NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT COMPUTER SCIENCE AND ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	**B.Tech., (CSE)**		
Course Title	**DISCRETE STRUCTURES**		
Course Code	**CSPC11**	**No. of Credits**	**4**
Course Code of Pre-requisite subject(s)	**-**	**Semester**	**II**
Session	**Jan – May 2020**	**Section**	**A**
Name of Faculty	**Dr. M. Sridevi**	**Department**	**CSE**
Official Email	**msridevi@nitt.edu**	**Telephone No.**	**0431 - 2503216**
Name of Course Coordinator(s)	**Nil**		
Official E-mail	**Nil**	**Telephone No.**	**Nil**
Course Type	☐ **Core course**		

Syllabus

Unit – I

Set Theory And Logic - Sets, Functions, Relations, Equivalence Relation, Poset. Functions Logic: Propositional logic, Truth Tables, Tautologies, Resolution Proof System, Predicate Logic.

Unit – II

Induction And Combinatorics - Peano's Axioms - Mathematical Induction - Pigeon-Hole Principle - Principle Of Inclusion And Exclusion - Review Of Permutations And Combinations - Distribution Problems - Derangements - Bijection Principle.

Unit – III

Algebraic Structures- Semi-Groups, Monoids, Groups, Subgroups And Their Properties - Cyclic Groups - Cosets - Permutation Groups - Lagrange's Theorem - Cayley's Theorem. Normal Subgroups - Homomorphism Of Groups - Quotient Groups –Introduction To Rings And Fields.

Unit – IV

Linear Algebra And Recurrence Relations- Linear Algebra: Vector Space, Basis, Dimension, Orthogonality.Recurrence Relations :Homogeneous And Inhomogeneous Recurrences And Their Solutions - Solving Recurrences Using Generating Functions.

Unit – V

Graph Theory- Definitions And Basic Results - Representation Of A Graph By A Matrix And Adjacency List - Trees - Cycles - Properties - Paths And Connectedness - Subgraphs - Graph Isomorphism - Operations On Graphs - Vertex And Edge Cuts - Vertex And Edge Connectivity.

COURSE OBJECTIVES

- To get familiar and understand the fundamental notions in discrete mathematics.
- To understand and demonstrate the basic concept of an algorithm and its application in combinatorial mathematics.
- To identify the basic properties of graphs and trees and model simple applications.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO)
1. Ability to distinguish between the notion of discrete and continuous mathematical structures	**1,5,6**
2. Ability to construct and interpret finite state diagrams and DFSA	**1,2,5,6**
3. Application to apply induction and other proof techniques towards problem solving	**1,2,5,6,8**

COURSE PLAN – PART II

COURSE OVERVIEW

This course mainly describes about the fundamentals of discrete mathematics and basic concepts of combinatorics and graph theory.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
		UNIT – I (Set Theory And Logic)	
1	1 Contact Hour	Introduction to Discrete mathematics	Chalk and Talk
2	1 Contact Hour	Introduction to Set, Operations, Laws	Chalk and Talk
3	1 Contact Hour	Proving the Laws; Computer representation	Chalk and Talk
4	1 Contact Hour	Functions - Introduction, Types of functions	Chalk and Talk
5	1 Contact Hour	Recurrence function	Chalk and Talk
6	1 Contact Hour	Relation – Types	Chalk and Talk
7	1 Contact Hour	Poset	Chalk and Talk
8	1 Contact Hour	Function Logics	Chalk and Talk
9	1 Contact Hour	Propositional logic	Chalk and Talk
10	1 Contact Hour	Truth Tables, Tautologies of logic	Chalk and Talk
11	1 Contact Hour	Resolution Proof System	Chalk and Talk
12	2 Contact Hours	Predicate Logic	Chalk and Talk
13	1 Contact Hour	Normal forms	Chalk and Talk
		UNIT – II (Induction And Combinatorics)	
14	1 Contact Hour	Peano's Axioms	Chalk and Talk
15	1 Contact Hour	Mathematical Induction	Chalk and Talk

