Hall Ticket Number:

Code No.: 21113 S

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. II Year (C.S.E.) I-Semester Supplementary Examinations, May/June-2017

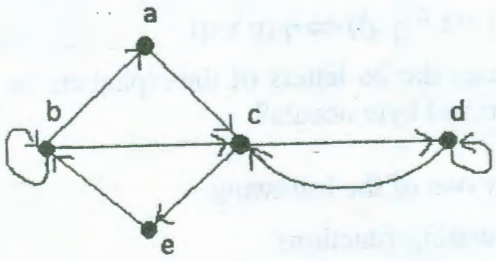
Discrete Structures

Time: 3 hours Max. Marks: 70

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 X 2=20 Marks)

1. Construct a truth table for $(p \vee q) \vee \neg p$.
2. State Duality Law and write duals for
   a) $(p \vee q) \wedge r$
   b) $(p \wedge q) \vee r$
   c) $\neg (p \wedge q) \vee (p \wedge \neg (q \vee \neg s))$
3. What is a partial order relation?
4. Let $f : R \rightarrow R$ and $g : R \rightarrow R$ where $f(x) = x^2$, $g(x) = x+5$ show that fog ! = gof .
5. Write a one to one function for the set A={1,2,3,4,5}.
6. Find the general solution for the recurrence relation $3a_{n+1} - 4a_n = 0$, $n >= 1$, $a_1 = 5$.
7. Define Planar Graph.
8. Find the spanning tree for the following graph.



9. Define algebraic system and write its properties.
10. Define semigroup and monoid.

Part-B (5 × 10 = 50 Marks)

11. a) Show that $(x)(P(x) \rightarrow Q(x)) \wedge (x)(Q(x) \rightarrow R(x))$ logically implies $(x)(P(x) \rightarrow R(x))$. [5]

    b) Apply Mathematical induction to verify $\sum_{i=1}^{n} i(2^i) = 2+(n-1)2^{n+1}$ [5]

12. a) Let R denote a relation on the set of ordered pairs of positive integers such that (x,y) R(u,v) if xv = yu. Show that R is equivalence relation. [5]

    b) Let f,g :R→R are bijectives prove that gof is also bijective. [5]

13. a) Determine the sequence generated by the following generating function: [5]
    $f(x) = x^4 / (1 - x)$

    b) Find the coefficient of x^{50} in $(x^7 + x^8 + x^9 + ...)^6$. [5]

Contd... 2

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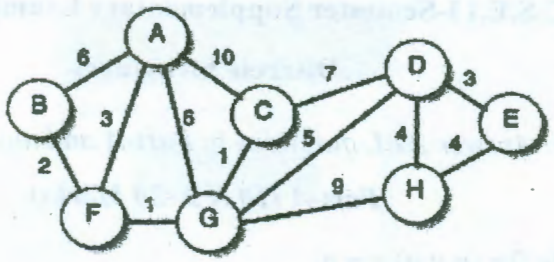
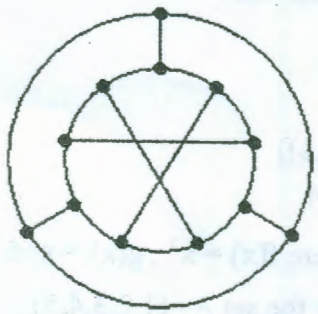
14. a) Discuss prims' algorithm and find the minimal spanning tree for the following graph using prims' algorithm. [5]



b) Find the chromatic number of the following graph. [5]



15. a) Let $(Z^+, +, 0)$, $(Z^+, x, 1)$ are two monoids $f: Z^+ \rightarrow Z^+$ If for all $m \in Z^+$, $f(m) = 3^m$ prove that f is monoid homomorphism. [4]

b) Prove that $(Q^+, *)$ where * is the binary operation defined by $a*b = ab/5$ is a group. [6]

16. a) Verify $(p \rightarrow q) \wedge (\neg q \wedge (r \vee \neg q)) \Leftrightarrow \neg (p \vee q)$. [5]

b) In how many ways can the 26 letters of the alphabets be permuted so that none of the patterns car, dog, pun and byte occurs? [5]

17. Write short notes on any *two* of the following:

a) Exponential generating functions [5]

b) Dual Graphs [5]

c) Parity check and generator Matrices. [5]