SY

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103
Winter Semester Examination – Dec.- 2019

Branch: Computer Science | **Sem.:- III**
Subject: - Discrete Mathematics (BTCOC302) | **Marks: 60**
Date: - 12/12/2019 | **Time:- 3 Hr.**

Instructions to the Students

1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriate assume it and should mention it clearly

(Marks)

Q.1. a) Let A = { 4,5,7,8,10 }, B = { 4,5,9} and C = { 1,4,6,9}. Then verify that,
$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ **(6)**

b) Show that $(n^3 + 2n)$ is divisible by 3, for all $n \geq 1$, by method of induction. **(6)**

Q.2. a) Find transitive closure of relation R defined on set A = {1, 2, 3, 4} defined as:
R = {(1,2), (1,3), (1,4), (2,1), (2,3), (3,4), (3,2), (4,2), (4,3) } **(6)**

b) Let set A = {1, 2, 3}, B= {a, b, c} & C = { x,y,z}.
Consider following relations R & S from A to B and B to C respectively.
R = { (1,b), (2,a), (2,c) } & S = { (a,y), (b,x) , (c,y) , (c,z)}
(i) Find composition relation R ° S.
(ii)Write matrices M_R, M_S & $M_{R \circ S}$ of relations R, S & R ° S.
(iii) Find product of M_R, $M_S = M_P$
Compare and comment on contents of $M_{R \circ S}$ & M_P. **(6)**

Q.3. a) Define discrete numeric function.
Also state rules for product and sum of two numeric functions a and b.
Find sum of two numeric functions defined as:

$$a_r = \begin{cases} 0 & 0 \leq r \leq 2 \\ 2^{-r} + 5 & r \geq 3 \end{cases}$$

and

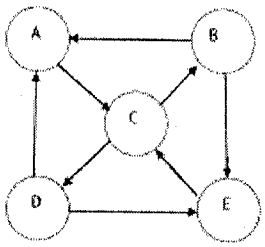
$$b_r = \begin{cases} 3\text{-}2^r & 0 \leq r \leq 1 \\ r + 2 & r \geq 2 \end{cases}$$

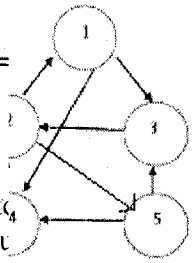
(6)

b) (i) How many different strings of length six can be generated using either three uppercase alphabets followed by three digits or four uppercase alphabets followed by two digits. **(6)**

Q.4. a) (i) Show that the maximum number of edges i e graph having n vertices is n * (n-1) / 2. (6)

b) (i) Show that following graphs are isomorphic ve correspondence between edges and vertices of two graphs. (6)





Q.5. a) Show the steps of constructing a binary Search following sequence of data items. Also write steps to search an eleme { 1,4,6, n the resultant tree. 32, 56, 47, 28, 30, 45, 15, 72, 25 (6)

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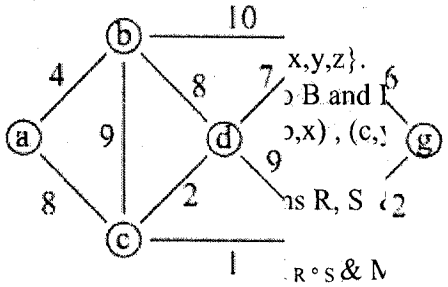
b) Find minimum spanning tree for the graph giv using Prim's algorithm



n set A =), (4,2), (x,y,z}. B and R ,x) , (c, ns R, S 2 R ° S & M (6)

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Q.6. a) Define following terms
(1) Abelian Group (2) M
(3) Ring (6)

b) Let A = { 0, 1, 2, 3} & <A, * > be an algebrai ,
where ∀ a,b ∈ A and a * b = (a + b) mod 4.] ∈ A, a^2, a^3 , a^4. (6)

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