. What do you mean by software configuration? What is mean by software configuration management?

61. What are the configuration management system elements?

62. What is SCI's? Explain in detail.

63. What are the contents of SCM repository?

64. Explain the following in brief: SCM Repository.

65. What is SCM Repository?

66. Explain functions performed by SCM Repository.

67. Explain the contents of SCM Repository.

68. Explain the contents of SCM features.

69. Explain the following repository features with respect to software configuration management.

70. Versioning,

71. Dependency tracking,

72. Requirement tracing,

73. Configuration management,

74. Audit trails.

75. What are the layers of SCM process? Explain each in detail.

76. Write note on: Software Configuration process.

77. Explain the configuration management process.

78. What are the roles of Software Maintenance in Software Product?

79. Write short note on "Identification of objects in the software configuration".

80. Explain Version control with respect to software configuration management.

81. Write short note on Configuration Audit.

82. Write short note on Status Reporting.

83. Explain Configuration Management process for WebApp.

84. Explain CVS and SVN Tools.

85. Comparison between CVS and SVN Tools.

86. What is the role of Software Maintenance in Software Product?

87. Define Modifiability. What are the types of maintenance?

88. What are the types of maintenance? Explain each in brief.

89. Write short note on: Reengineering.

UNIT VI

1. Compare verification and validation.

2. Write short notes on unit testing.

3. Describe smoke testing.

4. List out the steps for bottom-up integration.

5. List out the steps for top-down integration.

6. Write short note on integration testing.

7. Define alpha testing.

8. Define beta testing.

9. Write short notes on validation testing.

10. Explain art of debugging.

11. Describe regression testing.

12. List out the steps for integration step documentation.

13. Describe performance testing.

14. Write a short note on glass box testing.

15. Explain behavioral testing.

16. Explain about the importance of test strategies for conventional software

17. Discuss black box testing in a detailed view.

18. Compare black box testing with white box testing

19. Compare validation testing and system testing.

20. Discuss software quality factors? Discuss their relative importance.

21. Discuss an overview of quality metrics.

22. Explain should we perform the Validation test – the software developer or the software user? Justify your answer.

23. Explain strategic approach to software testing.

24. Describe test strategies for conventional software.

25. Describe validation testing.

26. Write a long note on system testing.

27. Demonstrate art of debugging.

28. Discuss a framework for product metrics.

29. Demonstrate metrics for analysis model.

30. Briefly list the metrics for the design model.

31. Describe metrics for source code and for testing.

32. Provide a few examples that illustrate why response time variability can be an issue.

4. Name of the Subject – Information Systems & Engineering Economics

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	4	-	-

In-Sem	Theory	Total Marks	Credit
30	70	100	4

4.1 Course Objectives

1.To prepare the students to various forms of the Information Systems and its application in organizations.

2.To expose the students to the managerial issues relating to information systems.

3.To help student to identify and evaluate various options in Information Systems.

4.To prepare engineering students to analyze cost / revenue data.

5.To prepare students for doing economic analysis in the decision making process to justify or reject alternatives / projects on an economic basis for an organization.

4.2 Course Outcomes

- Explain various forms of information systems & its applications in an organization.
- Explain the role of the major types of information systems in a business environment and their relationship to each other.
- Solve problems on time value of money.
- Apply the appropriate engineering economics and analyze the software enterprises from similar domains.
- Explain the effects of depreciation, income taxes, inflation and price change in engineering economics.

4.3 Syllabus

Unit	Course Contents	Hours
I	**Basic of Management Theory & Practices**	**09**
	Role of Information Systems in Organizations, The Information System Manager and his challenges, Concepts of Information Systems, Information Systems and Management Strategy Case Studies - Information Systems in the Indian Railways, Information Systems in an e-Commerce Organization.	
II	**Management Information System (MIS)**	**09**
	Managing Information Systems, Ethical and Social Issues, Information Technology Infrastructure and Choices, Information Systems Security and Control, Case Studies -Information Technology Infrastructure in a Bank, Information Technology Infrastructure in a manufacturing / process industry.	
III	**Leveraging Information Systems**	**09**
	Information Systems Development and Project Management, Managing Data Resources, Business Process Integration and Enterprise Systems, ICT for Development and E-Governance, Case Studies - in-house or cloud based ERP implementation, UIDAI Unique Identification Authority of India.	
IV	**Money and Economic Value**	**09**
	Engineering Economic Decisions, Time Value of Money, Understanding Money Management, Case Studies- Economic decisions done in Multi-national companies.	
V	**Economics and Management**	**09**
	Equivalence Calculations under Inflation, Present-Worth Analysis, Annual-Equivalence Analysis. Case Studies -comparative analysis of software enterprises from relevant domains.	
VI	**Understanding Cash Flow and Taxes**	**09**
	Accounting for Depreciation and Income Taxes, Project Cash-Flow Analysis, Understanding Financial Statements, Case Studies - cash flow analysis done in start-up companies.	

4.4 TEXT Books

1. Rahul De, "MIS: Management Information Systems in Business, Government and Society", Wiley India, ISBN: 13: 978-81-265-2019-0.

