

B.C.A. SEM-III (2014 Course) CBCS : SUMMER - 2019

SUBJECT : MATHEMATICS

Day : Thursday
Date : 25/04/2019

S-2019-2070

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 (15)
 $R = \{(1,2), (1,3), (2,5), (3,4), (5,5)\}$ and $S = \{(1,1), (2,2), (3,5), (4,1), (5,3)\}$.
Define ROS and SOR.
- Q.3** a) State division algorithm. By applying division algorithm find q (quotient) (08)
and r(remainder) for $a = -262$ and $b = 3$.
- b) Using mathematical induction prove $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$. (07)
- Q.4** Let the functions $f : A \rightarrow B$ and $g : B \rightarrow C$ (15)
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.
- 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 (20)
matrices.

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

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

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

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