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## **COMPOSED BY SADIA ALI SADI**

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	Discrete Mathematics	Total Marks: 40
	MTH 202	Time: 60 min
	Semester Fall 2004	
Instructions		
Please read the f	ollowing instructions carefully before attempting any	
1. The dur	ration of this examination is 60 minutes.	
2. This exa	amination is closed book, closed notes, closed	
3. Answer	all questions.	
4. Do not a	ask any questions about the contents of this examination f	rom anyone and if you feel
there is so	mething wrong with any question then made the best assu	mptions which you think
then answe	er that	
5. Calculate	or is allowed	
Question No: 1		Marks : 2
If R ={ (a, a),(b, b),(	(c, c)} is a relation on the set A={a, b, c} Then R is	
a) Symmetric	conly.	
b) Symmetric	and reflexive only.	
d) <b>Equivalen</b>	ice .	
Question No: 2		Marks : 2
The negation of th	he implication "If P is a square then P is a rectangle" is	
1. If P is not a	a square then P is not a rectangle	
2. Pisnotas	quare and P is a rectangle	
4. None of th	are and P is not a rectangle. Ne above	

Identify the false state	ment			
1. 0				
2. { } _{ } _{ } _{ } _{ } _{ } _{ } _{ }				
3. If A and B are ty	wo sets A B and	d B A then $A = B$ .		
4. Two sets are di	sioint if their inter	rsection is empty set.		
5. A $A^c = U$		section is empty set		
5. / <sub>11</sub> / 0				
Question No: 4				Marks : 2
et A be a set containi	ng 3 elements the	en the total number of	relations from A to A	
1. 2*9	5			
2. <b>2</b> <sup>9</sup>				
3. nħ				
$\Lambda  2^{n^2}$				
4. Z				Marks · 2
Let $A = \{1, 2, 3\}$ and $B = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$	{2,3,4,5} then	VL	ustudvpastpapers.cor	m
A = B.	D			
2. A is a subset of	B.			
3. A is improper s	ubset of B.			
4. Both 2 and 3.				
				Marka - E
Question No: 6				Marks : 5
Question No: 6 Construct truth table f	or the following o	compound		Marks : 5
Question No: 6 Construct truth table f $(p \rightarrow a) \Leftrightarrow (p = a)$	or the following c	compound		Marks : 5
Question No: 6 Construct truth table f $(p \rightarrow q) \leftrightarrow (p , q)$ solution:	or the following c	compound		Marks : 5
Question No: 6 Construct truth table f $(p \rightarrow q) \Leftrightarrow (p \land q)$ solution:	or the following c	compound		Marks : 5
Question No: 6 Construct truth table f $(p \rightarrow q) \Leftrightarrow (p \land q)$ solution: <b>p</b>	or the following o	compound p → q	p `d	p → q⇔ p ,q
Question No: 6 Construct truth table f $(p \rightarrow q) \leftrightarrow (p \ q)$ colution: T	or the following o	compound <u> </u>	<b>p_q</b>	marks : 5 <u>p → q ↔ p _q</u> T
Question No: 6         Construct truth table f $(p  ightarrow q)  ightarrow (p_{q}q)$ solution:         p         T         T	or the following c <b>q</b> T F	compound $p \rightarrow q$ T F	<mark>р_да</mark> Т F	$ \begin{array}{c} \text{Marks : 5} \\ \hline p \rightarrow q \leftrightarrow p q \\ \hline T \\ \hline T \end{array} $
Question No: 6         Construct truth table f $(p \rightarrow q) \Leftrightarrow (p \land q)$ solution:         T         T         F	or the following of <b>q</b>	compound $p \rightarrow q$ T F T T	<b>p_q</b> T F F	marks     5       p > q ↔ p _q       T       T       F
Question No: 6Construct truth table f $(p \rightarrow q) \leftrightarrow (p \land q)$ colution: $p$ TTFFF	or the following o <b>q</b> T F T F F	compound $p \rightarrow q$ T F T T T	<b>₽q</b> T F F	$ \begin{array}{c}                                     $
Question No: 6         Construct truth table f $(p \rightarrow q) \leftrightarrow (p \land q)$ colution: $p$ T         T         F         F         Aarks distribution	or the following of <b>q q</b> T         F         T         F         F         F         F         F         F         F         F         F         F	compound $p \rightarrow q$ T F T T T	<b>P_Q</b> T F F F	
Question No: 6         Construct truth table f $(p \rightarrow q) \Leftrightarrow (p_A q)$ colution: $p$ $T$ $T$ $F$ $F$ $F$ $F$ $p$ $T$ $q$ $T$ $T$ $p$ $T$ $p$ $q$ $p$	or the following o <b>q</b> T F T F F	compound $p \rightarrow q$ T F T T T	<b>p _q</b> T F F F F	$p \rightarrow q \leftrightarrow p q$ $T$ $T$ $F$ $F$
