J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

ACADEMIC YEAR **2013-14**

http://www.jbiet.edu.in

	COURSE PLAN	2013-14
		Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: Arifa Tehseen Ara
Designation: ASSISTANT PROFESSOR
Department:: CSE

COURSE DETAILS

Name Of The Programme:: B. Tech Batch:: 11-15
Designation::
Year III Semester :: II
Department:: CSE
Title of The Subject Mathematical Foundations of Computer Science Subject Code
No of Students 110

	COURSE PLAN	2013-14
		Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE

1. TARGET

a) Percentage Pass : 90

b) Percentage I class : 70

2. COURSE PLAN

(Please write how you intend to cover the contents: i.e., coverage of Units by lectures, guest lectures, design exercises, solving numerical problems, demonstration of models, model preparation, or by assignments, etc.)

A. Coverage of Units by Lectures B. Solving numerical problems C. Assignments

3. METHOD OF EVALUATION

3.1. ☐ Continuous Assessment Examinations (CAE 1, CAE 2)

3.2. ☐ Assignments / Seminars

3.3. ☐ Mini Projects

3.4. ☐ Quiz

3.5. ☐ Term End Examination

3.6. ☐ Others

4. List out any new topic(s) or any innovation you would like to introduce in teaching the subject in this Semester.

Signature of HOD
Date:

Signature of Faculty
Date:

	GUIDELINES TO STUDY THE SUBJECT	2013-14
		Regulation: R11

FACULTY DETAILS:

Name of the Faculty::	ARIFA TEHSEEN ARA
Designation:	ASSISTANT PROFESSOR
Department::	CSE
Guidelines for Preparing the Course:	

Course Description:

Fundamental concepts and tools in discreet mathematics with emphasis on their applications to computer science. Topics include logic and Boolean circuits; sets, functions, relations, databases, and finite automata: deterministic algorithms, randomized algorithms, and analysis techniques based on counting methods and recurrence equations; trees and more general graphs

Course Objectives:

1. Developing arithmetic, algebraic, geometric, and problem-solving skills necessary to succeed in subsequent courses.
2. Expressing contextual problems in both abstract and symbolic forms as well as analyze relationships through symbolic, graphical, and statistical means.
3. Demonstrating ability to solve advanced mathematical problems, apply various methods of mathematical proof, and communicate solutions in writing.
4. Demonstrating the ability to comprehend advanced mathematics, and present the material orally and in writing.
5. Be aware of and involved with mathematics outside the classroom.

Learning Outcomes:

At the end of the course, the student should be able to formulate logic expressions for a variety of applications; convert a logic expression into a Boolean circuit, and vice versa; design relational databases; design finite automata to recognize string patterns; apply, adapt, and design elementary deterministic and randomized algorithms to solve computational problems; analyze the running time of non-recursive algorithms with loops by means of counting; analyze the running time of divide-and-conquer recursive algorithms by means of recurrence equations; and use trees and graphs to formulate computational problems.

	COURSE OBJECTIVES	2013-14
		Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE

On completion of this Subject / Course the student shall be able to:

S.No.	Objectives	Outcomes
1.	Practice truth table problems	Application of knowledge/Demonstrate
2.	Study about the Normal forms	Apply/ Solve
3.	Define predicative logic	Knowledge/Define
4.	Define Relations & properties of relations	Knowledge/Define
5.	Define Functions, Lattices and properties	Knowledge/Define
6.	Define Semi Group and its properties	Knowledge/Define
7.	Define Homomorphism, isomorphism, Groups, sub groups and monoids	Knowledge/Define
8.	Work out of problems on combinations & permutations	Application of knowledge/Demonstrate
9.	Learning the recurrence relation problems	Apply/ Solve
10.	Study about the graph representations	Knowledge/Define , Understand/Give Examples
11.	Perform BFS & DFS search	
12.	Practice planar graph problems	Application of knowledge/Demonstrate
13.	Learn about the various graph theory applications like Mutli-graphs, Euler-circuits, Hamiltonian graphs and Chromatic numbers	Knowledge/Define , Understand/Give Examples

Signature of Faculty
Date:

Note: For each of the OBJECTIVE indicate the appropriate OUTCOMES to be achieved.
Kindly refer Page 16, to know the illustrative verbs that can be used to state the objectives.