2. Chan S. Park , "Fundamentals of Engineering Economics", 3rd Edition, Pearson Education, ISBN 13: 978-02-737-7291-0
    1

4.5 Reference Books

1. Turban and Wali, "Information Technology on Management", Willey India, ISBN:9788126558711
2.William G. Sullivan, Elin M. Wicks, C. Patrick Koelling, Engineering Economy, Pearson
Education, ISBN13: 978-01-334-3927-4

4.6 Teaching Plan

	Unit No.	Date	Main Topic to be Covered	Sub Topics to be Covered	Mode of Delivery
1		26/6/18	**Basic of Management Theory & Practices**	Role of Information Systems in Organizations,	Chalk and Board,PPT
2		27/6/18		The Information System Manager and his challenges,	Chalk and Board,PPT
3		28/6/18		Concepts of Information Systems, Information Systems and Management Strategy	Chalk and Board,PPT
4		29/6/18		Concepts of Information Systems, Information Systems and Management Strategy	Chalk and Board,PPT
5		3/7/18		Concepts of Information Systems, Information Systems and Management Strategy	Chalk and Board,PPT
6		3/7/18		Case Studies - Information Systems in the Indian Railways,	Chalk and Board,PPT
7		4/7/18		Information Systems in an e-Commerce Organization.	Chalk and Board,PPT
8		5/7/18	**Management Information System (MIS)**	Managing Information Systems,	Chalk and Board,PPT
9		10/7/18		Ethical and Social Issues,	Chalk and Board,PPT
10	II	10/7/18		Information Technology Infrastructure and Choices,	Chalk and Board,PPT
11		12/7/18		Information Technology Infrastructure and Choices,	Chalk and Board,PPT
12		12/7/18		Information Systems Security and Control,	Chalk and Board,PPT

13		17/7/18		Case Studies -Information Technology Infrastructure in a Bank,	Chalk and Board,PPT
14		18/7/18		Information Technology Infrastructure in a manufacturing / process industry	Chalk and Board,PPT
15	III	19/7/18	**Leveraging Information Systems**	Information Systems Development and Project Management,	Chalk and Board,PPT
16		24/7/18		Managing Data Resources	Chalk and Board,PPT
17		24/7/18		, Business Process Integration and Enterprise Systems,	Chalk and Board,PPT
18		25/7/18		ICT for Development and E-Governance,	Chalk and Board,PPT
19	III	31/7/18	**Leveraging Information Systems**	ICT for Development and E-Governance,	Chalk and ard,PPT
20		31/7/18		Case Studies - in-house or cloud based ERP implementation,	Chalk and Board,PPT
21		16/8/18		UIDAI Unique Identification Authority of India.	Chalk and Board,PPT
22		16/8/18		UIDAI Unique Identification Authority of India.	Chalk and Board,PPT
23	IV	21/8/18	**Money and Economic Value**	Engineering Economic Decisions	Chalk and Board,PPT
24		21/8/18		Engineering Economic Decisions	Chalk and Board,PPT
25		23/8/18		Time Value of Money	Chalk and Board,PPT
26		25/8/18		Time Value of Money	Chalk and Board,PPT
27		28/8/18		Understanding Money Management	Chalk and Board,PPT
28		29/8/18		Understanding Money Management	Chalk and Board,PPT
29		29/8/18		Understanding Money Management	Chalk and Board,PPT
30		30/8/18		Case Studies- Economic decisions done in Multi-national companies.	Chalk and Board,PPT
31		4/9/18		Equivalence Calculations under Inflation,	Chalk and Board,PPT

32	V	5/9/18	**Economics and Management**	Equivalence Calculations under Inflation,	Chalk and Board,PPT
33		6/9/18		Equivalence Calculations under Inflation,	Chalk and Board,PPT
34		7/9/18		Present-Worth Analysis, Annual-Equivalence Analysis	Chalk and Board,PPT
35		7/9/18		Present-Worth Analysis, Annual-Equivalence Analysis	Chalk and Board,PPT
36		14/9/18		Present-Worth Analysis, Annual-Equivalence Analysis	Chalk and Board,PPT
37		/9/18		Case Studies -comparative analysis of software enterprises from relevant domains.	Chalk and Board,PPT
	VI	/9/18	**Understanding Cash Flow and Taxes**	Accounting for Depreciation and Income Taxes,	Chalk and Board,PPT
39		/9/18		Accounting for Depreciation and Income Taxes,	Chalk and Board,PPT
40		/9/18		Project Cash-Flow Analysis,	Chalk and Board,PPT
41		/9/18		Project Cash-Flow Analysis,	Chalk and Board,PPT
42		/9/18		Project Cash-Flow Analysis,	Chalk and Board,PPT
43		/9/18		Understanding Financial Statements ,	Chalk and Board,PPT
44		/9/18		Understanding Financial Statements	Chalk and Board,PPT
45		/9/18		Case Studies - cash flow analysis done in start-up companies.	Chalk and Board,PPT

