

Reg. No.:



Name:

University of Kerala

W7035

Third Semester FYUGP Degree Examination, November 2025

Discipline Specific Core Course

MATHEMATICS

UK3DSCMAT202-Group Theory and Probability

Academic Level: 200-299

2024 Admission

Time: 1 Hour 30 Minutes(90 Mins.)

Max. Marks: 42

Part A 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark Each.Answer all questions

Qn.No.	Question	CL	CO
1	If a coin is tossed 3 times, what is the probability that all three are heads?	RE	4
2	Give an example of a cyclic group containing 5 elements.	RE	2
3	Is Klein 4 Group is Abelian?	UN	3
4	In a group there are two identity elements. True or false?	UN	2
5	Define mutually exclusive event	UN	2
6	If $P(A) = 0.4$ and $P(B) = 0.3$ and A, B are independent, find $P(A \cap B)$	UN	4

Part B 8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn.No.	Question	CL	CO
7	If you select a three-digit number at random, 1) What is the probability that the units digit is 7? 2) What is the probability that the hundreds digit is 7?	UN	4
8	Determine whether the binary operation $*$ defined on Z by $a * b = a - b$ is commutative? Justify.	UN	1
9	Ten coins are thrown simultaneously. Find the probability of getting at least 7 heads.	AP	4
10	Show that the subset S of all $n \times n$ matrices with determinant 1 or -1 forms a subgroup of the group consisting of all invertible $n \times n$ matrices	AP	2

Qn.No.	Question	CL	CO
	under matrix multiplication.		

Part C 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer.7 marks each.Answer all 4 Questions choosing among options * within each question

Qn.No.	Question	CL	CO
11	A) (i) In a group show that the identity element and inverse of each element are unique. (ii) Show that every group G with identity element e and such that $x * x = e$ for all $x \in G$ is abelian OR B) 1) