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Roll No.....

THIRD SEMESTER

B.Tech.(COE)

MID SEMESTER EXAMINATION

SEP-2019

CO 205 Discrete Structures

Time: 1:30 Hours

Max. Marks : 25

Note : Answer all questions.
Assume suitable missing data, if any.

Q.1 Let *P(x), Q(x), R(x) and S(x)* be the statements *"x is a baby", "x is logical", "x is able to manage a crocodile" and "x is despised" respectively.* Suppose that the domain consist of all people. Express each of these statements using quantifiers, logical connectives and *P(x), Q(x), R(x) and S(x).* (5)

a) Babies are illogical.
b) Nobody is despised who can manage a crocodile.
c) Illogical persons are despised.
d) Babies cannot manage crocodile.
e) Does d) follow from a), b) and c) ? If not, is there a correct conclusion?

Q.2 **[a]** In a class of 100 students, 39 play Tennis, 58 play Cricket, 32 play Hockey, 10 play Cricket and Hockey, 11 play Hockey and Tennis, 13 play Tennis and Cricket. How many students play

i. All 3 games
ii. Just one game
iii. Tennis and cricket and not Hockey?

[b] Find the conjunctive normal form of the function

$$f = [x \wedge (y' \vee z)] \vee z'$$ (3+2)

Q.3 Show that $2^n > n^3, n \geq 10$ using mathematical induction. (5)

Q.4 [a] In how many ways can a team of 11 cricketers be chosen from 6 bowlers, 4 wicket keepers and 11 batsmen to give a majority of batsmen if at least 4 bowlers are to be included and there is one wicket keeper.

[b] Give a recursive algorithm for finding reversal of a bit string. (3+2)

Q.5 Find the explicit formula for the given recurrence relation with initial conditions $a_0 = 0, a_1 = 1$. (5)

$$a_r - 7a_{r-1} + 10a_{r-2} = 2r^2 + 2$$