	COURSE OUTCOMES	2013-14
		Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE

The expected outcomes of the Course / Subject are:

S.No.	General Categories of Outcomes	Specific Outcomes of the Course
A.	An ability to apply knowledge of mathematics, science, and engineering	Compute, Solve
B.	An ability to design and conduct experiments, as well as to analyze and interpret data	Design, Devise
C.	An ability to design a system, component, or process to meet desired needs within realistic Constraints such as economic, environmental, social, political, ethical, health and safety, Manufacturability and sustainability	
D.	An ability to function on multi-disciplinary teams	Relate
E.	An ability to identify, formulate, and solve engineering problems	Estimate
F.	An understanding of professional and ethical responsibility	Knowledge
G.	An ability to communicate effectively	Relate
H.	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	Prepare
I.	A recognition of the need for, and an ability to engage in life-long learning	Appraise
J.	A knowledge of contemporary issues	
K.	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	Appraise

Objectives – Outcome Relationship Matrix (Indicate the relationships by ☒ mark).

Objectives \ Outcomes	A	B	C	D	E	F	G	H	I	J	K
1.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

	COURSE SCHEDULE	2013-14
		Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

S. No.	Description	Duration (Date)		Total No. of Periods
		From	To	
1.	Mathematical Logic	3/7/2013	16/7/2013	13
2.	predicates	17/7/2013	22/7/2013	9
3.	Relations	23/7/2013	30/7/2013	10
4.	Algebraic structures	1/8/2013	7/8/2013	4
5.	Elementary combinatories	12/8/2013	22/8/2013	5
6.	Recurrence relation	31/8/2013	11/9/2013	6
7	Graph theory	11/9/2013	25/9/2013	6
8	Graph theory applications	26/9/2013	5/10/2013	7

Total No. of Instructional periods available for the course: Hours / Periods

	SCHEDULE OF INSTRUCTIONS UNIT - I	2013-14 Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	3/7-4/7/2013	2	Introduction, Statements and notations	1 &A	TB1-1.1-1.3
2	6/7-8/7/2013	2	Connectives	1&A	TB1-1.4
3	9/7-10/7/2013	3	Well formed formulas, Truth Tables	1& A	TB1-1.5-1.8
4	10/7-11/7/2013	2	Tautology Problems	1& A	TB1-1.9-1.11
5	11/7/2013	1	Normal forms.	2 & A	TB1-1.12-1.15
6	15/7-16/7/2013	2	Problems on normal forms	1,2 & A	

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.
3. MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - II	2013-14 Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	17/7/2013	2	Introduction, Predicative logic	3&A	TB1-2.1-2.4
2	18/7/2013	2	Free & Bound variables and problems	3&A	TB1-2.5-2.7
3	20/7/2013	1	Rules of inference	3&F	TB1-2.8
4	20/7/2013	1	Consistency and problems	3&D	TB1-2.9-2.10
5	22/7/2013	1	proof of contradiction	3&F	TB1-2.12-2.13
6	22/7/2013	1	Automatic Theorem Proving	3&F	TB1-2.15-2.17
7		1	Problems	3&A, B	TB1-2.1-2.4

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
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MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - III	2013-14 Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	17/7/2013	2	Introduction, Predicative logic	3& A	TB1-2.1-2.4
2	18/7/2013	2	Free & Bound variables and problems	3& A	TB1-2.5-2.7
3	20/7/2013	1	Rules of inference	3& F	TB1-2.8
4	20/7/2013	1	Consistency and problems	3& D	TB1-2.9-2.10
5	22/7/2013	1	proof of contradiction	3& F	TB1-2.12-2.13
6	22/7/2013	1	Automatic Theorem Proving	3& F	TB1-2.15-2.17
7		1	Problems	3& A, B	TB1-2.1-2.4

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - IV	2013-14 Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	23/7/2013	1	Introduction , Properties of binary Relations	4& D	TB1-3.1-3.2
2	24/7/2013	1	Equivalence,transitive,closure	4& D	TB1-3.3.3.5
3	25/7/2013	1	compatibility and partial ordering relations	4& A	TB1-3.6-3.7
4	27/7/2013	2	Lattices, Hasse diagram	4& E	TB1-3.10-3.15
5	1/8/2013	1	Functions & inverse function	5& F	TB1-3.16-3.17
6	3/8/2013	1	Composition of functions	5& F	TB1-3.18
7	6/8/2013	1	Recursive functions	5& F	TB1-3.19
8	7/8/2013	1	Lattice and its properties	5& F	TB1-3.9
9	7/8/2013	1	problems	4,5 &A	

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.

