Code No: P18CST03

R18

HALL TICKET NUMBER

PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)
II B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, JAN - 2023
Mathematical Foundation of Computer Science
(Common to IT, AIML Branches)

Time: 3 hours Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answer all the questions in Part-A (5X2=10M)

Q.No.		Questions	Marks	CO	KL
1	a)	Explain contra positive with example.	[2M]	1	
	b)	Define transitive closure.	[2M]	2	
	c)	Give any two examples for a Monoid.	[2M]	3	
	d)	Define probability for any event with an example.	[2M]	4	
	e)	Explain planar graphs with examples?	[2M]	5	

PART-B

Answer One Question from each UNIT (5X10=50M)

Q.No.		Questions	Marks	CO	KL
		UNIT-I			
2.	a)	Prove the following logical equivalence without using truth table. (p → q) [⅂q (r ⅂q)] <=> ⅂(q p).	[5M]	1	
	b)	Show that P→S tautologically implied by ¬P∨Q , ¬Q∨R , R→S by automatic theorem proving.	[5M]	1	
		OR			
3.	a)	Explain in detail about the Logical Connectives with Examples?	[5M]	1	
	b)	Show that the following premises are inconsistent P→Q, P→R, Q→ ¬R , P	[5M]	1	
		UNIT-II			
4.	a)	Explain different types of functions with suitable example?	[5M]	2	
	b)	Let the Relation R be R={(1,2) ,(2,3),(3,3)} on the set A= {1,2,3}. What is the Transitive Closure of R?	[5M]	2	
		OR			
5.	a)	Define Relation? List out the Properties of Binary operations? Explain properties of binary relations with examples.	[5M]	2	
	b)	Draw the Hasse diagram of (P(S),≤), where P(S) is power set of the set S = {a,b,c}.	[5M]	2	
		UNIT-III			
6.	a)	In how ways can the letters of the word 'ORANGE' be arranged so that the consonants occupy only the even positions?	[5M]	3	
	b)	What is the coefficient of $x^3 y^7$ in $(x+y)^{10}$?	[5M]	3	
		OR			
7.	a)	How many ways are there to seat 10 boys and 10 girls around a circular table, if boys and girls seat alternatively.	[5M]	3	
	b)	Find n if i) P(n,2)=72 ii) P(n,4)= 42p(n,2) iii)2P(n,2)+50=p(2n,2).	[5M]	3	
		UNIT-IV			

<table>
<tr><td>8.</td><td></td><td>For the discrete probability distribution
<table>
<tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>f(x)</td><td>0</td><td>K</td><td>2k</td><td>2k</td><td>3k</td><td>K^2</td><td>$2k^2$</td><td>$7k^2+k$</td></tr>
</table>
Determine (1) K (ii) Mean (iii) Variance</td><td>[10M]</td><td>4</td><td></td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>9.</td><td>a)</td><td>Solve the recurrence relation $a_n - 8\,a_{n-1} + 21\,a_{n-2} - 18\,a_{n-3} = 0$ for $n \geq 3$ using generating functions?</td><td>[5M]</td><td>4</td><td></td></tr>
<tr><td></td><td>b)</td><td>Find Generating function ofa^n ?</td><td>[5M]</td><td>4</td><td></td></tr>
<tr><td colspan="6">UNIT-V</td></tr>
<tr><td>10.</td><td>a)</td><td>Prove that a connected graph is a tree if and only if it is minimally connected.</td><td>[5M]</td><td>5</td><td></td></tr>
<tr><td></td><td>b)</td><td>Explain Breadth First Search with suitable example?</td><td>[5M]</td><td>5</td><td></td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>11.</td><td>a)</td><td>Explain Kruskals algorithm with an example</td><td>[5M]</td><td>5</td><td></td></tr>
<tr><td></td><td>b)</td><td>Show that every graph with four or fewer vertices is planar.</td><td>[5M]</td><td>5</td><td></td></tr>
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