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| **University of Kerala** | | |
| Discipline:Mathematics |  | Time:2 Hours (120Mins.) |
| CourseCode:UK1DSCMAT107 |  | Total Marks: 56 |
| Course Title: **Relation, Functions and Number theory** |  |  |
| Type of Course: DSC |  |  |
| Semester:1 |  |  |
| Academic Level:100-199 |  |  |
| Total Credit:4,Theory:4 Credit, Practical: 0 Credit |  |  |

**Part A. 6 Marks**. Time: 5 Minutes

Objective Type. 1 Mark Each. Answer All Questions

(Cognitive Level: Remember/Understand)

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| **Qn.**  **No.** | **Question** | **Cognitive**  **Level** | **Course**  **Outcome(CO)** |
| 1. | **If a set S has n element then | P(S) | have \_\_\_ elements** | Remember | CO1 |
| 2. | Define an injective function. | Remember | CO2 |
| 3. | State Wilson ‘s theorem | Understand | CO1 |
| 4. | Give an example of a function such that is neither one –one nor onto | Understand | CO2 |
| 5. | **State** Fundamental theorem of Arithmetic | Remember | CO3 |
| 6. | **Give an example of a Lattice** | Remember | CO3 |

**Part B. 10 Marks**. Time: 20 Minutes

Two-Three sentences. 2 Marks Each. Answer All Questions

(Cognitive Level: Remember/Understand/Apply)

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| **Qn.**  **No.** | **Question** | **Cognitive**  **Level** | **Course**  **Outcome(CO)** |
| 7. | List the ordered pairs in the relation R from A = to  B = where iff | Remember | CO1 |
| 8. | If R and S be relations on a set A represented by the matrices  MR = and MS =  Find the matrices that represent RS and RS. | Remember | CO2 |
| 9. | If A = B = and the function and  are defined by f = and  g = find and | Remember | CO2 |
| 10. | If , with gcd(a, b) = 1, then prove that . | Understand | CO3 |
| 11. | **Let f: Z+** Z+ defined by f (x) = x2 + 2 , Prove that f is one – one. | Apply | CO4 |

**Part C. 16 Marks**. Time: 35 Minutes

Short Answer. 4 Marks Each. Answer all 4 questions, choosing among options within each question.

(Cognitive Level: Remember/Understand/Apply/Analyse)

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| Qn.  No. | Question | Cognitive  Level | Course  Outcome(CO) |
| 12 | A) If R is the relation on the set of positive integer such that  if and only if for some integer n , prove that R is an equivalence relations    **OR**  B) If R is the relation on A = Such that iff  . Find the rational matrix MR . find also the rational matrices of and | Understand | CO1 |
| 13 | 1. Let a and b be integers, not both zero. Prove that a and b are relatively prime if and only if there exist integers x and y such that .   **OR**   1. Prove that for all | Understand | CO2 |
| 14. | 1. are defined by and Show that and are inverse of each other.   **OR**   1. Derive Newton’s identity   = | Analyse | CO3 |
| 15. | 1. What is the remainder when the sum is divided by 12   **OR**   1. Use Fermat’s theorem to verify that 17 divides | Apply | CO4 |

**Part D. 24 Marks**. Time: 60 Minutes

Long Answer. 6 Marks Each. Answer all 4 questions, **choosing among options within each question**. (Cognitive Level: Understand/Apply/Analyse/Evaluate/Create)

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| **Qn.**  **No.** | **Question** | **Cognitive**  **Level** | **Course**  **Outcome(CO)** |
| 16 A    B | If R is the relation on the set of integers such that  iff for some positive integer m , Show that R is a partial ordering  **OR**  What is Hasse diagram ? Draw the Hasse diagram for  relation on the set | Understand | CO1 |
| 17. A  B | If and Are invertible functions then prove that g•f : is also invertible and =  **OR**  When x is a real number Show that + = | Understand | CO2 |
| 18.A  B | Prove by mathematical induction    **OR**  Solve the system  7x + 3y 10 (mod 16)  2x + 5y 19 (mod 16) | Analyse | CO3 |
| 19.A    B | Calculate  **OR**  a) State Fermat’s Little theorem  b) Find the unit digit of 3100 by the use of Fermat’s theorem | Apply | CO4 |

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| **Cognitive Level** | **Marks** | **Percentage** |  | **Course Outcomes** | **Marks** | **Percentage** |
| Remember | 10 | 17.85 |  | CO1 | 14 | 25 |
| Understand | 24 | 42.87 |  | CO2 | 16 | 28.57 |
| Apply | 12 | 21.43 |  | CO3 | 14 | 25 |
| Analyse | 10 | 17.85 |  | CO4 | 12 | 21.43 |
| Evaluate | 0 | 0 |  |  |  |  |
| Create | 0 | 0 |  |  |  |  |
| **TOTAL** | **56** | **100** |  | **TOTAL** | **56** | **100** |