2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - V	2013-14 Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	7/10/2013	1	Introduction, Generating Functions	9& E	TB2-6.1-6.2
2	8/10/2013	1	Function of Sequences Calculating Coefficient of generating function	9& E	TB1-6.3
3	9/10/2013	1	Recurrence relations,	9& E	TB1-6.4
4	10/10/2013	1	Solving recurrence relation by substitution and Generating funds	9& E	TB1-6.10
5	17/10/2013	1	Characteristics roots solution of In homogeneous Recurrence Relation.	9& E	Tb2-5.11
6	18/10/2013	1	problems	9& E	

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
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MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - VI	2013-14 Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	7/10/2013	1	Introduction, Generating Functions	9& E	TB2-6.1-6.2
2	8/10/2013	1	Function of Sequences Calculating Coefficient of generating function	9& E	TB1-6.3
3	9/10/2013	1	Recurrence relations,	9& E	TB1-6.4
4	10/10/2013	1	Solving recurrence relation by substitution and Generating funds	9& E	TB1-6.10
5	17/10/2013		Characteristics roots solution of In homogeneous Recurrence Relation.	9& E	Tb2-5.11
6	18/10/2013	1	Problems		

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.
MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - VII	2013-14 Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	11/9/2013	1	Introduction	10&F	TB1-7.1
2	4/9/2013	1	Representation of Graph	10&E	TB1-7.3
3	16/9/2013		Problems on Graph	10&B	TB1-7.4-7.6
4	19/9/2013	1	DFS	11&A	TB1-7.7-7.9
5	21/9/2013		BFS	11&A	TB1-7.10-7.12
6	23/9/2013	1	Spanning Trees	11&A	TB1-7.13
7	24/9/2013	1	planar Graphs	12&B	TB2-6.9
8	25/9/2013	1	problems	10,11,12	

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	SCHEDULE OF INSTRUCTIONS UNIT - VIII	2013-14 Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

Sl. No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcome Nos.	References (Text Book, Journal…) Page No___ to ___
1	26/9/2013	1	Graph Theory and Applications	13&F	TB1-8.1
2	28/9/2013	1	Basic Concepts Isomorphism and Sub graphs,	13&F	TB1-8.4
3	1/10/2013	1	Multi graphs and Euler circuits	13&E	TB1-8.7
4	3/10/2013	1	Hamiltonian graphs,	13&E	TB1-8.8
5	4/10/2013	2	Chromatic Numbers.	13&E	internet
6	5/10/2013	1	problems	13&E	TB1-8.1

Signature of Faculty
Date

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED **BOLDLY**.

MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

	COURSE COMPLETION STATUS	2013-14
		Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA

Subject:: Mathematical Foundations of Computer Science Subject Code:

Department:: CSE

Actual Date of Completion & Remarks, if any

Units	Remarks	Nos. of Objectives Achieved
Unit 1	17/2013, Learnt about Truth tables and Normal Forms	2
Unit 2	22/7/2013, Learnt about Predicates	1
Unit 3	7/8/2013, Learnt about Relations & Functions	2
Unit 4	22/8/2013, Learnt about different Algebraic Structures	2
Unit 5	11/9/2013, Learnt about the permutations and combinations	1
Unit 6	18/10/2013, Leant about the recurrence relations	1
Unit 7	24/9/2013, Leant about Graph theory concepts	3
Unit 8	5/10/2013, Learnt about different graph theory applications	1

Signature of Dean of School
Date:

Signature of Faculty
Date:

NOTE: AFTER THE COMPLETION OF EACH UNIT MENTION THE NUMBER OF OBJECTIVES ACHIEVED.

	TUTORIAL SHEETS - I	2013-14
		Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

Date:

This Tutorial corresponds to Unit Nos.1,2,3 Time:

Q1. Construed a truth table for each of there (easy) compound statements

i. $(p \rightarrow q) \Lambda (7p \rightarrow q)$
ii. $p \rightarrow (7qV r)$

b. Write the negation of the following statements.

i. Jan will take a job in industry or go to graduate school.
ii. James will bicycle or run tomorrow.
iii. If the processor is fast then the printer is slow.

c. What is the minimal set of connectives required for a well formed formula**.**

Q2. Write the converse, inverse, contra positive for the implication "If two angels in triangle are equal then triangle isosceles"

