**University of Kerala**



**UoK -FYUGP**

**Pedagogical Approaches and Evaluation - 2024**

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| **University of Kerala** | | |
| Discipline: **Mathematics** |  | Time: 2 Hours (120 Mins.) |
| Course Code:**UK1DSCMAT100** |  | Total Marks: 56 |
| Course Title: Foundations of Mathematics |  |  |
| 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. | Define the term ‘complement of a set’. | Remember | CO3 |
| 2. | Define ‘equivalence relation’ on a nonempty set. | Remember | CO 1 |
| 3. | Evaluate the determinant. | Understand | CO 2 |
| 4. | Solve the following system of equations by Cramer’s rule | Understand | CO 2 |
| 5. | Find the greatest common divisor (12,18,28). | Understand | CO 3 |
| 6. | State Pigeon-hole principle. | Remember | CO 3 |

**Part B. 10 Marks. Time: 20 Minutes  
Two-Three sentences. 2 Marks Each. Answer All Questions**

**(Cognitive Level: Understand/Apply)**

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| **Qn. No.** | **Question** | **Cognitive Level** | **Course Outcome (CO)** |
| 7. | Let be the universal set and and , find (a)  (b) The difference | Understand | CO 1 |
| 8. | Prove that a determinant vanishes if two parallel lines are identical. | Understand | CO 1 |
| 9. | Express the matrix as the sum of a symmetric and skew-symmetric matrices. | Apply | CO 2 |
| 10. | Prove that if *p* is a prime and *p*|*ab*, then *p*|*a*or *p*|*b*. | Apply | CO 3 |
| 11. | Using g.c.d(252*,* 360*)*, compute l.c.m[252*,* 360]. | Apply | CO 3 |

**Part C. 16 Marks. Time: 35 Minutes  
Short Answer. 4 Marks Each. Answer all 4 questions, choosing among options within each question.**

**(Cognitive Level: Apply/Analyse)**

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| **Qn. No.** | **Question** | **Cognitive Level** | **Course Outcome (CO)** |
| 12. | **A.**  Given *A* = {1*,* 2*,* 3*,* 4} and *B* = {*x, y, z*}. Let *R* be the following relation from *A* to *B*:  *R* = {*(*1*, y), (*1*, z), (*3*, y), (*4*, x), (*4*, z)*}  (*a*) Determine the matrix of the relation.  (*b*) Find the inverse relation *R*−1 of *R*.  (*c*) Determine the domain and range of *R*.  **Or**  **B.**  Consider the functions and . Prove that if and are one to one, then the composition function is one to one. | Apply | CO 4  CO 4 |
| 13. | **A.**  If compute . Also find B such  that  **or**  **B.**  Prove without expanding that vanishes. | Apply | CO 2 |
| 14. | **A.**  Let *b* be an integer ≥ 2. Suppose *b*+1 integers are randomly selected. Prove that thedifference of two of them is divisible by *b*.  **or**  **B.**  Find the number of positive integers and divisible by 3,5 or 7. | Analyse | CO 3 |
| 15. | **A.**  Prove that there are infinitely many prime.  **Or**  **B.**  Let . Prove that (a)  (b) | Apply | CO 2 |

**Part D. 24 Marks. Time: 60 Minutes  
Long Answer. 6 Marks Each. Answer all 4 questions, choosing among options within each question. (Cognitive Level: Analyse/Evaluate/Create)**

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| **Qn. No.** | **Question** | **Cognitive Level** | **Course Outcome (CO)** |
| 16. | **A.** Consider the **Z** of integers and an integer *m* > 1.be a relation on defined by if *x* − *y* is divisible by *m*. Show that defines an equivalence relation on **Z**.  **Or**  **B.** Prove the theorem ‘A function is invertible if and only if is one- to- one and on to. Give an example of one-to-one and onto function. | Analyse | CO 3  CO 4 |
| 17. | **A.** Test for consistency and solve  **Or**  **B.** Prove that where . | Evaluate | CO 2  CO 2 |
| 18. | **A.** Describe Euclidean algorithm. Also express (4076, 1024) as a linear combination of 4076and 1024.  **Or**  **B.** Let and be positive integers. Prove that , where  . Using  (252, 360), compute [252, 360]. | Apply | CO 3 |
| 19. | **A.**  **a)** Determine whether has solutions? Justify.  b) Solve the congruence 12*x* ≡ 48 *(*mod 18*)*.  **Or**  **B.** Find the positive integers for which is a square. | Apply | CO 3 |

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| **Cognitive Level** | **Marks** | **Percentage** |  | **Course Outcomes** | **Marks** | **Percentage** |
| Remember | 10 | 17.85 |  | CO1 | 9 | 17 |
| Understand | 24 | 42.87 |  | CO2 | 20 | 35 |
| Apply | 12 | 21.43 |  | CO3 | 20 | 35 |
| Analyse | 10 | 17.85 |  | CO4 | 7 | 13 |
| Evaluate | 0 | 0 |  |  |  |  |
| Create | 0 | 0 |  |  |  |  |
| **TOTAL** | **56** | **100** |  | **TOTAL** | **56** | **100** |