16	2 Contact Hours	Permutations And Combinations	Chalk and Talk
17	1 Contact Hour	Distribution Problems	Chalk and Talk
18	1 Contact Hour	Derangements	Chalk and Talk
19	1 Contact Hour	Principle Of Inclusion And Exclusion	Chalk and Talk
20	1 Contact Hour	Pigeon-Hole Principle	Chalk and Talk
21	1 Contact Hour	Bijection Principle	Chalk and Talk
UNIT – III (Algebraic Structures)			
22	1 Contact Hour	Semi-Groups, Monoids, Groups	Chalk and Talk
23	2 Contact Hours	Subgroups And Their Properties	Chalk and Talk
24	1 Contact Hour	Cyclic Groups - Cosets	Chalk and Talk
25	1 Contact Hour	Permutation Groups	Chalk and Talk
26	1 Contact Hour	Lagrange's Theorem	Chalk and Talk
27	1 Contact Hour	Cayley's Theorem	Chalk and Talk
28	1 Contact Hour	Normal Subgroups	Chalk and Talk
29	1 Contact Hour	Homomorphism Of Groups - Quotient Groups	Chalk and Talk
30	1 Contact Hour	Introduction to Rings And Fields	Chalk and Talk
UNIT – IV (Linear Algebra And Recurrence Relations)			
31	2 Contact Hours	Vector Space, Basis, Dimension, Orthogonality.	Chalk and Talk
32	2 Contact Hours	Recurrence Relations	Chalk and Talk
33	2 Contact Hours	Homogeneous And Inhomogeneous Recurrences And Their Solutions	Chalk and Talk
34	2 Contact Hours	Generating function and Solving Recurrences Using Generating Functions.	Chalk and Talk
UNIT – V (Graph Theory)			
35	2 Contact Hours	Graph – Definitions, properties and Representation	Chalk and Talk

36	1 Contact Hour	Cycles, Paths And Connectedness	Chalk and Talk
37	1 Contact Hour	Trees – Definition and representation	Chalk and Talk
38	1 Contact Hour	Subgraphs and Graph Isomorphism	Chalk and Talk
39	2 Contact Hours	Operations On Graphs	Chalk and Talk
40	2 Contact Hours	Vertex And Edge Cuts	Chalk and Talk
41	2 Contact Hours	Vertex And Edge Connectivity	Chalk and Talk
42		Assignment	Demo

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test 1	As per Academic schedule	1 hour	20
2	Cycle Test 2	As per Academic schedule	1 hour	20
3	Assignment (Problem solving)	Every Unit	-	10
CPA	Compensation Assessment	After completion of Cycle Test 2	1 hour	20
4	Final Assessment	As per Academic schedule	3 hours	50

COURSE EXIT SURVEY

- Feedbacks are collected before final examination through MIS or any other standard format followed by the institute
- Students, through their Class Representatives, may give their feedback at any time to the course faculty which will be duly addressed.
- The students may also give their feedback during Class Committee Meeting.

COURSE POLICY

MODE OF CORRESPONDENCE:

- Email / Phone

COMPENSATION ASSESSMENT:

- One compensation assessment will be given after completion of CT1 and CT2 for the students those who are absent for the assessment due to genuine reason.

- The prior permission and required document must be submitted for absence.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION

- The students can get their doubts clarified at any time with prior appointment.
- Mode of correspondence through Email.

Text Books:

1. C.L.Liu and D.P.Mohapatra, " Elements Of Discrete Mathematics: A Computer Oriented Approach", Mc Graw Hill, Third Edition, 2012.
2. Kenneth H. Rosen, "Discrete Mathematics And Its Applications" Mc Graw Hill, Seventh Edition, 2012 (Indian Adaptation By Kamala Krithivasan, IIT Madras).

References:

1. R. Balakrishnan and K. Ranganathan, "A Text Book Of Graph Theory", Springer
2. Thomas Koshy, "Discrete Mathematics with Applications", Elsevier, 2009.
3. Gary Haggard, John Schlipf, and Sue Whitesides, "Discrete Mathematics for Computer Science", Cengage Learning Publisher, 2005.
4. B. Bollobás, "Modern Graph Theory", Springer, New York 1998.

FOR APPROVAL

23.1.2020		28/1/2020
M. SRIDEVI	**K. VISWANATHAN IYER**	**RAJESWARI SRIDHAR**
Course Faculty	**CC- Chairperson**	**HOD**