4.7 Assessment Tools Details

Units	Co No.	Assessment Tool	Marks	Schedule
I	304.1	Assignment A1	10	1st week of July 2018
		PRE1	10	4th week of July 2018
II&III	304.2	Class Test T1	10	2nd week of July 2018
		Quiz Q1	10	1st week of Aug 2018
IV	304.3	Class Test T2	10	1st week of Sept 2018
		Assignment A2	10	2nd week of Aug 2018
V	304.4	Quiz Q2	10	3rd week of Sept 2018
		Study Report SR	10	2th week of Sept 2018
VI	304.5	Assignment A3	10	4th week of Sept 2018
		Mind Map	10	4th week of Sept 2018
		Course Exit Survey	--	1st week of October 2018

CO No.	ASSESSMENT TOOLS USED	Total Weightage
C304.1	A1(10), PRE1(10)	20
C304.2	M1(10), T1(10)	20
C304.3	A2(10), T2(10)	20
C304.4	SR(10), M2(10)	20
C304.5	Mind Map(10),A3(10)	20
	TOTAL	**100**

4.8 Question Bank

Unit No.-I

1. List the various challenges of IS Manager.

2. State role of information system in an organization.

3. Describe the components and resources of an information system.

4. Explain Transaction Processing System and List detailed set of transactions for purchasing a railway ticket.

5. Explain Transaction Processing System and List detailed set of transactions for purchasing a product in online shopping.

6. Explain importance (& responsibilities) of management.

7. Indicate three levels of management.

8. Explain the major function of management.

9. Enumerate the top ten IT-IS related business applications.

10. Describe the activities of an information system.

11. Write short note on:

    a). Transaction Processing System.

    b). Management Information system.

12. Write short note on:

    a). Local Area network

    b). Metropolitan area network

Unit No. II

1. Explain evolution of MIS.
2. Define MIS and state its role in an organization.
3. State and explain primary function of MIS.
4. Explain the benefit provided by MIS
5. Describe ethical issues in information society.
6. Enumerate and explain the various modes of committing cyber crime.
7. What is hacking? Describe the different types of hackers.
8. Explain concept of MIS.
9. Explain ethical and social issue related to system.
10. What are the reasons for cyber crime?
11. Give classification of cyber crime.
12. Explain client server Era in detail.

Multiple Choice Questions(MCQ)

MCQ Test

DATE:

Sub: ISEE   **Max.marks:10**

Class: T.E. (A)

1. _____ expressly designed for the support of individual and collective decision making.

A. MIS

B. DSS

C. TPS

D. OIS

ANSWER: B

2. _____ is formal social units devoted to the attainment of specific goals.

A. Management

B. Organization

C. Decision support system

D. None of these

ANSWER: B

3. _____ technology includes computers hardware, software, database management systems and data communication system.

A. Information

B. Computer

C. Marketing

D. All of the above

ANSWER: A

4. Which factor ensure that performance meets established standards that worker's activities occurs as planned and that the organization process.

A. Controlling

B. Planning

C. Leading

D. Organizing

ANSWER: A

5. Newspaper, magazine, radio, television are example of _____.

A. Storing information

B. Retrieving information

C. Communication information

D. Acquiring information

ANSWER: D

6. Which systems are interactive information systems that assist a decision maker in approaching ill-structured problems by offering analytical models and access to database.

A. Decision making

B. Systematic

C. Cognitive

D. Decision support systems

ANSWER: D

7. The components of DSS –

A. Data management sub systems

B. Model management sub system

C. Dialog management sub system

D. All of the above

ANSWER: D

8. _____ systems help to a analyze historical and current data either on demand or periodically.

A. Data access system

B. Data analysis system

C. Forecast-oriented data analysis system

D. System based on accounting models

ANSWER: B

9. Buying a cinema ticket on a mobile phone is an example of what?

A. Decision-making

B. B2B e-commerce

C. M-commerce

D. C2C e-commerce

ANSWER: C

10. Which of the following is not a means of measuring the value of an IS?

A. Earnings growth

B. Market share

C. Customer satisfaction

D. Systems analysis

ANSWER: D

Multiple Choice Questions(MCQ)

MCQ Test

DATE:

Sub: ISEE   **Max.marks:10**
Class: T.E.(A)

The concept of supply curve as used in economic theory is relevant only for the case of
A. Oligopoly competition
B. Perfect or pure competition
C. Monopolistic competition
D. Monopoly
ANSWER: B

Direct regulation of business has the potential to yield economic benefits to society when
A. diseconomies of scale exist
B. barriers to entry are absent
C. there are no good substitutes for a product
D. many firms serve a given market
ANSWER: C

Managerial economics generally refers to the integration of economic theory with business
A. Ethics
B. Management
C. Practice
D. All of the above
ANSWER: C

When a firm's average revenue is equal to its average cost, it gets.....
A. Super profit
B. Normal profit
C. Sub normal profit
D. None of the above
ANSWER: B

Which property the paper money does not possess
A. Acceptability

B. Divisibility
C. Durability
D. Portability
ANSWER: C

Other things being equal, an increase in supply can be caused by
A. A rise in the income of the consumer
B. An improvement in the techniques of production
C. A rise in the price of the commodity
D. An increase in the income of the seller
ANSWER: B

