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GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE AND ECONOMICS, PONDA-GOA

B.C.A. (SEMESTER –II) EXAMINATION, APRIL 2018

DISCRETE MATHEMATICS

Duration: 2 Hours **Marks: 50**

Instructions: All questions are compulsory.

Answer the following questions. Justify your answer.

Q.1

1(a) Let p and q be the propositions given as p: It is below freezing and q: It is snowing. Write the below proposition using p, q and logical connectives.
It is not below freezing and it is not snowing (1)

1(b) State the converse, contrapositive and inverseof the conditional statement given below.

I come to class whenever there is going to be a quiz (3)

1(c) Find the sets A and B if A-B= $\{1, 5, 7, 8\}$, B-A= $\{2,10\}$, and A∩ B= $\{3, 6, 9\}$ (1)

1(d) How many permutations of $\{a,b,c,d,e,f,g\}$end with a? (1)

1(e) List the ordered pairs in the relation from A= $\{ 0,1,2,3,4\}$ to B= $\{ 0,1,2,3 \}$

where (a,b) is a member of R if and only if a+b=4. (1)

1(f) List the ordered pairs in the equivalence relation produced by the partition

$\{ 0 \},\{ 1,2 \}$, and$\{3,4,5\}$, of the set $\{0,1,2,3,4,5\}$ (1)

1(g) Find the sum-of- products and product-of- sums expansions of the

boolean function F(x,y,z) =x+y+z (2)

Q.2. (i) Show that (p→q) →r and p→ (q→r) are not logically equivalent. (5)

(ii) Determine whether ($\neg$ q $\wedge$ (p → q)) → $\neg$ p is a tautology (3)

(iii) Identify p and q in each of these sentences (a) It snows whenever the wind blows from north east. (b) The apple trees will bloom if it stays warm for a week.
(c) Jan will go swimming unless the water is too cold. (3)

Q. 3. (i) Let f(x) = $\lfloor x^2/3 \rfloor$. Find f(S) if S= { -2,-1, 0, 1, 2} (2)

(ii) Using mathematical induction, prove that for every positive integer n,

$1\cdot2+2\cdot3+\ldots+n(n+1) = n(n+1)(n+2)/3$ (3)

(iii) Let X= { -1,0,1,2 }, and Y= { -4,-2,0,2 }, define the function F: X → Y as

$F(x)= x^2 -x$,

(a) Determine whether F is a function,
(b) Check whether F is 1-1, onto. Justify your answer. (4)

(iv) (a) Find the coefficient of x^9 in the expansion of $(2-x)^{19}$. (2)

(b) Find the coefficient of $x^{101}y^{99}$ in the expansion of $(2x-3y)^{200}$ (3)

Q.4. (i) For the following relation on the set $\{1,2,3,4\}$, determine whether it is reflexive, whether it is symmetric, whether it is anti-symmetric, and whether it is asymmetric.

{(2,2),(2,3),(2,4),(3,2), (3,3),(3,4)} (4)

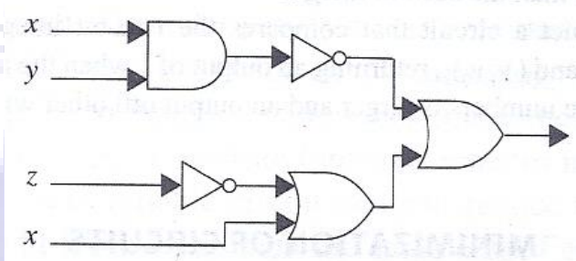
(ii) How many permutations are possible from the letters ORONO. (1)

(iii) Apply Warshall's algorithm to the following relation on the set {1,2,3,4} to determine whether it is transitive or not. Perform one iteration.

{ (1,1), (1,2),(1,3), (1,4), (2,2), (2,3),(2,4), (3,3), (3,4),(4,4)} (5)

Q.5. (i) Construct circuit that produce the output x (y+z) (2)

(ii) Find the output of the circuit given below. (3)



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