Question No: 6 Construct truth table f $(p \rightarrow q) \Leftrightarrow (p \land q)$ olution: P T T T F F Marks distribution marks for column 1 marks for column 2	or the following of the	compound $p \rightarrow q$ T F T T T	p_q T F F F F	$ \begin{array}{c}                                     $
Question No: 6 Construct truth table f $p \rightarrow q$ ) ↔ $(p \downarrow q)$ colution: <b>p</b> T T F F Marks distribution marks for column 1 marks for column 2 marks for column 3	or the following of <b>q</b>	compound $p \rightarrow q$ T F T T T	P_q T F F F	$ \begin{array}{c}                                     $
Question No: 6 Construct truth table f $(p \rightarrow q) \Leftrightarrow (p \land q)$ colution:	or the following of the	compound $p \rightarrow q$ T F T T T	<b>p_q</b> T F F F	$ \begin{array}{c}                                     $
Puestion No: 6Construct truth table f $(p  ightarrow q) \leftrightarrow (p_{ightarrow q})$ colution:pTTFFMarks distributionI marks for column 1marks for column 2marks for column 3marks for column 4	or the following of T	compound $p \rightarrow q$ T F T T T	<b>pq</b> T F F F	$ \begin{array}{c}                                     $
Puestion No: 6Construct truth table f $(p \rightarrow q) \leftrightarrow (p_A q)$ solution: $p$ TTFFMarks distributionI marks for column 1I marks for column 2I marks for column 3I marks for column 4	or the following of the	compound $p \rightarrow q$ T F T T T	P_q T F F F	$ \begin{array}{c}                                     $
Puestion No: 6Construct truth table f $(p \rightarrow q) \Leftrightarrow (p_{A}q)$ solution: $p$ TTFFMarks distributionI marks for column 1I marks for column 2I marks for column 3I marks for column 4	or the following of <b>q</b>	compound $p \rightarrow q$ T F T T T	<b>p_q</b> T F F F	$ \begin{array}{c}                                     $
Question No: 6         Construct truth table f $(p \rightarrow q) \Leftrightarrow (p \land q)$ colution: $p$ $T$ $T$ $F$ $F$ Marks distribution         marks for column 1         marks for column 2         marks for column 3         marks for column 4         marks for column 5	or the following of T	compound $p \rightarrow q$ T F T T T	P_q T F F F	Marks : 5
Question No: 6         Construct truth table f $(p \rightarrow q) \Leftrightarrow (p_A q)$ colution: $p$ T         T         F         F         Marks distribution         I marks for column 1         marks for column 2         I marks for column 3         I marks for column 4         marks for column 5	or the following o	compound $p \rightarrow q$ T F T T T	P_Q T F F F	Marks : 5
Puestion No: 6Construct truth table f $(p \rightarrow q) \leftrightarrow (p \ q)$ solution: $p$ TTFFMarks distributionI marks for column 1I marks for column 2I marks for column 3I marks for column 4I marks for column 5Question No: 7	or the following of the	compound $p \rightarrow q$ T F T T T Se , and the converse of	p _q T F F F F	Marks : 5
Question No: 6 Construct truth table f $(p \rightarrow q) \Leftrightarrow (p \land q)$ solution:	or the following of the	compound $p \rightarrow q$ T F T T T Se , and the converse of I miss the final examina	p_q T F F F F	Marks : 5
Question No: 6 Construct truth table f $(p \rightarrow q) \Leftrightarrow (p_{A}q)$ solution:	or the following of the	compound $p \rightarrow q$ T F T T T Se , and the converse of I miss the final examina	P q T F F F F	Marks : 5
Question No: 6 Construct truth table f $(p \rightarrow q) \Leftrightarrow (p_{A}q)$ Solution: P T T F F Marks distribution I marks for column 1 I marks for column 2 I marks for column 3 I marks for column 3 I marks for column 4 I marks for column 5 Question No: 7 What are the contra por "If you have Solution: et p = you have flu	or the following of the	compound $p \rightarrow q$ T F T T Se , and the converse of I miss the final examina	p_q T F F F	Marks : 5
Question No: 6 Construct truth table f $(p  ightarrow q)  ightarrow (p_{A}q)$ solution:	or the following of the following of the following of the final examination of the final examina	compound $p \rightarrow q$ T F T T T se , and the converse of I miss the final examination	p_q T F F F	Marks : 5

