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| **Scheme of Valuation/Answer Key**  (Scheme of evaluation (marks in brackets) and answers of problems/key) | | | | | |
| **APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018 | | | | | |
| **Course Code: CS201** | | | | | |
| **Course Name: DISCRETE COMPUTATIONAL STRUCTURES** | | | | | |
| Max. Marks: 100 | | |  | Duration: 3 Hours | |
| **PART A** | | | | | |
|  |  | ***Answer all questions, each carries3 marks.*** | | | Marks |
| 1 |  | Only the diagonal elements are non zero. Intersection or R and its converse contains only the elements of the form (x, x) – 3 marks | | | (3) |
| 2 |  | Definition – 2 marks, Example – 1mark | | | (3) |
| 3 |  | Proof – 3 marks | | | (3) |
| 4 |  | f-1(x) = (x +2)1/3 | | | (3) |
| **PART B** | | | | | |
| ***Answer any two full questions, each carries9 marks.*** | | | | | |
| 5 | a) | Hasse diagram – 4 x 1= 4 marks  {1,2,3,6,12} is not totally ordered all others are totally ordered – 1 mark | | | (5) |
|  | b) | Proof – 4 marks. (Any answer that discusses the partition of an equivalence relation can be given 3 marks) | | | (4) |
| 6 | a) | Characteristic equation – (a2 – 7a + 10 = 0) - 1 mark  Homogeneous Solution – 1 mark  Total Solution – 3 marks – ( T(k) = -9 2k + 2 5k +8 + 2k) | | | (5) |
|  | b) | Ans: 26 (pigeon hole principle). Identification of the problem – 2 marks  Solution – 2 marks | | | (4) |
| 7 | a) | 7C3.6C2 + 7C4.6C1 + 7C5.6C0 = 756  Problem identification – 2 marks, Solution – 2 marks | | | (4) |
|  | b) | f ᵒ g = (x + 4)2 – 2 – 2 marks  g ᵒ f = (x2 + 2) - 2 marks both are surjective (onto) – 1 mark | | | (5) |
| **PART C** | | | | | |
| ***Answer all questions, each carries3 marks.*** | | | | | |
| 8 |  | No proper subgroups (according to Legrange Theorem O(G)/O(H) should be an integer. Here O(G) is a prime number. If the answer contains Legrange Theorem, 1 mark can be given | | | (3) |
| 9 |  | Proof – 3 marks | | | (3) |
| 10 |  | Properties of ring – 3 marks | | | (3) |
| 11 |  | Definition – 2 marks, Example – 1 mark | | | (3) |
| **PART D** | | | | | |
| ***Answer any two full questions, each carries9 marks.*** | | | | | |
| 12 | a) | Proof – 5 marks | | | (5) |
|  | b) | Proof – 4 marks | | | (4) |
| 13 | a) | Proof – 4 marks | | | (4) |
|  | b) | Definition – 2 marks. Illustration with example ({0,1} with AND, OR and NOT operations is an example) - 3 marks | | | (5) |
| 14 | a) | Proof – 5 marks. ( If the proof just shows that every element of a group appears in each row and column of the composition table, 3 marks can be given) | | | (5) |
|  | b) | Definition – 2 + 2 | | | (4) |
| **PART E** | | | | | |
| ***Answer any four full questions, each carries10 marks.*** | | | | | |
| 15 | a) | Proof – 5 marks | | | (5) |
|  | b) | Truth table method – 5 marks | | | (5) |
| 16 | a) | Proof – 4 marks | | | (4) |
|  | b) | Premises are of the form P→Q, R→˥Q, R, and conclusion is ˥P – 3 marks  Validity of arguments – 3 marks | | | (6) |
| 17 | a) | Atomic statements – 2 marks, Quantified statement – 2 marks | | | (4) |
|  | b) | i. x is bound in P(x) ˄ R(x) and in P(x), x is free in R(x) - 3 marks  ii. all occurrence of x in (P(x) ˄ (Q(x)) are bound, occurrence of x in last Q(x) is free - 3 marks | | | (6) |
| 18 | a) | Proof – 5 marks | | | (5) |
|  | b) | Proof – 5 marks | | | (5) |
| 19 | a) | Premises – 2 marks, consistency checking – 3 marks (they are inconsistent) | | | (5) |
|  | b) | Proof – 5 marks | | | (5) |
| 20 | a) | Proof – 5 marks | | | (5) |
|  | b) | Proof – 5 marks | | | (5) |
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