Obtain principal conjunctive normal form (PCNF) for the following formula

$p V (\sim p \rightarrow (q V (\sim q \rightarrow r)))$

Q3. Shows that the following set of premises are inconsistent using indirect method of proof:

$P \rightarrow Q, Q \rightarrow R, \sim (P \wedge R), P v R \leftrightarrow R$

Q4. Draw Hasse diagram representing the partial ordering $\{(A, B):A \leq B\}$ on the power set P(S) where S = {a, b, c) where $\leq$ represents subset relation

Q5. Show that the function f<x, y> = x-y is partial recursive.

b) Show that every finite set is primitive recursive.

c) Let $f :R \rightarrow R$ and $g: R \rightarrow R$ where R is set of real numbers. Find fog and gof where $f(x) = x^2-2$ and $g(x) = x+4$. Determine whether these functions are injective, surjective and bijective

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the objectives to which these questions / Problems are related.

Signature of Dean of School
Date:

Signature of Faculty
Date:

	TUTORIAL SHEETS - II	2013-14
		Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE
The Schedule for the whole Course / Subject is:: Mathematical Foundations of Computer Science

Date:

This Tutorial corresponds to Unit Nos.4, 5 Time:

Q1. Define group. Show that set of integers are group under addition

Q2. Show that the set N of natural numbers is a semi group under the operation x*y = max{x, y}. Is it a monoid? Why or why not?

b) Let <S, *> be a semi group and z ∈ S be a left zero. Show that for any x∈S , x*z is also a left zero.

c) Prove or disprove the following

Every finite group of order n is isomorphic to a permutation group of degree n

Q3. A) Find the number of non-negative integral solutions to x1+x2+x3+x4+x5 = 10

b) Find the number of arrangements of the letters MISSISSIPPI

Q4. Determine the number of integers between 1 and 10,000,000 have the sum of digits equal to 18.

b) Determine the number of ways possible to wear 5 rings on 4 fingers.

Q5. Illustrate Pigeon hole principle and its applications

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the objectives to which these questions / Problems are related.

Signature of Dean of School
Date:

Signature of Faculty
Date:

	TUTORIAL SHEETS - III	2013-14
		Regulation: R11

FACULTY DETAILS:

Name of the Faculty:: ARIFA TEHSEEN ARA
Designation: ASSISTANT PROFESSOR
Department:: CSE

Date:

This Tutorial corresponds to Unit Nos.6,7,8 Time:

Q1. a) Solve the following recurrence relation using generating function

$a_n - 6\ a_n\text{-}1 = 0$ for $n \geq 1$, and $a_0 = 1$

b) Find a general expression for a solution to the recurrence relation

$a_n - 5a_n\text{-}1 + 6a_n\text{-}2 = n(n\text{-}1)$ for $n \geq 2$

c) Solve the recurrence relation

$a_n - 7a_n\text{-}1 + 10a_n\text{-}2 = 0$ for $n \geq 2$

Q2. a) What is planar graph? Is $K_{3,3}$ planar? Explain.

b) What is spanning tree? Explain Kruskals algorithm for spanning tree with example.

Q3. a) Explain and Illustrate various ways for representation of graphs.

b) Explain and Illustrate DFS and BFS with examples.

Q4. a) In any planar graph, show that $|V| - |E| + |R| = 2$.

b) What is Hamiltonian cycle? Show the Hamiltonian cycle in K_5.

Q5. Explain the following clearly, Illustrate with suitable examples.

a) Isomorphism and Sub graphs b) Multi-graphs c) Euler circuits

d) Hamiltonian graphs and chromatic numbers

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the objectives to which these questions / Problems are related.

Signature of Dean of School
Date:

Signature of Faculty
Date:

	ILLUSTRATIVE VERBS FOR STATING INSTRUCTIONAL OBJECTIVES	2013-14 Regulation: R11

These verbs can also be used while framing questions for Continuous Assessment Examinations as well as for End – Semester (final) Examinations.

