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MCS-013

MCA (Revised) / BCA (Revised)
Term-End Examination
June, 2015

05293

MCS-013 : DISCRETE MATHEMATICS

Time : 2 hours *Maximum Marks : 50*

Note : *Question number **1** is **compulsory**. Attempt any **three** questions from the rest.*

1. (a) Write down the truth table of

$$p \rightarrow q \wedge \sim r \leftrightarrow r \oplus q.$$

Also explain whether it is a tautology or not. *5*

(b) Show that $\sqrt{5}$ is irrational. *4*

(c) Give the geometric representation of $R \times \{2\}$. *3*

(d) Find the f inverse of the function

$$f : f(x) = x^3 - 3.$$ *3*

(e) Present a *direct proof* of the statement : "Square of an odd integer is odd." *3*

(f) How many permutations are there for the word "UNIVERSITY" ? *2*

2. (a) (i) Check whether $(A \cup B) \cap C = A \cup (B \cap C)$ or not, using Venn Diagram. *3*

(ii) Find the dual of $A \cup (B \cup C)$. *2*

(b) Prove that $C(n, r) = C(n, n - r)$, for $0 \leq r \leq n, n \in N$. *5*

3. (a) State and prove Addition Theorem of Probability. *5*

(b) Show that in any group of 30 people, we can always find 5 people who were born on the same day of the week. *3*

(c) State Pigeonhole principle. Also give an example of its application. *2*

4. (a) What is the probability that a number between 1 and 200 is divisible by neither 2, 3, 5 nor 7 ? *3*

(b) In how many ways can 20 students be grouped into 3 groups ? *3*

(c) In how many ways can r distinct objects be distributed into 6 different boxes with at least two boxes empty ? *4*

5. (a) Give an example of a compound proposition that is neither a tautology nor a contradiction. *2*

(b) Show that $2^n > n^3$ for $n \geq 10$. *5*

(c) Draw the logic circuit for the following boolean expression :

$$x \cdot y + x \cdot y' + x' \cdot y.$$ *3*