

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- MAY-2023

COURSE CODE(CREDITS): 18B11MA413 (3)

MAX. MARKS: 35

COURSE NAME: DISCRETE MATHEMATICS

COURSE INSTRUCTOR: P K Pandey

MAX. TIME: 2 Hours

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

1. (a) Write the power set of $\{0, \phi, \{\phi\}\}$, and find its cardinality. [2] [CO1]

(b) Check the validity of the following argument using the truth table: [3] [CO1]

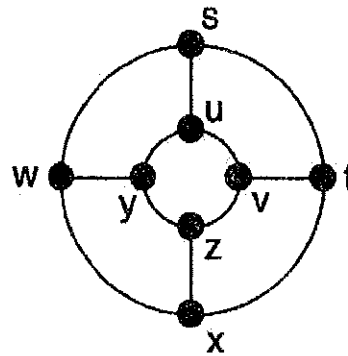
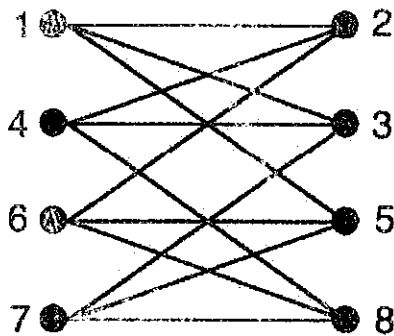
$$p \rightarrow q, q \rightarrow r, \sim r \vdash \sim p$$

2. (a) Using mathematical induction show $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}, \forall n \in \mathbb{Z}^+$. [3] [CO3]

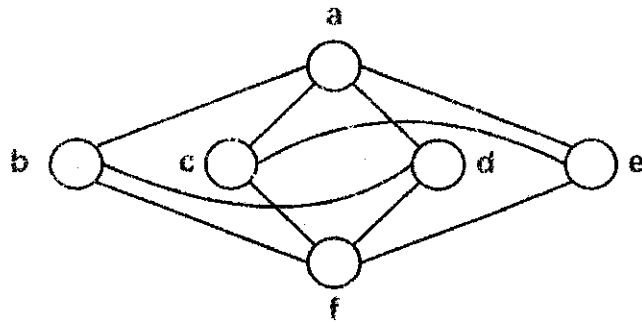
(b) Write the graph model of seven bridges of Konigsberg, and explain its solution. [3] [CO3]

3. (a) Draw wheel graph W_5 on 5 vertices, and verify the Euler's formula for it. [3] [CO3]

(b) Using definition of graph Isomorphism prove or disprove that the following graphs are isomorphic: [3]

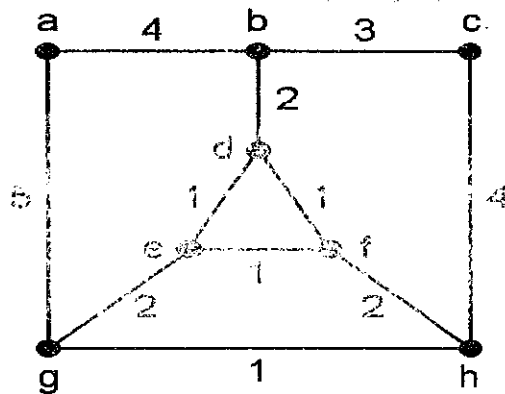


4. (a) Use the Welsh Powell algorithm to color the following graph, and write its chromatic number: [4]

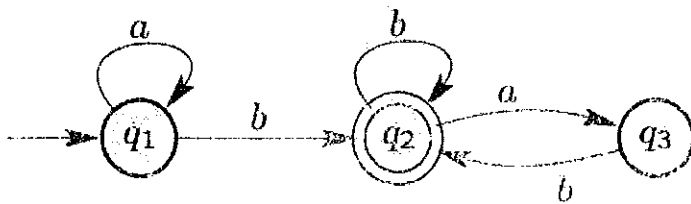


(b) Draw the complete graph K_5 and verify the hand-shaking lemma for it. [2] [CO4]

5. (a) Obtain a minimum spanning tree (MST) for the given graph using Prim's Algorithm, also find the weight of the MST. [3] [CO5]



(b) Explain whether the string $abbbabab$ will be accepted by following DFA. [3] [CO5]



6. Prove or disprove that $(\mathbb{Z}_6, +_6, \times_6)$ is a Ring, where $+_6, \times_6$ are addition and multiplication modulo 6 respectively. [6] [CO4]