ILLUSTRATIVE VERBS FOR STATING **GENERAL OBJECTIVES**

Know Comprehend	Understand Apply	Analyze Design	Generate Evaluate

ILLUSTRATIVE VERBS FOR STATING **SPECIFIC OBJECTIVES:**

A. Cognitive Domain

1	2	3	4	5	6
Knowledge	**Comprehension Understanding**	**Application** of knowledge & comprehension	**Analysis** of whole w.r.t. its constituents	**Synthesis** combination of ideas/constituents	**Evaluation** judgement
Define	Convert	Change	Breakdown	Categorize	Appraise
Identify	Defend	Compute	Differentiate	Combine	Compare
Label	Describe (a	Demonstrate	Discriminate	Compile	Conclude
List	procedure)	Deduce	Distinguish	Compose	Contrast
Match	Distinguish	Manipulate	Separate	Create	Criticize
Reproduce	Estimate	Modify	Subdivide	Devise	Justify
Select	Explain why/how	Predict		Design	Interpret
State	Extend	Prepare		Generate	Support
	Generalize	Relate		Organize	
	Give examples	Show		Plan	
	Illustrate	Solve		Rearrange	
	Infer			Reconstruct	
	Summarize			Reorganize	
				Revise	

B. Affective Domain		**C. Psychomotor Domain (skill development)**				
Adhere	Resolve	Bend	Dissect	Insert	Perform	Straighten
Assist	Select	Calibrate	Draw	Keep	Prepare	Strengthen
Attend	Serve	Compress	Extend	Elongate	Remove	Time
Change	Share	Conduct	Feed	Limit	Replace	Transfer
Develop		Connect	File	Manipulate	Report	Type
Help		Convert	Grow	Move preciselyReset		Weigh
Influence		Decrease	Handle	Operate	Run	
Initiate		Demonstrate	Increase	Paint	Set	

	LESSON PLAN **Unit-1**	2013-14 Regulation: R11

Name of the Faculty: ARIFA TEHSEEN ARA

Subject: Mathematical Foundations of Computer Science Subject Code

Unit I

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Introduction, Statements and notations	50 min	TB1-1.1-1.3	Chalk& board , exercises
2	Connectives	50 min	TB1-1.4	Chalk& board , exercises
3	Well formed formulas, Truth Tables	50 min	TB1-1.5-1.8	Chalk& board , exercises
4	Tautology Problems	50 min	TB1-1.9-1.11	Chalk& board , exercises
5	Normal forms.	50 min	TB1-1.12-1.15	Chalk& board , exercises
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7				
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On completion of this lesson the student shall be able to(Outcomes)

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	ASSIGNMENT **Unit-I**	2013-14 Regulation: R11

Assignment / Questions

1. Construed a truth table for each of there (easy) compound statements
   i. $(p \rightarrow q) \Lambda (7p \rightarrow q)$
   ii. $p \rightarrow (7qV\ r)$

d. Write the negation of the following statements.
   i. Jan will take a job in industry or go to graduate school.
   ii. James will bicycle or run tomorrow.
   iii. If the processor is fast then the printer is slow.

e. What is the minimal set of connectives required for a well formed formula**.**

2. Write the converse, inverse, contra positive for the implication "If two angels in triangle are equal then triangle isosceles"

Obtain principal conjunctive normal form (PCNF) for the following formula

$p\ V\ (\sim p \rightarrow (q\ V\ (\sim q \rightarrow\ r)))$

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN Unit-II	2013-14
		Regulation: R11

Name of the Faculty: ARIFA TEHSEEN ARA

Subject: Mathematical Foundations of Computer Science Subject Code

Unit II

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Introduction, Predicative logic	50 min	TB1-2.1-2.4	Chalk& board , exercises
2	Free & Bound variables and problems	50 min	TB1-2.5-2.7	Chalk& board , exercises
3	Rules of inference	50 min	TB1-2.8	Chalk& board , exercises
4	Consistency and problems	50 min	TB1-2.9-2.10	Chalk& board , Exercises
5	Proof of contradiction	50 min	TB1-2.12-2.13	Chalk& board , exercises
6	Automatic Theorem Proving	50 min	TB1-2.15-2.17	Chalk& board , exercises

On completion of this lesson the student shall be able to

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	ASSIGNMENT **Unit-II**	2013-14 Regulation: R11

Assignment / Questions

1. (a) Let p,q and r be the propositions.
   P: you have the flee
   q: you miss the final examination.
   r: you pass the course.
   Write the following proposition into statement form.
   i. P → q
   ii. 7p → r
   iii. q → 7r
   iv. pVqVr
   v. (p → 7r) V (q →□ r)
   vi. (pΛq) V (7qΛr)

   (b) Define converse, contrapositive and inverse of an implication.