Managerial economics cannot be used to identify
A. microeconomic consequences of managerial behavior.
B. how macroeconomic forces affect the organization.
C. goals of the organization.
D. ways to efficiently achieve the organization's goals.
ANSWER: C

Which is the best definition of the marginal firm?
A. The firm with lowest costs
B. The firm with the large profit
C. The firm which makes only normal profit
D. The firm which equates its marginal costs with marginal revenue.
ANSWER: C

Which is NOT a desirable characteristic of money?
A. Portable
B. Uniform
C. Easily recognized
D. Easily duplicated
ANSWER: D

A Ten rupee note is
A. Token money
B. Credit money
C. Legal money
D. (a) and (c) of above
ANSWER: D

5. *Subject – Computer Network*

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	4hrs	-----	2hrs

In-sem	Theory	Practical	Oral	Term-work	Total Marks	Credit
30	70	50	------	25	175	4

5.1 Course Objective

1. To classify the fundamental concepts of wired and wireless network.

2. To outline the OSI reference model's overall function.

3. To summarize the role of protocols at various layers in the protocol stack.

4. To develop an understanding of modern network architecture from a design and performance perspective

5.2 Course Outcomes

- Explain the fundamental concepts of wired and wireless Networks.
- Solve the design issues related to sub layers of Data Link Layer.
- Identify different routing protocols at Network Layer.
- Analyze data flow through transport and application layers of TCP/IP model.

5.3 Syllabus

Unit No.	Contents	Hours
I	**Physical Layer** Introduction of LAN; MAN; WAN; PAN, Ad-hoc Network, Network Architectures: Client-Server; Peer To Peer; Distributed and SDN, OSI Model, TCP/IP Model, Topologies: Star and Hierarchical; Design issues for Layers, Transmission Mediums: CAT5, 5e, 6, OFC and Radio Spectrum, Network Devices: Bridge, Switch, Router, Brouter and Access Point, Manchester and Differential Manchester Encodings; IEEE802.11: Frequency Hopping (FHSS) and Direct Sequence (DSSS)	**09**
II	**Logical Link Control** Design Issues: Services to Network Layer, Framing, Error Control and Flow Control. Error Control: Parity Bits, Hamming Codes (11/12-bits) and CRC. Flow Control Protocols: Unrestricted Simplex, Stop and Wait, Sliding Window Protocol, WAN Connectivity : PPP and HDLC	**09**
III	**Medium Access Control** Channel allocation: Static and Dynamic, Multiple Access Protocols: Pure and Slotted ALOHA, CSMA, WDMA, IEEE 802.3 Standards and Frame Formats, CSMA/CD, Binary Exponential Back -off algorithm, Fast Ethernet, Gigabit Ethernet, IEEE 802.11a/b/g/n and IEEE 802.15 and IEEE 802.16 Standards, Frame formats, CSMA/CA.	**09**
IV	**Network Layer** Switching techniques, IP Protocol, IPv4 and IPv6 addressing schemes, Subnetting, NAT, CIDR, ICMP, Routing Protocols: Distance Vector, Link State, Path Vector, Routing in Internet: RIP ,OSPF, BGP, Congestion control and QoS, , MPLS, Mobile IP, Routing in MANET : AODV, DSR	**09**
V	**Transport Layer** Services, Berkley Sockets, Addressing, Connection establishment, Connection release, Flow control and buffering, Multiplexing, TCP, TCP Timer management, TCP Congestion Control, Real Time Transport protocol(RTP), Stream Control Transmission Protocol (SCTP), Quality of Service (QoS), Differentiated services, TCP and UDP for Wireless.	**09**
VI	**Application Layer** Domain Name System (DNS), Hyper Text Transfer Protocol (HTTP), Email: SMTP, MIME, POP3, Webmail, FTP, TELNET, Dynamic Host Control Protocol (DHCP), Simple Network Management Protocol (SNMP).	**09**

5.4 Text Books:

T1	Andrew S. Tenenbaum, "Computer Networks", PHI, ISBN 81-203-2175-8.
T2	Fourauzan B., "Data Communications and Networking", 5th Edition, Tata McGraw- Hill, Publications, ISBN: 0 – 07 – 058408 – 7

5.5 Reference Books:

R1	Kurose, Ross "Computer Networking a Top Down Approach Featuring the Internet", Pearson, ISBN-10: 0132856204
R2	Matthew S. G, "802.11 Wireless Networks", O'Reilly publications, ISBN: 81-7656-992-5
R3	C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols" Prentice Hall, ISBN-10: 8131706885; ISBN-13: 978-8131706886
R4	Holger Karl and Andreas Willing, "Protocols and Architectures for Wireless Sensor Networks", Wiley India , ISBN: 9788126533695
R5	Eldad Perahia, Robert Stacey, "Next Generation Wireless LANs", Cambridge, ISBN-10: 1107016762; ISBN-13: 978-1107016767
R6	Efraim Turban, Linda Volonino, Gregory R. Wood "Computer Networking a Top Down Approach Featuring the Internet", 10th Edition, Wiley; ISBN13: 978-1-118-96126-1

