I.M.C.A. SEM–III (2014 Course) CBCS : SUMMER - 2019

SUBJECT : MATHEMATICS

Day : Thursday
Date : 25/04/2019

S-2019-2124

Time 02.00 PM TO 05.00 PM
Max. Marks : 100

N.B.

1) Attempt any **FOUR** questions from Section – I and any **TWO** questions from Section – II.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in SAME answer book.

SECTION – I

Q.1 **a)** Determine the validity of the following argument: **(08)**

If 7 is less than 4, then 7 is not a prime number.
7 is not less than 4.
____
7 is a prime number

b) Negate each of the following statements: **(07)**

i) $\exists x \forall y, p(x,y)$; **ii)** $\exists x \forall y, p(x,y)$; **iii)** $\exists y \exists x \forall z, p(x,y,z)$

Q.2 What is composition of relation. When R and S are two relations such that R= {(1,2), (1.3), (2,5), (3,4), (5,5)} and S = {(1,1), (2,2), (3,5), (4,1), (5,3)}. Define ROS and SOR. **(15)**

Q.3 **a)** State division algorithm. By applying division algorithm find q (quotient) and r(remainder) for a = -262 and b = 3. **(08)**

b) Using mathematical induction prove $1+2+3+...+n=\dfrac{n(n+1)}{2}$. **(07)**

Q.4 Let the functions $f:A\to B$ and $g:B\to C$ defined as $f=\{(a,y),(b,x),(c,y)\}$, $g=\{(x,r),(y,t),(z,r)\}$ where $A=\{a,b,c\}, B=\{x,y,z\}, C=\{r,s,t\}$ then define fog, gof, fof, gog. **(15)**

Q.5 **a)** Define 'power set'. Find power set of $A=\{1,2,3,4\}$. **(08)**

b) Find all partitions of $S=\{a,b,c,d\}$. **(07)**

Q.6 Let $E = xy' + xyz' + x'yz'$. Find **(15)**

a) the prime implicants of E; **b)** a minimal sum for E.

Q.7 Write short notes (Any two) **(15)**

a) Mathematical induction
b) Partitions of set
c) Types of relations

P.T.O.

SECTION – II

Q.8 Prove right distributive law (B+A)C=BC+AC with reference to following matrices. **(20)**

$$A=\begin{bmatrix}1 & 5\\ 7 & 2\end{bmatrix} \quad B=\begin{bmatrix}4 & 0\\ 8 & 6\end{bmatrix} \quad C=\begin{bmatrix}2 & 9\\ 3 & 5\end{bmatrix}$$

Q.9 Check if the given relation R on set A = {1,2,3,4,5} such that R={(a,b)|a>b} is reflexive, symmetric and transitive relation. If not find its closures. **(20)**

Q.10 Write algorithm for find sum-of-products form. Express $E=((xy)'z)'((x'+z)(y'+z'))'$ in sum of products form. **(20)**

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