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Roll No. _____

THIRD SEMESTER

B.Tech.

SUPPLEMENTARY EXAMINATION *FEB-2020*

CO 205 DISCRETE STRUCTURES

Time: 3:00 Hours

Max. Marks : 50

Instructions :
1) Attempt any five questions.
2) Calculator is allowed.
3) Assume suitable missing data, if any.

Q.1 [a] i) Suppose that there are 1807 freshmen at your school. Of these, 453 are taking a course in computer science, 567 are taking a course in mathematics, and 299 are taking courses in both computer science and mathematics. How many are not taking a course either in computer science or in mathematics?

ii) How many elements are in $A1 \cup A2$ if there are 12 elements in $A1$, 18 elements in $A2$, and

a) $A1 \cap A2 = \emptyset$

b) $|A1 \cap A2| = 1$

c) $A1 \subseteq A2$ (2+3)

[b] i) How many cards must be selected from a standard deck of 52 cards to guarantee that at least three cards of the same suit are chosen?

ii) How many must be selected to guarantee that at least three hearts are selected? (3+2)

Q.2 [a] Show by induction that for any positive integer n, $6^n - 1$ is divisible by 5. (5)

[b] Show that $\neg(p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences. (5)

Q.3 [a]] Let p, q and r be the propositions (5)

p: You get an A on the final exam.

q: You do every exercise in this book.

r: You get an A in this class.

Write these propositions using p, q, and r and logical connectives (including negations).

i) You get an A in this class, but you do not do every exercise in this book.

ii) You get an A on the final, you do every exercise in this book, and you get an A in this class.

iii) To get an A in this class, it is necessary for you to get an A on the final.

iv) You get an A on the final, but you don't do every exercise in this book; nevertheless, you get an A in this class.

v) Getting an A on the final and doing every exercise in this book is sufficient for getting an A in this class.

[b] Draw the Hasse diagram for the partial ordering *{(a, b)| a divides b}* on *{1, 2, 3, 4, 6, 8, 12}*.

Q.4 [a] Use K-map to find a minimal sum of products form for

$$x\bar{y} + xyz + \bar{x}\,\bar{y}\,\bar{z} + \bar{x}\,y\,z\,\bar{t}$$ (5)

[b] Find the general solution of following recurrence relation : (5)

$$a_r - 6a_{r-1} + 9a_{r-2} = n\,3^n$$