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SUBJECT CODE :- 44

FACULTY OF ENGINEERING AND TECHNOLOGY

S.E. (CSE/IT) Examination Nov/Dec 2015

Discrete Mathematics

(Revised)

[Time: Three Hours] **[Max. Marks: 80]**

"Please check whether you have got the right question paper."

N.B i) Questions 1 from section A & Question 6 from section B are compulsory.
ii) Assume suitable data if necessary.
iii) Solve any two questions from each section from remaining questions.

Section – A

Q1. Solve $\underline{any\ five}$ 10

a) Explain discrete probability.
b) Explain distributive law of sets.
c) Explain power of set with example
d) Write the following sets in tabular form
i) A ={x : x is a divisor of 24}
ii) B = { x : x is a multiple of 3 0r 5}
e) Give an example of converse and contrapositive of a proposition
f) Form the conjunction of p & q of the following
i) p : it is cold q: it is raining
ii) p: 5x + 6 = 26 q: x > 3
g) Explain existential quantifier
h) What is logical equivalence

Q.2 a) (A ∩ $\bar{C}$) $\underline{C}$ (B∩ $\underline{\bar{C}}$) show that A $\underline{C}$ B by using Venn-diagram 07

b) A card is draw from a deck of cards find the probability of getting ace or a spade card 08

Q.3 a) Show that $1^3 + 2^3 + \ldots\ldots\ldots + n^3 = (1+2+\ldots\ldots.+n)^2$ using mathematical induction for $n \geq 1$ 08

Explain universal modus ponens and universal modus tollens with example 07

Q.4 a) Construct the truth table for the following statement to determine tautology or contradiction 07

(C$\nsim$ P ∧ q) V (q ∧ r)) → r

b) Let k (x) : x is student 08

M (x) : x I cleaver

N (x) : x is successful

Express the following using quantifier

i) There exists a student ii) Some students are cleaver. iii) Some students are note successful.

Q.5 a) Show that t is a valid conclusion from the premises p ⇒ q, q ⇒ r , r ⇒ s ,$\nsim$S and pvt. 07

b) Show that p ⇔ q ≡ (pvq) ⇒ (p ∧ q) using algebra of proposition 08

Section –B

Q.6 Solve any five 10

a) Let A = {7, 8, 9} determine all the partitions of set A
b) Explain range & domain of a function
c) Give an example of a relation which is
   i) reflexive and symmetric but not transitive
   ii) Reflexive and transitive but neither symmetric nor anti symmetric
d) Explain zero – one matrix representation of a graph with example
e) Find the hamming weight of the given words
   i) 1010101
   ii) 11100111
f) Explain ring & its properties
g) Explain homomorphism with example
h) What left coset & right coset give example

Q.7 a) Consider f, g & h, all functions on the integers by $f(n) = n^2$, $g(n) = n + 1$ and $h(n) = n - 1$ 08

find (i) hofog (ii) gofoh (iii) fogoh (iv) hofof

b) If R be a relation on the set of integers 2 and it defined by $R = \{(x, y) : x \in z, (x-y)$ is derisible by 6$\}$ then prove that R is an equivalence relation & determine equivalence classes & partitions. 07

Q.8 a) Explain pigeonhole principle and show that if any five integers from 1 to 8 are chosen then at least two of them will have a sum 9 08

b) explain Hasse diagram with chain and antichain with example 07

Q.9 a) Explain decoding with coset leaders in detail with example 08

b) Explain integral domain and field in detail 07

Q.10 a) Show that (2,5) encoding function $E : B^2 \rightarrow : B^5$ defined by 08

E (00) = 00000 E(01) = 01110

E (10) = 10101 E (11) = 11011

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b) Explain elements of coding theory in detail. 07