Only for 2021-2022 AD admitted Regular Students

TRIBHUVAN UNIVERSITY
FACULTY OF MANAGEMENT
Office of the Dean
October 2023

Full Marks: 60
Pass Marks: 30
Time: 3 Hrs.

BIM / Second Semester / IT 235: Discrete Structure

Candidates are required to answer the questions in their own words as far as practicable.

Group "A"

Brief Answer Questions: *[10 × 1 = 10]*

1. Give the negation of the sentence "All people are loyal".
2. What is the value of -7 MOD 5?
3. What is recursively defined set?
4. If the multiple tasks have dependency, can we apply sum rule?
5. Differentiate between tree and graph.
6. What is necessary and sufficient condition for a graph to have Euler path but not Euler circuit?
7. Define prefix code.
8. What is spanning tree?
9. What do you mean by well ordering property?
10. What is chromatic number for planar graph?

Group "B"

Short Answer Questions: (Attempt any FIVE Questions) *[5×3 = 15]*

11. Prove that $\sqrt{2}$ is irrational number.
12. Use mathematical induction to prove $n^5 - n$ is divisible by 5.
13. Define the binomial coefficient. Prove that C(n+1, r) = C(n , r-1)+C(n , r).
14. Find GCD of 20 and 24 using Extended Euclidean algorithm.
15. How do you represent graph? Explain.
16. What are the necessary conditions for a graph to be isomorphic?

Group "C"

Long Answer Questions: (Attempt any THREE Questions) *[3 ×5 = 15]*

17. Test the validity of an argument: Someone in this class has studied BIM. Everyone who has studied BIM study discrete structure and digital logic. Therefore someone in this class has studied discrete structure.
18. Using Chinese remainder theorem solve the following congruence. $x \equiv 1(mod\ 2),\ x \equiv 4(mod\ 5),\ x \equiv 2(mod\ 7)$

19. How do you compute degree of a node in directed and undirected graph? Explain with an example.

20. What is minimum spanning tree? Explain Kruskal's algorithm to construct MST with example.

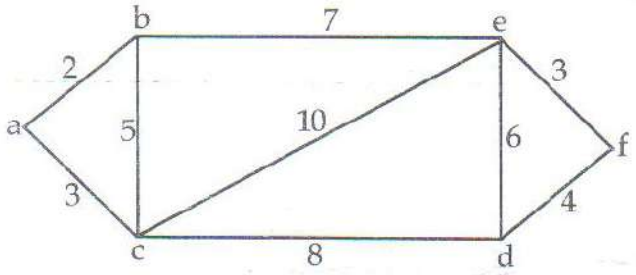
Group "D"

Comprehensive Answer / Case / Situation Analysis Questions: *[2 × 10 = 20]*

21. Define linear homogeneous recurrence relation. Solve the recurrence relation $a_n = a_{n-1} + a_{n-2}$, $n \geq 3$ with initial condition $a_1 = 1$ and $a_2 = 1$.

22. (a) A box contain 2 white balls, 3 black balls and 4 red balls. In how many ways 3 balls can be drawn from the box if at least one black ball is to be included in the draw.

    (b) Apply Dijkstra's algorithm to find the shortest path between a to f for the following graph.



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