

SUBJECT CODE NO:- P-307
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E. (CSE/IT) Examination MAY/JUNE-2016
Discrete Mathematics
(Revised)

[Time: Three Hours]

[Max Marks:80]

“Please check whether you have got the right question paper.”

N.B

- i) Q.No.1 from section A and Q.No.6 from section B are compulsory.
 ii) Solve any two questions from each section from remaining questions.
 iii) Assume suitable data, if necessary.

Section A

- Q.1 Solve any five 10
- a) What is conditional probability?
 - b) Let $A = \{\phi, \{\phi\}\}$. Determine whether the following statements are true or false.
 - i) $\{\{\phi\}\} \subseteq A$ ii) $\{\phi\} \in A$
 - c) Explain associative law of sets.
 - d) What is uncountable set?
 - e) What is conditional proposition?
 - f) Using the following statement P: Rajani is tall q: Rajani is beautiful write the following statements in symbolic form
 - i) It is false that Rajani is short or beautiful
 - ii) Rajani is tall but not beautiful.
 - g) Explain universal quantifier.
 - h) What is logical equivalences.
- Q.2 07
- a) A bag contains 5 white, 3 black & 4 balls are successively drawn out and not replaced. What is probability that they are alternately of different color.
 - b) $(A \cap C) \subseteq (B \cap C)$ Show that $A \subseteq B$ using Venn diagram. 08
- Q.3 07
- a) Explain universal instantiation and universal generalization with proper example.
 - b) Construct the truth – table for the following statement to determine tautology or contraction. 08
 $(p \wedge (\sim p \vee q)) \wedge \sim q$
- Q.4 07
- a) Prove that $8^n - 3^n$ is a multiple of 5 mathematical induction for $n \geq 1$.
 - b) Write the negation of each of the following statements. 08
 - i) He swims if and only if the water is warm
 - ii) This computer program is correct if and only if, it produces the correct answer for all possible sets of input data.
- Q.5 07
- a) Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises $P \vee Q, Q \Rightarrow R, P \Rightarrow M$ and $\sim M$
 - b) Let $D = \{1, 2, 3, \dots, 9\}$. Determine the truth value of each of the following statements 08
 - i) $(\forall x \in D), x + 6 \leq 15$
 - ii) $(\exists x \in D), x + 6 = 10$
 - iii) $(\forall x \in D), x + 6 \leq 10$
 - iv) $(\exists x \in D), x + 6 > 15$

Section B

- Q.6 Solve any five 10
- a) What is a difference between relation & function?
 - b) Give an example of a relation which is,
 - i) Reflexive and transitive but not symmetric.
 - ii) Symmetric and reflexive but not transitive.
 - c) Explain the Cartesian product of two sets.
 - d) What is hamming weight & distance?
 - e) Explain homomorphism with example.
 - f) Explain directed graph with example.
 - g) What is ring and its properties?
 - h) Explain cyclic group.
- Q.7
- a) Let $f(x) = 2x+3$, $g(x) = 3x+4$ and $h(x) = 4x$ for $x \in R$ where R is set of real numbers. Find gof , fog , foh & goh . 08
 - b) Explain pigeonhole principle and show that if 9 books are to be kept in 4 shelves, there must be at least one self which contain at least 3 books. 07
- Q.8
- a) Let $A = \{1, 2, 3, 4, 5\}$ and $R = \{(1,2), (1,1),(2,1),(2,2),(3,3),(4,4),(4,5),(5,4),(5,5)\}$ be relation on A . Determine the relation R is equivalence relation and find equivalences classes & partitions. 08
07
 - b) Explain chain & anti chain with example.
- Q.9
- a) Determine whether algebraic system $(Q, +)$ is a group where Q is the set of all rational number and $+$ is an addition operation 08
07
 - b) Let $\begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \end{bmatrix}$ be a parity check matrix of the $(7, 4)$ hamming code. If $y = 1111011$ is received, determine the code word which was most likely sent.
- Q.10
- a) Explain parity check matrix with example. 08
 - b) Explain integral domain and field. 07