

B.Sc. (I.T.) (Part-I) (with Credits)-Regular-Semester 2012 Sem II
2BIT6 - Discrete Mathematics Paper – VI

P. Pages : 2

Time :



GUG/W/16/5545

Max. Marks :

- Notes :
1. All question are compulsory and carry equal marks.
 2. Draw neat and clean diagram whenever necessary.
 3. Avoid vogue answer and write answer relevant and specific to question only.

Either

1. a) Show that $1^2 + 3^2 + 5^2 + \dots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$ **8**
- b) Obtain PCNF of $(\neg P \rightarrow R) \wedge (Q \leftrightarrow P)$. **8**

OR

- c) Show that $R \rightarrow S$ can be derived from the premises $P \rightarrow (Q \rightarrow S)$, $\neg R \vee S$ and Q . **8**
- d) If 'a' and 'b' are +ve integer then : $\text{GCD}(a, b) \cdot \text{LCM}(a, b) = a \cdot b$ **8**

Either

2. a) Show that **8**
- i) $p(n, r) = n \cdot p(n-1, r-1)$
 - ii) $p(n, r) = p(n-1, r) + r \cdot p(n-1, r-1)$
- b) Using Backtrack to find an explicit formula for the sequence defined by the recurrence relation $b_n = 2b_{n-1} + 1$ with initial condition $b_1 = 7$. **8**

OR

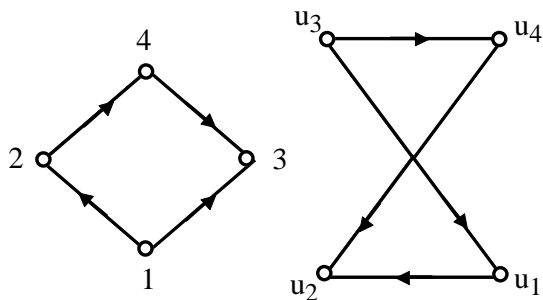
- c) Explain Warshall's Algorithm. **8**
- d) Explain any four functions used in computer science with an example each. **8**

Either

3. a) Simplify the following expression - **8**
- i) $(1 * a) \oplus (0 * a')$
 - ii) $(a * c) \oplus c \oplus [(b \oplus b') * c]$
- b) Obtain sum of product canonical form of given boolean forms in 3 variables **8**
- i) $X_1 \oplus (X_2 * X_3')$
 - ii) $X_1 \oplus X_2 = (X_1 \oplus X_2) \oplus 0$

OR

- c) Show that the following graphs are isomorphic 8



- d) Prove that in any graph, there are an even number of vertices of odd degree. 8

Either

4. a) For any commutative monoid $(M, *)$ the set of idempotent element of M for MS a submonoid. 8
- b) Let $(A, *)$ be a semigroup. Show that for a, b, c in A , if $a * c = c * a$ and $b * c = c * b$ then $(a * b) * c = c * (a * b)$. 8

OR

- c) If N is a normal subgroup of G if and only if $g \cap g^{-1} = N$. 8
- d) Define 8
- | | |
|--------------------|------------------------|
| i) Regular grammar | ii) Derivation |
| iii) Language | iv) Regular expression |

5. Solve all the questions :
- a) Show that 4
- i) $A \cap (B \cap C) = (A \cap B) \cap C$
 - ii) $A \cap A = A$
- b) Determine the value of 'n' $6 \times {}^n P_3 = 3 \times {}^{n+1} P_3$. 4
- c) Explain minimum spanning tree with an example. 4
- d) Define the following : 4
- i) Normal subgroup
 - ii) Lattices
