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

[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
a) What is conditional probability?
b) Let $A=\{\phi,\{\phi\}\}$. Determine wheather the following statements are true or false.
i) $\{\{\phi\}\} \subseteq A \quad$ 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 a) A bag contains 5 white, 3 black \& 4 balls are successively drawn out and not replaced. What is probability that they 07 are alternately of different color.
b) $(A \cap C) \subseteq(B \cap C)$ Show that $A \subseteq B$ using Venn diagram.
Q. 3 a) Explain universal instantiation and universal generalization with proper example.
b) Construct the truth - table for the following statement to determine tautology or contraction.
$(p \wedge(\sim p \vee q)) \wedge \sim q$
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.
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.
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 -M
b) Let $\mathrm{D}=\{1,2,3, \ldots . . . . . .9\}$. Determine the truth value of each of the following statements
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) $\quad(\exists x \in D), x+6>15$

## Section B

## Q. 6 Solve any five

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.
a) Let $\mathrm{f}(\mathrm{x})=2 \mathrm{x}+3, \mathrm{~g}(\mathrm{x})=3 \mathrm{x}+4$ and $\mathrm{h}(\mathrm{x})=4 \mathrm{x}$ for $x \in R$ where R is set of real numbers. Find gof, fog, foh \& goh.
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.
a) Let $A=\{1,2,3,4,5\}$ and $\mathrm{R}=\{(1,2),(1,1),(2,1),(2,2),(3,3),(4,4),(4,5),(5,4),(5,5)\}$ be relation on A . Determine the 08 relation $R$ is equivalence relation and find equivalences classes \& partitions.
b) Explain chain \& anti chain with example.
a) Determine whether algebraic system $(Q,+)$ is a group where $Q$ is the set of all rational number and + is an addition operation
b) Let $\left[\begin{array}{lllllll}1 & 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1\end{array}\right]$ 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.
a) Explain parity check matrix with example.
b) Explain integral domain and field.

