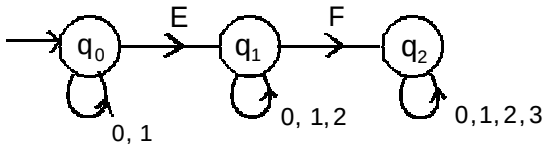
$$a_r = \begin{cases} 0, & 0 \le r \le 4 \\ 2^{-r} + 7, & r > 4 \end{cases}$$

$$b_r = \begin{cases} 3 - 2^r, & 0 \le r \le 2 \\ r + 3, & r > 2 \end{cases}$$

Unit-IV / FkeâeF-IV 6/12

8. (a) Draw DFA for the following NFA :

evecve NFA keâe DFA yeveeFS :

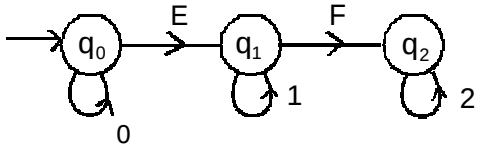


(b) Design a Mealy machine for binary addition.

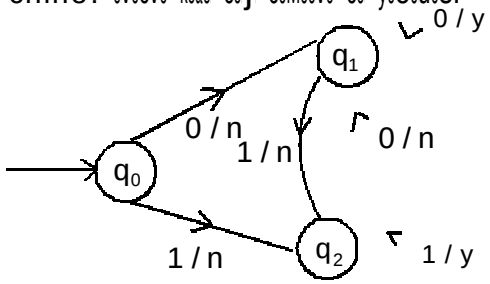
yeeFvejle Ùeeie keâ eueS ceeuee ceMeeve yeveeFS~

9. (a) Construct DFA for the following:

evecve keâ eueS DFA yeveeFS~



(b) Transform the following into Moore Machine: evecve keâe cej ceMeeve ce yeoeueS:



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Roll No. _____

S-681

B.A./B.Sc. (Part-III) Examination, 2015

MATHEMATICS-IV-e

Fourth Paper

(*Discrete Mathematics*)

Time Allowed : Three Hours] ***[Maximum Marks :*** B.A. : 40, B.Sc. : 75

Note : Attempt five questions in all, selecting one question from each unit. Question No. 1 is compulsory. Symbols have their usual meanings.

ØelÙekeâ FkeâeF me Skeâ ØeMve Ûevele nS, keâue heeÙe ØeMvee keâ Gòej oeepeS~ ØeMve me.1 DeeveJeeÙe n~ Øeleekeâe keâ meeceevÙe DeLe n~

1. Attempt all parts : 16/30

meYee KeC[nue keâeepeS :

(a) Draw truth table of 'AND' and 'OR' in Logic theory.

lekeâ MeeŒe ce 'AND' Deej 'OR' keâe melÙe leeeuekeâeS yeveeFS~

(b) Define simple statement and compound statement.

mejue keâLeve SJe Ùeice keâLeve keâe heejYee<ee oeepeS~

(c) Differentiate between Partial order relation and Total order relation.
DeeeMekeâ ›eâce meyeOe SJe heCe ›eâce meyeOe Delej mecePeeFS~

(d) Prove that : emeæ keâeepeS :
$P \vee (Q \wedge R) = (P \vee Q) \wedge (P \vee R)$

(e) Define Complemented lattice.
hejkeâ ueeŠme keâe heejYee<ee oeepeS~

(f) Write types of graph. «eeHeâ keâ Øekeâej eueeKeS~

(g) Define generating function.
pevekeâ Heâueve keâe heejYee<ee oeepeS~

(h) Obtain particular solution of the following recurrence relation :
evecve ›eâecekeâ meyeOe keâe eJeMe<e nue %eele keâeepeS~
$a_r - 3\, a_{r-1} = 6 \times 3^r$

(i) Draw NFA that accepts
$\sum^* = \{00, 101, 0011\}$.
$\sum^* = \{00, 101, 0011\}$ keâe mJeekeâej keâjve Jeeuee NFA yeveeFS~

(j) What is E-closure (q)? Explain.
E-closure (q) keÙee n? mecePeeFS~

Unit-I / FkeâeF-I 6/11

2. (a) State and discuss duality theorem in logic.
lekeâ keâ [SeueŠe emeæevle keâe keâLeve SJe Fmekeâe ÛeÛee keâeepeS~

(b) Prove the following: evecve keâe emeæ keâeepeS :
$\sim (P \rightarrow Q) \equiv P \wedge (\sim Q)$

3. Prove the validity of the following arguments:

evecve lekeâe keâe melÙelee emeæ keâeepeS :

(a) $P \rightarrow Q,\ Q \rightarrow R,\ P, \therefore R$

(b) $P \rightarrow Q,\ Q \rightarrow R,\ \therefore ((\sim P) \vee R)$

Unit-II / FkeâeF-II 6/11

4. (a) Explain Karnaugh map method for minimization of Boolean functions.
yeeueÙeve Heâuevee keâe vÙevelece keâjve keâe keâjveehe leeeuekeâe eJeeOe keâe mecePeeFS~

(b) Minimize : vÙevelece keâeepeS :
f(x,y,z,t) = xyzt + xyz't + xyzt' + x"yzt + xy'zt.

5. (a) Discuss graph isomorphism.
«eeHeâ DeeFmeeceejeHeâpce keâe ÛeÛee keâeepeS~

(b) Discuss binary tree and its applications.
yeeFvejeŠe SJe Fmekeâ GheÙeeiee keâe ÛeÛee keâeepeS~

Unit-III / FkeâeF-III 6/11

6. (a) Write method for obtaining particular solution of recurrence relation.
›eâecekeâ meyeOe keâ eJeMe<e nue keâe %eele keâjve keâe eJeeOe eueeKeS~

(b) Find the particular solution:
eJeMe<e nue %eele keâeepeS :
$a_r + 3\, a_{r-1} + 6\, a_{r-2} = 6.4^r$

7. (a) Solve the following recurrence relation:
evecve ›eâecekeâ meyeOe keâe nue keâeepeS :
$a_r - 6a_{r-1} + 9a_{r-2} = 6.3^r$; $d_1 = 2,\ a_2 = 3$

(b) Find $a_r + b_r$ for the following:
evecve keâ eueS $a_r + b_r$ %eele keâeepeS :