Contro positivo	
$\frac{\text{Contra positive}}{\sqrt{a} \rightarrow \sqrt{a}}$	
If you will not miss the final examination then you have no flu	
Inverse	
$\sim p \rightarrow \sim a$	
If you have no flu then you will not miss the final examination	
Converse	
$\overline{q \rightarrow p}$	
If you will miss the final examination then you have flu.	
Marks distribution	
2 marks for contra positive	vustudypastpapers.com
2 marks for the inverse	
I marks for the converse	
Question No: 8	Marks : 5
Determine whether the Devite set of intervention to set	
Determine whether the R on the set of integers is transitive	ve, where $x, y = R$ if and only if $2 (x - y)$
Solution	
To show that B is reflexive it is necessary to show that	
For all $x, y, z = 7$ if $x R y, y R z$ then $x R z$	
By definition of R this means that	
·	
For all x, y, z _Z, if $2 (x - y), 2 (y - z)$ then $2 (x - z)$	
Now by definition of "divides"	
2 (X-Y)	
x - y = 2k for some integer k	
Now by definition of "divides"	
2 (y-z)	
y - z = 2m for some integer m	
(x - y) + (y - z) = 2k + 2m	
x - z = 2(k + m)	
Since $k$ and $m$ are integers then $k + m$ is also an integer	
Let $k + m = s$ for some integer s	
X - Z = 2S	
This implies that $2 (x - z) $	
Marke distribution	
2 marks for the definition	
2 marks for the calculations	
1 marks for the required result	

