

Total No of Questions: [8]

SEAT NO. :

[Total No. of Pages : 3]

SE Information Technology (Semester-I)
Discrete Structures (214441)
2012 Course

Time: 2 Hours

Max. Marks : 50

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume suitable data if necessary.

Q1

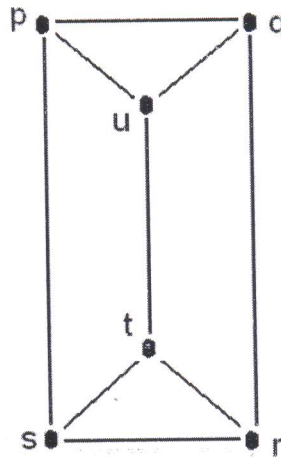
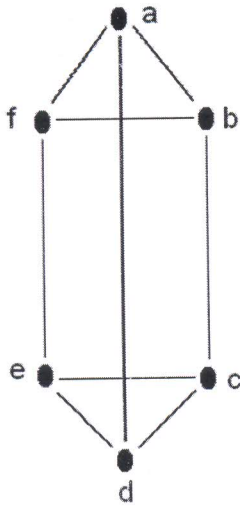
- a Explain the principle of inclusion and exclusion. [6]
Assume that 100 out of 120 students study at least one of the three languages Japanese, French and Russian. It is given that 65 students study Japanese, 45 study French and 42 study Russian. 20 students study Japanese and French, 25 students study Japanese and Russian and 15 study French and Russian. Find the number of students who study:
- i) Only Japanese and French but not Russian
 - ii) Only Japanese and Russian but not French
- b Find a recurrence relation to calculate the number of bit strings of length 'n' that contains a pair of consecutive zeros. Using the same recurrence relation find the number of strings of length 7 containing 2 consecutive zeros. [6]

OR

Q2

- a Prove by mathematical induction for $n \geq 1$. [6]
- $$1 \times 2 + 2 \times 3 + \dots + n(n+1) = \frac{n(n+1)(n+2)}{3}$$
- b Let $R = \{(a, b), (b, a), (b, c), (c, d), (d, a)\}$ over the set $A = \{a, b, c, d\}$. Find transitive closure using Warshall's algorithm. [6]

- a Define and illustrate with example: [6]
- i) Ring
 - ii) Integral Domain
 - iii) Fields
- b Determine whether the graphs are isomorphic: [6]



OR

Q4

a Define and illustrate with examples

[6]

- i) Monoid
- ii) Semi-group
- iii) Group

b Solve the following travelling salesman problem using nearest neighborhood method.

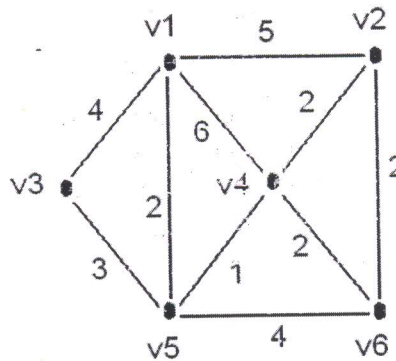
[6]

	a	b	c	d	e
a	0	58	98	147	135
b	58	0	142	167	133
c	98	142	0	113	137
d	147	167	113	0	56
e	135	133	137	56	0

Q5

a Find the MST for the graph given below using Kruskal's algorithm.

[6]



b Use Huffman coding to encode the following symbols

[7]

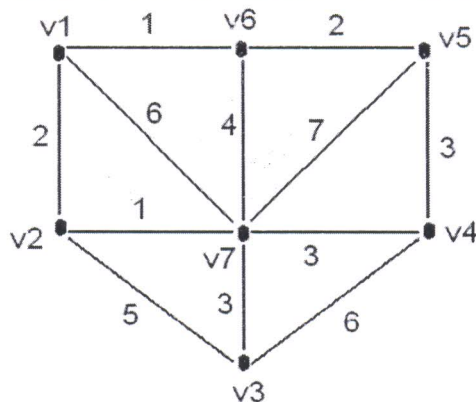
Symbol	Frequency
A	0.08
B	0.10
C	0.12
D	0.15
E	0.20
F	0.35

OR

Q6

- a Find the MST for the graph given below using Prim's algorithm.

[6]



- b Represent the following expression in:

[7]

- i) Using a binary tree
- ii) Post-fix notation
- iii) Pre-fix notation

$$((x + 2) \uparrow 3) \times (y - (3 + x)) - 5$$

Q7

- a A coin was chosen at random and tossed. The probability that a fair coin was chosen and 'head' as an outcome is $1/3$. The probability that a fair coin was chosen and 'tail' as an outcome is also $1/3$. The probability that an unfair coin was chosen and 'head' as an outcome is $1/12$. The probability that an unfair coin was chosen and 'tail' as an outcome is $1/4$. Find the conditional probability that

[7]

- i) Unfair coin chosen given that 'head' is the outcome.
- ii) 'Head' is the outcome given that unfair coin is chosen.

- b How many ways are there to handover 5 cards to each of 4 players from a standard deck of 52 cards.

[6]

OR

Q8

- a State and explain Baye's theorem
- b How many different strings can be made by reordering the letters of the word SUCCESS ?

[7]

[6]