5.7 Teaching Plan

Sr. No.	Unit	Broad Topic to be covered	Books Referred	Total Lectures Planned
1	I	Physical Layer	T1 &T2	4
2	II	Logical Link Control	T1 &T2	4
3	III	Medium Access Control	T1 &T2	8
4	IV	Network Layer	T1 &T2	9
5	V	Transport Layer	T1 &T2	9
6	VI	Application Layer	T1 &T2	9

5.8 Assessment Tools Details

Sr. No.	Assessment Tool	Total in number	Marks
1	Class Test (T1 to T3)	Each of 20 marks	60
2	Assignment I	20 marks	20
3	Knowledge Survey	20 marks	20
		Total	**100**

5.9 Assessment Tool Planner

Units	Co No.	Assessment Tool	Marks	Schedule
I	C305.1	TEST-I	20	4th week of July 2019
II, III	C305.2	KNOWLEDGE SURVEY	20	3rd week of October 2019
IV	C305.3	ASSIGNMENT	20	3rd week of August 2019
V	C305.4	TEST-II	20	1st week of September 2019
VI	C305.5	TEST-III	20	2nd week of October 2019

5.10 Question Bank

Question Bank – Module 1

Subject: Computer Network   **Year/Sem: Third Year(2019-20)/V Sem**

Q.1) What are the design issues of layer? Explain it. (Aug 17)

Q.2) What are the different network devices? Explain difference between switch and hub. (Aug 17, Dec 17)

Q.3) What is encoding? Give the Manchester line code and differential Manchester code for the bit sequence : 1100110. (Aug 17)

Q.4) Differentiate between OSI and TCP/IP reference model. (Dec 17, May 18)

Q.5) Represent 101011100 using Manchester and differential Manchester line coding technique. (Dec 17)

Q.6) Explain in brief FHSS and DSSS. (Dec 17, May 18, Dec 18)

Q.7) What are different type of topology? Explain any one. (Dec 18)

Q.8) For the bit sequence 10000101111 draw the waveform for (i) Manchester Encoding (ii) Differential Manchester Encoding. (Dec 18)

Question Bank – Module 2

Q.1) Compare and contrast the Go Back N ARQ protocol with Selective Repeat ARQ. (Aug 17, Dec 17, May 18, Dec 18)

Q.2) Explain control field of HDLC w.r.t. I-frame, S-frame and U-frame. (Aug 17, Dec 17, May 18)

Q.3) The data word 1101011011is to be sent using generator polynomial $x4 + x + 1$. Use CRC to compute the codeword at the sender side. (Aug 17)

Q.4) A bit stream 1001101 is transmitted using an hamming code. Show the actual bit string transmitted. Suppose 7th bit from left is inverted during transmission, show that this error is detected and corrected at the receivers end. (Dec 17)

Q.5) Explain the working of cyclic redundancy check (CRC) using the following example (show the complete steps of division). Data Bit: 1101110110 Generator polynomial : $x3 + x + 1$. Write the redundant bits that will be sent along with the data bits. (Dec 18)

Q.6) In a stop-and-wait system, the b/w of the line is 2 Mbps and 1 bit takes 20 milliseconds to make a round trip. What is the b/w delay product? If the system data packets are 2000 bits in length, What is the utilization percentage of the link? (Dec 17, May 18)

Q.7) Calculate the throughput for stop and wait protocol, If the frame size is 4800 bits, bit rate is 9600bps, within distance 2000km with speed of propagation 200000 km/s. (May 18)

Q.8) In a stop-and-wait system, the b/w of the line is 1 Mbps and 1 bit takes 10 milliseconds to make a round trip. What is the b/w delay product? If the system data packets are 1000 bits in length, What is the utilization percentage of the link? (Dec 18)

Question Bank – Module 3

Q.1) Explain working of CSMA/CD. (Aug 17, May 18)

Q.2) Draw flowchart of CSMA/CA. (Dec 17)

Q.3) Explain in brief: FHSS and DSSS. (Dec 17, May 18, Dec 18)

Q.4) Draw and explain frame format of 802.16. (Aug 17)

Q.5) Explain bluetooth 802.15 frame format. (May 18)

Q.6) Explain 802.11 wireless frame format. (Dec 18)

6.Subject – Skill Development Lab

<u>COURSE DETAILS DOCUMENT</u>

Class – TE
Course Name – Skill Development Lab

Course Code – 310246   **Course No.** – 306

Teaching Scheme   **Marking Scheme**
TUT- 02 Hour/Week
Practical – 4 Hrs./wk.   **TW**: 50 marks
                                                      Oral: 50 marks

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Course Objectives
1. To adapt the usage of modern tools and recent software.
2. To evaluate problems and analyze data using current technologies
3. To learn the process of creation of data-driven web applications using current technologies
4. To understand how to incorporate best practices for building enterprise applications
5. To learn how to employ Integrated Development Environment(IDE) for implementing and testing of software solution
6. To construct software solutions by evaluating alternate architectural patterns.

