B **C1B002** **Total Pages:3**

Reg. No.____________ Name:________________________________

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER REGULAR MCA DEGREE EXAMINATION, DEC 2016

Course Code: RLMCA 103

Course Name: DISCRETE MATHEMATICS

Max Marks: 60 Duration: 3 Hours

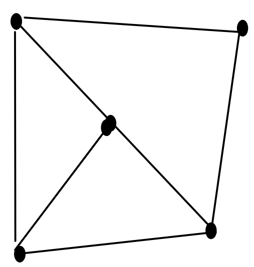
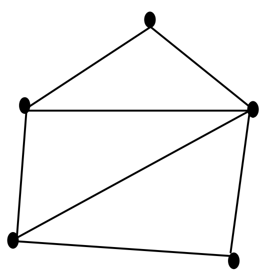
PART A

Answer All Questions. Each question carries 3 marks

1. Define equivalence relation with suitable example. (3 marks)
2. Let R is a relation defined on a set of positive integers such that $\forall\, x, y \in Z^+, x\, R\, y\ iff\ |x-y| < 7$.

   Determine R is an equivalence relation. (3 marks)
3. How many 13 letter character can be formed from the letters of the word "ASSASSINATION"? (3 marks)
4. Find the number of diagonals of a polygon having 'n' sides. (3 marks)
5. Define a) Regular graph b) Bipartite graph.

   Give an example of 3 regular bipartite graphs. (3 marks)
6. Define isomorphism. Check whether the given below are isomorphic. (3 marks)

7. Symbolize the sentence every integer is either positive or negative. (3 marks)
8. Show that $\forall x\big(P(x) \rightarrow Q(x)\big) \wedge \forall x\big(Q(x) \rightarrow R(x)\big) \Rightarrow \exists\, x\big(P(x) \rightarrow R(x)\big)$ (3 marks)

PART B

Answer All Questions. Each question carries 6 marks

MODULE 1

9. Let U={1,2,3,4,5,6,7,8,9,10}, A={2,4,6,8}, B={1,3,5,7},c={1,4,8,10}. Verify Demorgan's laws.

OR

10. Write warshall's algorithm. Use it to find the the transitive closure of the relation. {(1,3), (3,2), (2,4), (3,1),(4,1) on (1,2,3,4)}

MODULE 2

11. Write GCD of 858 and 325 as a linear combination of thetwo numbers.

OR

12. Solve the set of simultaneous congruence.$x \equiv 2(mod\ 3)$; $x \equiv 3(mod\ 5)$; $x \equiv 3(mod\ 7)$

MODULE 3

13. Students are awarded for grades A, B, C & D. How many students must be there in a group, so that at least 6 students get the same grade?
    a. b) How many positive integers not exceeding 100 are divisible by 4 or 6.

OR

14. How many integers between 100 and 999 inclusive a) are not divisible by 4 b) are divisible by 3 or 4 c) are divisible by 3 but not by 4.

MODULE 4

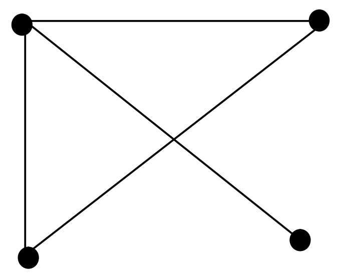
15. Solve the recurrence relation.$2\ a_n = 7\ a_{n-1} - 3a_{n-2}$: $a_0 = 2\ , a_1 = 5$

OR

16. Solve the recurrence relation$a_{n+2} - 8\ a_{n+1} + 16a_n = 8(5^n) + 6(4^n)$: $n \geq 0\ and\ a_0 = 12\ , a_1 = 5$

MODULE 5

17. Define (a) Adjacency matrix (b) Incidence matrix. Give Adjacency the matrix and Incidence matrix of the graph



OR

18. Prove that for a planar
$v - e + r = 2, where\ |V| = v\ ; |E| = e; r = number\ of\ regions$

MODULE 6

19. Prove that R ∧ (P ∨ Q) is a valid conclusion from the premises P ∨ Q , Q →R,
P → M, ˥M.

OR

20. Show the validity of following argument(A→ B) ∧ (A → C), ˥(B ∧ C), D ∨ A => D

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