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| **University of Kerala** | | |
| Discipline: **Mathematics** |  | Time: 1 Hour 30 Minutes (90 Mins.) |
| Course Code: UK1MDCMAT101 |  | Total Marks: 42 |
| Course Title: Mathematical Thinking |  |  |
| Type of Course: MDC |  |  |
| Semester: 1 |  |  |
| Academic Level: 100-199 |  |  |
| Total Credit: 3, Theory: 3 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. | State Division algorithm | Remember | CO2 |
| 2. | Define tautology | Remember | CO1 |
| 3. | Let Relate and such that ,  by finding and | Understand | CO2 |
| 4. | Let , find | Understand | CO1 |
| 5. | Define square free positive integer and illustrate with an example | Understand | CO3 |
| 6. | Explain postage stamp problem | Understand | CO3 |

**Part B. 8 Marks**. Time: 24 Minutes

Short Answer. 2 Marks Each. Answer All Questions

(Cognitive Level: Understand/Apply)

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| **Qn.**  **No.** | **Question** | **Cognitive**  **Level** | **Course**  **Outcome (CO)** |
| 7. | Rephrase the statement using and as appropriate “for every positive number there is a positive number such that ” | Understand | CO1 |
| 8. | If 19 and 11, find | Understand | CO3 |
| 9. | Apply Euclidean algorithm to find gcd(45, 75) | Apply | CO2 |
| 10. | Apply Euclidean algorithm to convert 6 to the base 10 | Apply | CO2 |

**Part C. 28 Marks**. Time: 60 Minutes

Long Answer. 7 Marks Each. Answer all 4 questions, choosing among options within each question.

(Cognitive Level: Apply/Analyse/Evaluate/ Create)

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| Qn.  No. | Question | Cognitive  Level | Course  Outcome (CO) |
| 11. | A. Apply Extended Euclidean Algorithm to find and such that gcd (4284,286) =4284 + 286  OR  B.  (a)Develop the proof that “if is composite, then is composite  (b) Find and such that | Apply | CO2 |
| 12. | A.  (a) Analyse the truth table to verify that, is a tautology  (b)List the converse, contrapositive and inverse of the implication, “if is closed and bounded then is compact”  OR  B.  (a) Let and define a relation on by if and only if . Examine the equivalence of the relation on  (b) Assume be subsets of a universal set .  Then prove (i) (ii) | Analyse | CO1 |
| 13. | A.  (a) Let be integers with non-zero and . If and , then prove that  (b) Let and be positive integers with  , are the prime factorization of and . Then prove that if and only if for all  OR  B.  (a) Let be a prime and let be integers such that . Then prove that for some .  (b) Let be a positive integer. Then prove that there is an integer and a square free integer such that | Evaluate | CO3 |
| 14. | A. Discuss that there are non-negative integers and with by assuming that and are positive with ,  OR  B. Discuss that there are no non-negative integers and with by assuming that and are positive and relatively prime integers | Create | CO4 |

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| **Cognitive Level** | **Marks** | **Percentage** |  | **Course Outcomes** | **Marks** | **Percentage** |
| Remember | 2 | 4.8 |  | CO1 | 11 | 26.19 |
| Understand | 8 | 19.0 |  | CO2 | 13 | 30.95 |
| Apply | 11 | 26.2 |  | CO3 | 11 | 26.19 |
| Analyse | 7 | 16.7 |  | CO4 | 7 | 16.67 |
| Evaluate | 7 | 16.7 |  |  |  |  |
| Create | 7 | 16.7 |  |  |  |  |
| **TOTAL** | **42** | **100** |  | **TOTAL** | **42** | **100** |