Course Outcomes

CO No.	Year of study 2017-18	Bloom's taxonomy	Bloom's Level
At the end of the course students will be able to -			
C306.1	**Make use of** data structures and collection framework to **develop** a system.	Apply and create	L3,L6
C306.2	**Apply** socket programming, JDBC, multithreading concept to develop a system.	Apply and create	L3,L6
C306.3	**Develop** a real-time application in team and demonstrate it.	Create	L6
C306.4	**Solve** problems of critical thinking, logical ability and vocabulary skills	Apply	L3

List of Assignments

Sr. No.	Title	Bloom's Level
LA1	Design a system with the help of advance data structures in Java and enhance the system using collections and generics.	L3,L6
LA2	Enhance the above system with the help of socket programming use client server architecture.	L6
LA3	Enhance above system by using JDBC, Multithreading, concurrency, synchronous and asynchronous callbacks, ThreadPools using ExecutorService.	L6
LA4	Transform the above system from command line system to GUI based application	L6
LA5	Download Install and Configure Android Studio on Linux/windows platform.	L6
LA6	Design a mobile app for media player.	L6
LA7	Design a mobile app to store data using internal or external storage.	L6
LA8	Design a mobile app using Google Map and GPS to trace the location.	L6

COURSE ASSESMENT

Sr. No.	Type	Weightage
1	Direct Assessment (Internal + External)	80%
2	Indirect Assessment (Course Exit Survey)	20%
	TOTAL	100%

DIRECT ASSESMENT (80% Weightage)
Activities planned / assessment tools to be used to achieve Course Outcomes

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Lab Assignments (LA1 to LA8)	Each of 10 marks	80
2	Assignment(A1)	Each of 10 marks	10
3	Mock Oral (MO)	01	50
4	Mini Project(MP)	01	10
5	MCQ(M1)	01	10
		Total	**160**

Rubrics for evaluation of Practical Assignment of 10 Marks Each .			
Problem Solving Ability and logic	Basic Concept: Knowledge Understanding	Execution of assignment & Inference Drawn	On time Submission
2	2	4	2

External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Marks scale down to
1	TW	50
2	Oral	50
	Total	**100**

Internal Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	Total Weightage
C306.1	LA1, MO	10
C306.2	LA2, LA3, LA4, MO	30
C306.3	LA5, LA6, LA7, LA8,MP, MO	50

C306.4	A1,M1	20
	TOTAL	**110(Except mock)**

External Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	
C306.1		
C306.2	TW (50)	ORAL (50)
C306.3		
C306.4		
Marks	**50**	**50**
Total Marks	**100**	

INDIRECT ASSESMENT (20% Weightage)

- **Course Exit Survey (to be submitted at the end of the course)**

7.Subject – DBMS Lab

COURSE DETAILS DOCUMENT

Class – TE – A
Course Name – DBMS Lab   **Course Code –** 310247

Course No. – C307
Teaching Scheme   **Marking Scheme**
Pracitcal – 4 Hrs/wk   **Practical** : 50 marks
                                                                TW :25 marks

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Course Objectives

1. To develop an ability to write queries in SQL/PLSQL
2. To give an introduction to NOSQL Databases.

Course Outcomes

Related Course No	CO No.	Year of study 2017-18	Bloom's taxonomy	Bloom's Level
At the end of the course students will be able to -				
C307	C307.1	**Design** and **implement** database using SQL queries.	Create	Level 6
	C307.2	**Solvereal** world problems using PL/SQL for creation and manipulation ofDatabase.	Apply	Level 3
	C307.3	**Compile**queries for NOSQL databases.	Create	Level 6
	C307.4	**Builda** databaseapplicationusing basic and advanced database concepts.	Create	Level 6

List of Assignments

Course No.	Sr. No.	Title	Bloom's Level
C307	LA1	1. Study of Open Source Relational Databases : MySQL	L3
	LA2	2. Design and Develop SQL DDL statements which demonstrate the use of SQL objects such as Table, View, Index, Sequence, Synonym	L3
	LA3	3. Design at least 10 SQL queries for suitable database application using SQL DML statements: Insert, Select, Update, Delete with operators, functions, and set operator.	L6
	LA4	4. Design at least 10 SQL queries for suitable database application using SQL DML statements: all types of Join, Sub-Query and View.	L6
	LA5	1. Unnamed PL/SQL code block: Use of Control structure and Exception handling is mandatory. Write a PL/SQL block of code for the following requirements:- Schema: Borrower(Rollin, Name, DateofIssue, NameofBook, Status) Fine(Roll_no,Date,Amt) a. Accept roll_no& name of book from user. b. Check the number of days (from date of issue), if days are between 15 to 30 then fine amount will be Rs 5per day. c. If no. of days>30, per day fine will be Rs 50 per day & for days less than 30, Rs. 5 per day. d. After submitting the book, status will change from I to R. e. If condition of fine is true, then details will be stored into fine table. Frame the problem statement for writing PL/SQL block inline with above statement.	L6
	LA6	5. Cursors: (All types: Implicit, Explicit, Cursor FOR Loop, Parameterized Cursor) Write a PL/SQL block of code using parameterized Cursor, that will merge the data available in the newly created table N_RollCall with the data available in the table O_RollCall. If the data in the first table already exist in the second table then that data should be skipped. Frame the separate problem statement for writing PL/SQL block to implement all types	L6
	LA7	6. PL/SQL Stored Procedure and Stored Function. Write a Stored Procedure namely proc_Grade for the categorization of student. If marks scored by students in	L3

