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GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE & ECONOMICS
PONDA-GOA
B.C.A. (SEMESTER-II) EXAMINATION, APRIL 2015
DISCRETE MATHEMATICS

Duration:2hrs   Max. Mark :50

INSTRUCTIONS:

1) **All questions are compulsory**
2) **Figures to the right indicate full marks**

Q.1) Answer the following
   i)Draw the truth table for $p \wedge q$ (1)
   ii)The logic symbol for NOT gate is ………………..   (1)
   iii) Convert $(1101111)_2$ to decimal form   (2)
   iv)If p and q are two statements with truth values T and F respectively, then the truth value of $p \rightarrow q$
      is………………   (2)
   v) Write the complete expansion of $(2x-1)^4$ (2)
   vi) Convert $(3FED)_{16}$ to its decimal equivalents   (2)

Q.2.a) Prove that the relation R on the set of integers Z defined as R={(x,y)/x−y is divisible by 3;x,y∈Z}
       is an equivalence relation   (5)
   b) If X={a,b,c,d}, A={c,d}, B={a,b,c}, verify D'Morgans laws   (3)
   c) Give an example of a relation that is reflexive and transitive but not symmetric   (2)

<div align="center">OR</div>

Q.2.x) If X is the universal set and A and B are two sets then draw a venn diagram for   (5)
       i) AUB ii)A∩B iii) (AUB)'
   y) If A= {a,b,c} B={a,d,e} then find i)AXB ii)BXA   (3)
   z) Let A={a,b,c} and a relation on A be R={(a,a),(a,b),(b,a),(b,b),(b,c),(c,c)}.   (2)
       Prove that the relation R is reflexive and not symmetric.

Q.3.a) In a class of 100 students, 64 students have taken English and 56 students have taken maths.
       How many students have taken both the subjects?   (4)
   b) If $f(x)=x^2$ and $g(x)=5x-6$ find f(g(x)) & g(f(x))   (4)
   c) How many seating arrangements can be made for 5 students on 2 chairs   (2)

<div align="center">OR</div>

Q.3.x) Find the number of arrangements of the letters of the word REPETITION.   (2)
   y) If g(y) =2y+2 then find g(g(g(y)))   (4)
    z) A town has a total population of 40,000 out of which 400 people own cars, 10,000 people own
       bicycles and 300 own both cars and bicycles. How many in the town do not own either?   (4)

Q.4.a) Verify whether (p→q) v ~(pvq) is a contradiction, tautology or contingency
(3)

   b) Write a short note on XOR gate
(2)

   c) By principle of mathematical induction prove that
(5)

$$p(n) : 1+2+3+\ldots\ldots\ldots+n = n(n+1)/2$$
OR

Q.4.x) By principle of mathematical induction prove that
(5)

$$p(n) : 1^2+2^2+3^2+\ldots\ldots+n^2 = n(n+1)(2n+1)/6$$

   y)Explain OR gate by giving symbol and truth table
(2)

   z) Verify whether (p∧q)→(~pVq) is a contradiction, tautology or contingency
(3)

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Q.5.a) Find the output for the given inputs of the following circuit diagram:
(5)

   Inputs x_1=0 & x_2=1

   X_1

   $f(x_1 x_2)$

   X_2

b) Write a short note on various types of grammars
(5)

OR

Q.5.x)) Find the output for the given inputs of the following circuit diagram: (5)
   X=0, y=1,z=1

   x
   y

z

y) Write a short note on finite state machine (5)

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