A

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M. TECH DEGREE EXAMINATION

Computer Science & Engineering

(*Computer Science & Systems Engineering)*

04CS6401—Discrete Structures For Computer Science

Max. Marks : 60 Duration: 3 Hours

PART A

Answer All Questions

Each question carries 3 marks

1. For any three sets A, B , C Show that (A - B) – C = A - (B U C).
2. Define a Lattice with an example..
3. What is meant by soundness of propositional logic ? Explain.
4. A book shop offers 20 kinds of books. Assuming there are at least a dozen of each kind is available. When we enter the shop , in how many ways one dozen of book can be selected?
5. What is meant by Discrete Random Variable? Explain.
6. Prove that the inverse of an element in a Group is unique.
7. Prove that every Field is an Integral Domain
8. What is Commutative Ring? Give an example. ***(3 x 8= 24 Marks)***

PART B

Each question carries 6 marks

9. (a)Among 50 students in a class , 26 passed in the first semester and 21 passed in the second semester exams. If 17 did not pass in either the semester , how many passed in both the semesters. (3 Marks)

   (b)Let R and S be two relations on a Set A . If R and S are Symmetric, Prove that (R∩ S) is also Symmetric . (3 Marks)

OR

10. (a)Suppose f(x) = x+2 , g(x) = x-2, and h(x) = 3x for x ε R , where R is the set of real numbers. Find (g o f) , (f o g) , (f o f) and (g o g) (3 Marks)

    (b)Determine the number of positive integers n, where 1≤ n ≤ 2000, and n is not divisible by 2, 3 or 5 but is divisible by 7. (3 Marks)

11. (a)Let Z be the set of integers. R is a relation called “Congruence modulo 7 “ defined by R = { (x,y)/x ε Z,y ε Z, x-y is divisible by 7 } . Show that R is an equivalence relation. (3 Marks)

    (b)Prove by the principle of mathematical induction that

    $1^2 + 2^2 + 3^2 + ... + n^2 = n(n+1)(2n+1)/6$ (3 Marks)

OR

12.(a)What are the equivalence classes of 0, 1 ,2 and 3 for Congruence Modulo 4 and Show that the equivalence classes are either disjoint or identical.(3 Marks)

(b)A connective denoted by Δ is defined as follows

P	Q	P Δ Q
T	T	F
T	F	T
F	T	T
F	F	F

Find a formula using P,Q and the connectives whose truth values are identical to the truth values of P Δ Q (3 Marks)

13. In how many ways can the letters of the word ALLAHABAD be arranged ? How many of these permutations are there in which
(i) Two L's come together? (ii) Two L's do not come together ?(6 Marks)

OR

14.In how many ways can (i) 12 balloons be distributed at a birthday party among 10 children (ii) Find the number of ways the balloons can be distributed if we ensure that every child gets at least one balloon. (6 Marks)

15.A bag contains 7 red and 4 white balls. Two balls are drawn at random without replacement. Find the probability that
(i) Both balls are red
(ii) One ball is white and another one red (6 Marks)

OR

16.If the probability that a communication system will have high fidelity is 0.81 and the probability that it will have high fidelity and high selectivity is 0.18, what is the probability that a system with high fidelity will also have high selectivity?
(6 Marks)

17.Prove that the Group {1,- 1, i, -i} is cyclic and find its generator.(6 Marks)

OR

18.Show that if a,b Ɛ G ,then $(ab)^2 = a^2 b^2$ iff G is abelian (6 Marks)

19.State and Prove Lagrange's theorem. (6 Marks)

OR

20.List the properties of a Ring. (6 Marks)

(6 x 6 = 36 Marks)