Let A, B and C be sets .Show that $(A \mid (B \cap C))^c = (C^c \mid B^c) \cap A^c$ By using set identities. <u>Solution</u> :	vustudypastpapers.com
$(A \ (B \ C))^{c}$ $= A^{c} \ (B \ C)^{c} By De Morgan slaw$ $= A^{c} \ (B^{c} \ C^{c}) By De Morgan slaw$ $= (B^{c} \ C^{c}) A^{c}By commutative law for intersection$ $= (C^{c} \ B^{c}) A^{c}By commutative law for union$	
Marks distribution 2 marks for applying the De Morgan's law 1 marks for applying commutative law 2 marks for applying commutative law of union	
Question No: 10	Marks:5
If the 3 <sup>rd</sup> element of an arithmetic series is -16 and the <b>Solution:</b>	<sup>th</sup> term is -46. Then find the 10 <sup>th</sup> term?
If the 3 <sup>rd</sup> element of an arithmetic series is -16 and the <b>Solution:</b> $a_3 = -16$	<sup>th</sup> term is -46. Then find the 10 <sup>th</sup> term?
If the 3 <sup>rd</sup> element of an arithmetic series is -16 and the <b>Solution:</b> $a_3 = -16$ $a_{20} = -46$	<sup>th</sup> term is -46. Then find the 10 <sup>th</sup> term?
If the 3 <sup>rd</sup> element of an arithmetic series is -16 and the <b>Solution:</b> $a_3 = -16$ $a_{20} = -46$ $a_{10} = ?$	<sup>th</sup> term is -46. Then find the 10 <sup>th</sup> term?
If the 3 <sup>rd</sup> element of an arithmetic series is -16 and the <b>Solution:</b> $a_3 = -16$ $a_{20} = -46$ $a_{10} = ?$ <i>U</i> sin <i>g</i> the formula	<sup>th</sup> term is -46. Then find the 10 <sup>th</sup> term?
If the 3 <sup>rd</sup> element of an arithmetic series is -16 and the <b>Solution:</b> $a_3 = -16$ $a_{20} = -46$ $a_{10} = ?$ $U \sin g$ the formula $a_n = a_1 + (n-1)d$	<sup>th</sup> term is -46. Then find the 10 <sup>th</sup> term?
If the 3 <sup>rd</sup> element of an arithmetic series is -16 and the <b>Solution:</b> $a_3 = -16$ $a_{20} = -46$ $a_{10} = ?$ $U \sin g$ the formula $a_n = a_1 + (n-1)d$ Putting the values in the above formula we get	<sup>th</sup> term is -46. Then find the 10 <sup>th</sup> term?
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If the 3 <sup>rd</sup> element of an arithmetic series is -16 and the Solution: $a_3 = -16$ $a_{20} = -46$ $a_{10} = ?$ U sin g the formula $a_n = a_1 + (n-1)d$ Putting thevalues in the above formula we get $-16 = a_1 + (3-1)d$ $-46 = a_1 + (20-1)d$ Solving the above two equations we have $d = \frac{-30}{17}$	<sup>th</sup> term is -46. Then find the 10 <sup>th</sup> term?
If the 3 <sup>rd</sup> element of an arithmetic series is -16 and the <b>Solution:</b> $a_3 = -16$ $a_{20} = -46$ $a_{10} = ?$ $U \sin g$ the formula $a_n = a_1 + (n-1)d$ Putting thevalues in the above formula we get $-16 = a_1 + (3-1)d$ $-46 = a_1 + (20-1)d$ Solving the above two equations we have $d = \frac{-30}{17}$ -212	<sup>th</sup> term is -46. Then find the 10 <sup>th</sup> term?
If the 3 <sup>rd</sup> element of an arithmetic series is -16 and the <b>Solution:</b> $a_3 = -16$ $a_{20} = -46$ $a_{10} = ?$ U sin g the formula $a_n = a_1 + (n-1)d$ Putting the values in the above formula we get $-16 = a_1 + (3-1)d$ $-46 = a_1 + (20-1)d$ Solving the above two equations we have $d = \frac{-30}{17}$ $a_1 = \frac{-212}{17}$	<sup>th</sup> term is -46. Then find the 10 <sup>th</sup> term?

$$a_{10} = a_1 + (10-1)d$$
 $a_{10} = \frac{-212}{17} + 9(\frac{-30}{17})$ 
 $a_{10} = \frac{-212 - 270}{17}$ 
 $a_{10} = \frac{-482}{17}$ 
**Marks distribution**

 1 marks for substituting values in the formula

 1 marks for solving the equation

 1 marks for solving the equation

 1 marks for finding the correct values of d and a1

 1 marks for solving the equation R on a set is represented by the

  $M_g = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ 

 Is R reflexive, symmetric, and/or anti symmetric?

 **Solution:**

 Since all the diagonal elements of this matrix are equal to 1, R is reflexive. Moreover, since M is symmetric because  $M_g = M_g^+$ , it follows that R is symmetric. But R is not anti symmetric.

 **Marks distribution**

 2 marks for sreflexive

 2 marks for sreflexive

 2 marks for stribution

 2 marks for reflexive

 2 marks for solution:

 2 marks for soluting

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