

Roll No.....

MCTA-101**M.E./M.Tech. I Semester**

Examination, June 2017

Mathematical Foundation of Computer Application*Time : Three Hours**Maximum Marks : 70*

- Note:** i) Answer any five questions.
ii) All questions carry equal marks.

- Show that the set of integer which are divisor's of 60 is partially order set. Also draw its Hass diagram.
 - Prove that if R is an equivalence relation then R^{-1} is also an equivalence relation.
- Show that the statement $n^3 < 2^n$ is true for $n \geq 10$.
 - Write short notes on
 - Lattice
 - Distributed lattice
- Prove the following statements
 $(P \Rightarrow Q) \vee r \equiv (P \vee r) \Rightarrow (Q \cup r)$ is logically equivalents.
 - Find the disjunctive normal form of the molecular statement $\sim (P \vee Q) \leftrightarrow (P \wedge Q)$
- Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises $P \vee Q, Q \rightarrow R, P \rightarrow M$ and $\neg M$
 - Form a compound statement from the following:
 - $M(x) : x$ is man
 - $H(y) : y$ is mortal

5. a) Prove that following two machines M_1 and M_2 are equivalent

M ₁			
State	Input		Output
	1	2	
A	B	C	0
B	F	D	0
C	G	E	0
D	H	B	0
E	B	F	1
F	D	H	0
G	E	B	0
H	B	C	1

M ₂			
State	Input		Output
	1	2	
A	B	C	0
B	C	D	0
C	D	E	0
D	E	B	0
E	B	C	1

- b) Define finite state machine.

- Prove that ${}^nC_r = {}^nC_{n-r}$.
 - Using generating function prove that

$$\sum_{k=0}^r {}^nC_k \cdot {}^mC_{r-k} = {}^{m+n}C_r$$

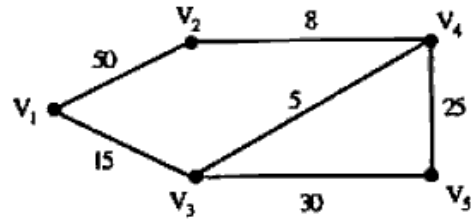
- Solve the recurrence relation

$$a_r - 5a_{r-1} + 6a_{r-2} = 2^r + r, r \geq 2 \text{ with boundary condition } a_0=1 \text{ and } a_1 = 1.$$

- b) Determine the generating function of the numeric fraction

$$a_r \text{ where } a_r = \begin{cases} 2^r, & \text{if } r \text{ is even} \\ -2^r, & \text{if } r \text{ is odd} \end{cases}$$

8. a) Using Dijkstra algorithm find the shortest path from V_1 to V_5 in weighted graph.



- b) Write short notes on
- Matrix representation of graph
 - Cut vertices

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