2. Prove using rules of inference or disprove.

   (a) Duke is a Labrador retriever
   All Labrador retriever like to
   swim. Therefore Duke likes to
   swim.

   (b) All ever numbers that are also greater than
   ii. are not prime
   iii. is an even number
   iv. is prime
   Therefore some even numbers are prime.
   UNIVERSE = numbers.

   (c) If it is hot today or raining today then it is no fun to snow ski today
   It is no fun to snow ski today
   Therefore it is hot today
   UNIVERSE = DAYS.

3. Shows that the following set of premises are inconsistent using indirect method of proof:
P → Q, Q → R, ~ (P ^ R), P v R ↔ R

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN Unit-III	2013-14
		Regulation: R11

Name of the Faculty: ARIFA TEHSEEN ARA

Subject: Mathematical Foundations of Computer Science Subject Code

Unit III

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Introduction , Properties of binary Relations	50 min	TB1 4.1-4.2	Chalk& board , exercises
2	Equivalence,transitive,closure	50 min	TB1 4.3	Chalk& board , exercises
3	compatibility and partial ordering relations	50 min	TB1 4.4	Chalk& board , exercises
4	Lattices, Hasse diagram	50 min	TB1 4.6-4.7	Chalk& board , exercises
5	Functions,inverse function	50 min	TB1 4.9	Chalk& board , Exercises
6	Composition of functions	50 min	TB1-3.18	Chalk& board , exercises
7	Recursive functions	50 min	TB1-3.19	Chalk& board , exercises
8	Lattice and its properties	50 min	TB1-3.9	Chalk& board , Exercises

On completion of this lesson the student shall be able to(Outcomes)

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	ASSIGNMENT **Unit-III**	2013-14 Regulation: R11

Assignment / Questions

1.Draw Hasse diagram representing the partial ordering {(A, B):A$\leq$ B} on the power set P(S) where S = {a, b, c) where $\leq$ represents subset relation

2. Show that the function f<x, y> = x-y is partial recursive.

b) Show that every finite set is primitive recursive.

c) Let f :R $\rightarrow$R and g: R$\rightarrow$ R where R is set of real numbers. Find fog and gof where f(x) = x^2-2 and g(x) = x+4. Determine whether these functions are injective, surjective and bijective

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN Unit-IV	2013-14
		Regulation: R11

Name of the Faculty: ARIFA TEHSEEN ARA

Subject: Mathematical Foundations of Computer Science Subject Code

Unit IV

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Introduction, algebraic systems	50 min	TB1 4.1-4.2	Chalk& board , exercises
2	Examples and properties.	50 min	TB1 4.3	Chalk& board , exercises
3	Semi groups	50 min	TB1 4.4	Chalk& board , exercises
4	monoids.	50 min	TB1 4.6-4.7	Chalk& board , exercises
5	Groups and sub groups	50 min	TB1 4.9	Chalk& board , exercises
6	Homomorphism,	50 min	Tb1-4.10	Chalk& board , exercises
7	isomorphism.	50 min	TB2-3.11	Chalk& board , exercises

On completion of this lesson the student shall be able to (Outcomes)

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	ASSIGNMENT **Unit-IV**	2013-14
		Regulation: R11

Assignment / Questions

1. Define group. Show that set of integers are group under addition

2. Show that the set N of natural numbers is a semi group under the opearation x*y = max{x, y}. Is it a monoid? Why or why not?

   b) Let <S, *> be a semi group and z ∈ S be a left zero. Show that for any x∈S , x*z is also a left zero.

   c) Prove or disprove the following

   Every finite group of order n is isomorphic to a permutation group of degree n

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN **Unit-V**	2013-14 Regulation: R11

Name of the Faculty: ARIFA TEHSEEN ARA

Subject: Mathematical Foundations of Computer Science Subject Code

Unit V

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Introduction , Basis of counting,	50 min	TB2-5.6	Chalk& board , exercises
2	Combinations & Permutations with repetitions, Constrained repetition	50 min	TB2-5.1-5.5	Chalk& board , exercises
3	Binomial Coefficients,	50 min	TB2-5.6	Chalk& board , exercises
4	Binomial Multinomial theorems	50 min	TB2-5.8	Chalk& board , exercises
5	Principle of Inclusion – Exclusion.	50 min	TB2-5.9	Chalk& board , exercises

On completion of this lesson the student shall be able to (Outcomes)

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	ASSIGNMENT **Unit-V**	2013-14 Regulation: R11

Assignment / Questions

1. A) Find the number of non-negative integral solutions to x1+x2+x3+x4+x5 = 10
   b) Find the number of arrangements of the letters MISSISSIPPI

2. Determine the number of integers between 1 and 10,000,000 have the sum of digits equal to 18.
   b) Determine the number of ways possible to wear 5 rings on 4 fingers.

