Assignment Questions - Set A

COURSE: Discrete Structure

Course Coordinator: Muhammad Iqbal

ASSIGMENT # 01

Note: Last date to submit on 21 May 2025

1. Define an arithmetic sequence and give an example from daily life.
2. What is a logic gate? Name three basic logic gates and their symbols.
3. Define a relation. What is the difference between symmetric and transitive relations?
4. Find the 6th term of the arithmetic sequence: 3, 7, 11, …
5. How many different 3-letter words can be formed using the letters A, B, and C (no repetition)?
6. Write the truth table for a NOT gate.
7. Add the matrices:

[[2, 4], [1, 3]] + [[5, 6], [7, 8]]

8. Draw a graph with 3 vertices where every vertex is connected to every other vertex.
9. The 4th term of a geometric sequence is 81 and the 7th term is 6561. Find the common ratio and first term.
10. From a group of 10 students, in how many ways can you form a team of 4 where order matters?
11. Construct a truth table for the expression:

$(A \vee B) \wedge (\neg A \vee C)$

12. Multiply the matrices:

[[1, 2], [0, 1]] × [[2, 0], [1, 3]]

13. Determine whether the relation R = {(1,2), (2,3), (1,3)} on set {1,2,3} is transitive, reflexive, or symmetric.
14. The sum of the first n terms of a sequence is given by $S_n = 2n^2 + 3n$. Find the 5th term using $T_n = S_n - S_{n-1}$.
15. A graph has 5 vertices and 7 edges. Prove whether or not it is possible for all vertices to have degree 3.

16. Solve the following system of linear equations using matrix methods:

$3x - y + z = 4$

$2x + y - z = 3$

$5x - 3y + 2z = 8$

Assignment Questions - Set **B**

COURSE: Discrete Structure

Course Coordinator: Muhammad Iqbal

ASSIGMENT # 01

1. Define a geometric sequence and give an example.
2. What is the difference between AND, OR, and NOT gates?
3. Explain the concept of a function as a special type of relation.
4. Find the 5th term of the arithmetic sequence: 2, 6, 10, …
5. How many different 4-digit numbers can be made using the digits 1, 2, 3, and 4 (no repetition)?
6. Write the truth table for an OR gate.
7. Subtract the matrices:
[[6, 5], [4, 3]] - [[1, 2], [2, 1]]
8. Draw a simple undirected graph with 4 vertices and 4 edges.
9. The 3rd term of a geometric sequence is 27 and the 6th term is 729. Find the first term and common ratio.
10. From a group of 8 people, how many ways can you select a committee of 3 members?
11. Construct the truth table for the expression:
$(A \wedge B) \vee (\neg B \wedge C)$
12. Multiply the matrices:
[[3, 1], [2, 4]] × [[1, 2], [0, 1]]
13. Is the relation R = {(a,a), (b,b), (a,b)} on set {a,b} reflexive and symmetric?
14. The sum of the first n terms of a sequence is given by $S_n = n(n + 1)$. Find the 6th term.
15. A graph has 6 vertices and 8 edges. Is it possible for each vertex to have an even degree? Justify your answer.

16. Solve the following system of linear equations using matrix methods:
$3x - y + z = 4$
$2x + y - z = 3$
$5x - 3y + 2z = 8$

Note: Last date to submit on 21 May 2025

Assignment Questions - Set **C**

COURSE: Discrete Structure

Course Coordinator: Muhammad

1. 1. What is an arithmetic mean? How is it related to sequences?
2. 2. Describe the role of the XOR gate and where it is used.
3. 3. Define an equivalence relation and provide an example.
4. 4. Find the 7th term of the arithmetic sequence: 5, 9, 13, ...
5. 5. How many ways can 5 people stand in a line?
6. 6. Write the truth table for an AND gate.
7. 7. Add the matrices:
   [[3, 2], [1, 5]] + [[6, 4], [2, 3]]
8. 8. Sketch a graph with 5 vertices where two vertices are isolated.
9. 9. The 2nd term of a geometric sequence is 16 and the 5th term is 128. Find the common ratio and first term.
10. 10. From a group of 12 books, how many ways can you choose 5 books to read (order does not matter)?
11. 11. Construct the truth table for the expression:
    ¬(A ∨ B) ∧ C
12. 12. Multiply the matrices:
    [[2, 3], [1, 0]] × [[4, 1], [2, 5]]
13. 13. For the relation R = {(1,1), (2,2), (1,2), (2,1)}, test if it is symmetric and transitive.
14. 14. The sum of the first n terms of a sequence is given by $S_n = 3n^2 + n$. Find the 4th term.
15. 15. A graph has 4 vertices with degrees 2, 2, 3, and 3. Can this graph exist? Explain why or why not.
16. 16. Solve the following system of linear equations using matrix methods:
    $3x - y + z = 4$
    $2x + y - z = 3$
    $5x - 3y + 2z = 8$

Note: Last date to submit on 21 May 2025