		examination is <=1500 and marks>=990 then student will be placed in distinction category if marks scored are between 989 and900 category is first class, if marks 899 and 825 category is Higher Second Class Write a PL/SQL block for using procedure created with above requirement. Stud_Marks(name, total_marks) Result(Roll,Name, Class) Frame the separate problem statement for writing PL/SQL Stored Procedure and function, inline with above statement. The problem statement should clearly state the requirements.	
	LA8	1. Database Trigger (All Types: Row level and Statement level triggers, before and After Triggers). Write a database trigger on Library table. The System should keep track of the records that are being updated or deleted. The old value of updated or deleted records should be added in Library_Audit table.	L3
	LA9	1. Study of Open Source NOSQL Database: MongoDB (Installation, Basic CRUD operations, Execution)	L3
	LA10	2. Design and Develop MongoDB Queries using CRUD operations. (Use CRUD operations, SAVE method, logical operators)	L3
	LA11	3. Implement aggregation and indexing with suitable example using MongoDB	L3
C307	LA12	Mini Project	L6

COURSE ASSESMENT

Sr. No.	Type	Weightage
1	Direct Assessment (Internal + External)	80%
2	Indirect Assessment (Course Exit Survey)	20%
	TOTAL	100%

DIRECT ASSESMENT (80% Weightage)
Activities planned / assessment tools to be used to achieve Course Outcomes

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Lab Assignments (LA1 to LA12)	12 (each of 05 marks)	60
2	Mock Practical	12(each of 05 marks)	50
		Total	**110**

Rubrics for evaluation of Practical Assignmentof 5 Marks Each .			
Problem Solving Ability and logic	Basic Concept: Knowledge Understanding	Execution of assignment & Inference Drawn	On time Submission
1	1	2	1

External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Marks scale down to
1	Practical	50
2	TW	25
	Total	**75**

Internal Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	Total Weightage
C307.1	LA1 to LA4,Mock Practical	(20+10)
C307.2	LA5 to LA8, Mock Practical	(20+10)
C307.3	LA9 toLA11, Mock Practical	(15+10)
C307.4	LA12, Mock Practical	(5+20)
	TOTAL	110

External Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	
C307.1	PRACTICAL (50)	TW(25)
C307.2		
C307.3		
C307.4		
Marks	25	50
Total Marks	75	

8.Subject – Audit Course-III (Cyber Security)

COURSE DETAILS DOCUMENT

Class – TE – B
Course Name – Computer Network Lab
Course Code – 310248   **Course No.** – 308
Teaching Scheme   **Marking Scheme**
Pracitcal – 2 Hrs/wk   **Practical**: 50 marks

Course Objectives
1. To establish communication among the computing nodes in various network architecture.
2. Configure the computing nodes with understanding of protocols and technologies.
3. Use different communicating modes and standards for communication.
4. Use modern tools for network traffic analysis

Course Outcomes

Related Course No	CO No.	Year of study 2017-18	Bloom's taxonomy	Bloom's Level
At the end of the course students will be able to -				
C308	C308.1	**Assess** the network for data transfer, error control and flow control.	Evaluating	L5
	C308.2	**Construct** routing algorithm with the help of modern tools.	Applying	L3
	C308.3	**Analyze** socket programming at transport layer.	Analyzing	L4
	C308.4	**Elaborate** the services provided by application layer across the network.	Creating	L6

List of Assignments

Course No.	Sr. No.	Title	Bloom's Level
C308	LA1	Using Layer 2 Switch of minimum four computers setup a wired LAN test it with PING utility and demonstrate the PING packets captured traces using Wireshark Packet Analyzer Tool. Extend the same Assignment for Wireless using Access Point	L5
	LA2	Write a Program with following four options to transfer- a. Characters separated by space b. One Strings at a time c. One Sentence at a time d. file between two RS 232D or USB ports using C/C++. (To demonstrate Framing, Flow control, Error control).	L5
	LA3	Write a program for error detection and correction for 7/8 bits ASCII codes using Hamming Codes or CRC. Demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.(50% students will perform Hamming Code and others will perform CRC)	L5
	LA4	Write a program to simulate Go back N and Selective Repeat Modes of Sliding Window Protocol in peer to peer mode and demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.	L5
	LA5	Write a program to demonstrate subnetting and find the subnet masks.	L3
	LA6	Write a program to simulate the behavior of link state routing protocol to find suitable path for transmission.	L3
	LA7	Write a program using TCP socket for wired network for following a. Say Hello to Each other (For all students) b. File transfer (For all students) c. Calculator (Arithmetic) (50% students) d. Calculator (Trigonometry) (50% students) Analyze the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.	L4
	LA8	Write a program using UDP Sockets to enable file transfer (Script, Text, Audio and Video one file each) between two machines. Analyze the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.	L4
	LA9	Write a program to analyze following packet formats captured through Wireshark for wired network. 1. Ethernet 2. IP 3.TCP 4. UDP	L4
	LA10	Write a program to simulate the behavior of Slow Start and AIMD (Additive Increase and Multiplicative Decrease) congestion control protocols. (Use JAVA/PYTHON)	L4
	LA11	Write a program for DNS lookup. Given an IP address input, it should return URL and vice-versa.	L6
	LA12	Write a program for DNS lookup. Given an IP address input, it should return URL and vice-versa.	L6
	LB1	Write a Program to transfer- By using Bluetooth a. Characters separated by space b. One Strings at a time c. One Sentence at a time d. File	L5
	LB2	Using any network simulation tools create a network with three nodes and establish a TCP connection between node 0 and node 1 such that node 0 will send TCP packet to node 2 via node 1	L4