3. Illustrate Pigeon hole principle and its applications

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN **Unit-VI**	2013-14 Regulation: R11

Name of the Faculty: ARIFA TEHSEEN ARA

Subject: Mathematical Foundations of Computer Science Subject Code

Unit VI

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Introduction, Generating Functions	50 min	TB2-6.1-6.2	Chalk& board , exercises
2	Function of Sequences Calculating Coefficient of generating function	50 min	TB1-6.3	Chalk& board , exercises
3	Recurrence relations,	50 min	TB1-6.4	Chalk& board , exercises
4	Solving recurrence relation by substitution and Generating funds	50 min	TB1-6.10	Chalk& board , exercises
5	Characteristics roots solution of In homogeneous Recurrence Relation.	50 min	Tb2-5.11	Chalk& board , exercises

On completion of this lesson the student shall be able to (Outcomes)

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	ASSIGNMENT **Unit-VI**	2013-14
		Regulation: R11

Assignment / Questions

1. Solve the following recurrence relation using generating function
   a_n - 6 a_n-1 = 0 for n $\geq$ 1, and a_0 = 1
2. Find a general expression for a solution to the recurrence relation
   a_n – 5a_n-1 + 6a_n-2 = n(n-1) for n $\geq$ 2

   b) Solve the recurrence relation
   a_n – 7a_n-1 + 10a_n-2 = 0 for n $\geq$ 2

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN **Unit-VII**	2013-14 Regulation: R11

Name of the Faculty: ARIFA TEHSEEN ARA

Subject: Mathematical Foundations of Computer Science Subject Code

Unit VII

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Introduction	50 min	TB1-7.1	Chalk& board , exercises
2	Representation of Graph	50 min	TB1-7.3	Chalk& board , exercises
3	Representation of Graph	50 min	TB1-7.4-7.6	Chalk& board , exercises
4	DFS	50 min	TB1-7.7-7.9	Chalk& board , exercises
5	BFS	50 min	TB1-7.10-7.12	Chalk& board , exercises
6	Spanning Trees	50 min	TB1-7.13	Chalk& board , exercises
7	planar Graphs	50 min	TB2-6.9	Chalk& board , exercises

On completion of this lesson the student shall be able to

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	ASSIGNMENT **Unit-VII**	2013-14 Regulation: R11

Assignment / Questions

1. a) What is planar graph? Is $K_{3,3}$ planar? Explain.

   b) What is spanning tree? Explain Kruskals algorithm for spanning tree with example.
2. Explain and Illustrate various ways for representation of graphs.
3. Explain and Illustrate DFS and BFS with examples.

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Note: Mention for each question the relevant objectives and outcomes.

	LESSON PLAN **Unit-VIII**	2013-14 Regulation: R11

Name of the Faculty: ARIFA TEHSEEN ARA

Subject: Mathematical Foundations of Computer Science Subject Code

Unit **VIII**

INSTRUCTIONAL OBJECTIVES:

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Graph Theory and Applications	**50 min**	TB1-8.1	Chalk& board , exercises
2	Basic Concepts Isomorphism and Sub graphs,	**50 min**	TB1-8.4	Chalk& board , exercises
3	Multi graphs and Euler circuits	**50 min**	TB1-8.7	Chalk& board , exercises
4	Hamiltonian graphs,	**50 min**	TB1-8.8	Chalk& board , exercises
5	Chromatic Numbers.	**50 min**	internet	Chalk& board , exercises

On completion of this lesson the student shall be able to

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	ASSIGNMENT **Unit-VIII**	2013-14 Regulation: R11

Assignment / Questions

1 a) In any planar graph, show that |V| - |E | + | R | = 2.

b) What is Hamiltonian cycle? Show the Hamiltonian cycle in K_5.

2. Explain the following clearly, Illustrate with suitable examples.

a) Isomorphism and Sub graphs

b) Multi-graphs

c) Euler circuits

d) Hamiltonian graphs and chromatic numbers

Signature of Faculty

Note: Mention for each question the relevant objectives and outcomes.