



WEST BENGAL STATE UNIVERSITY
B.Sc. Programme 5th Semester Examination, 2022-23

CMSGDSE02T-COMPUTER SCIENCE (DSE1)



Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.*

GROUP-A

1. Answer any **five** questions from the following: 2×5 = 10
- (a) What is tautology?
 - (b) What is Euler Graph?
 - (c) What is symmetric relation?
 - (d) What is minimal spanning tree?
 - (e) What are the basic differences between Big-Oh (O) and Big-Omega (Ω)?
 - (f) Prove that the statement "I pass only if you pass" is equivalent to "If you fail then I fail".

GROUP-B

Answer any **five** questions

- 8×5 = 40
2. (a) What is the difference between the walk and path of a graph? Use diagram to explain. 4+4
(b) A tree with n vertices has $(n-1)$ edges.
 3. (a) Out of 7 consonants and 4 vowels, how many words can be made each containing 3 consonants and 2 vowels? 4+4
(b) Show that the relation $(x, y) \rho (a, b) \Leftrightarrow x^2 + y^2 = a^2 + b^2$ is an equivalence relation.
 4. (a) Use mathematical induction to prove: $2 + 4 + 6 + \dots + 2n = n(n+1)$. 5+3
(b) State and prove De Morgan's Law.
 5. (a) Give an example of a relation that is transitive but not reflexive and symmetric. 3+5
(b) Check whether $(p \rightarrow q) \rightarrow [(p \rightarrow q) \rightarrow q]$ is a tautology or not. Justify your answer.
 6. (a) Every connected graph has at least one spanning tree. 4+4
(b) Show, using Pigeonhole principle that at least 2 people out of 13 must have their birthday in the same month when they are assembled in a room.
 7. Define Edge-connectivity and vertex-connectivity of a graph. Give examples. 3+5
Prove that a connected graph with n vertices and $(n-1)$ edges is a tree.
 8. Show that the number of vertices of odd degree in a graph is always even. 8