LB3	Write a program using TCP sockets for wired network to implement a. Peer to Peer Chat b. Multiuser Chat Demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.		L4
LB4	Write a program using UDP sockets for wired network to implement a. Peer to Peer Chat b. Multiuser Chat Demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.		L4
LB5	Write a program to prepare TCP and UDP packets using header files and send the packets to destination machine in peer to peer mode. Demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.		L4
LB6	Use network simulator NS2 to implement: a. Monitoring traffic for the given topology b. Analysis of CSMA and Ethernet protocols c. Network Routing: Shortest path routing, AODV. d. Analysis of congestion control (TCP and UDP).		L3
LB7	Using packet Tracer, configure RIP/OSPF/BGP.		L3

COURSE ASSESMENT

Sr. No.	Type	Weightage
1	Direct Assessment (Internal + External)	80%
2	Indirect Assessment (Course Exit Survey)	20%
	TOTAL	100%

DIRECT ASSESMENT (80% Weightage)
Activities planned / assessment tools to be used to achieve Course Outcomes

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Lab Assignments (LA1 to LA12) (Out of 12 Implement and Submit **8** (– (LA1, LA7, LA8, LA9 any 4 from (LA2 to LA6)) and (LA10 to LA12).	8 (each of 10 marks)	80
	Lab Assignments (LB1 to LB7) (Out of 7 Implement and Submit 4 (– (LB6, LB7 any2 from (LB1 to LB5)).	4 (each of 10 marks)	40
2	Mock Practical (MP)	01	25
	Total		**145**

Rubrics for evaluation of Practical Assignment of 10 Marks Each.

Problem Solving Ability and logic	Basic Concept: Knowledge Understanding	Execution of assignment & Inference Drawn	Presentation
2	2	4	2

Rubrics for Mock Practical (MPR)

Implementation	Presentation (Logic Explanation)	Algorithm or flow chart

15	5	5

External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Marks scale down to
1	Practical	50
2	TW	25
	Total	**75**

Internal Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	Total Weightage
C308.1	(LA1 to LA4) , (LB1), MP	55
C308.2	(LA5, LA6,LB6, LB7) , MP	50
C308.3	(LA7 to LA10, LB3 to LB5), MP	75
C308.4	(LA11,LA12) , MP	25
	TOTAL	**205**

External Assessment tools to CO mapping

CO No.	ASSESSMENT TOOLS USED	
C308.1	PRACTICAL (50)	TW(25)
C308.2		
C308.3		
C308.4		
Marks	**50**	**25**
Total Marks	**75**	

9.Subject – Audit Course-III (Cyber Security)

COURSE DETAILS DOCUMENT

Class – TE
Course Name – Audit Course-III (Cyber Security)
Course Code – 310249   **Course No.** – C309
Teaching Scheme   **Marking Scheme**
Lab – 2 Hrs/week   **Grade** – AP

Prerequisite course: Discrete Mathematics, Computer Network.

Companion Course: Information and Cyber Security.

Course Objectives

- To assess the current security landscape, the general status of common vulnerabilities, and the likely consequences of security failures.
- To critique and assess the strengths and weaknesses of general cyber security models.
- To appraise the interrelationships among elements that comprises a modern security system.
- To assess how all domains of security interact to achieve effective system-wide security at the enterprise level.

Course Outcomes

CO No.	Year of study 2020-21	Mapping to POs/PSOs		
	At the end of the course students will be able to -	Substantial	Moderate	Low
C309.1	Explain the elements of Information security and models of N/W security.		1	12, 13, 15
C309.2	Classify different authentication methods, protocols and standards for electronic mail security.		1	2, 12, 13
C309.3	Explain intrusion detection system, firewall and hacking.		1	12, 13,14, 15

DIRECT ASSESMENT (100%)

Activities planned / assessment tools to be used to achieve Course Outcomes

Internal Assessment Tools (20% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Presentation(P1)	01- 10 marks	10
2	Test (MCQ1-2)	Each of 10 marks	20
		Total	**30**

External Assessment Tools (80% Weightage)

Sr. No.	Assessment Tool	Total in number	Marks scale down to
1	Grade	01	PP
		Total	**PP**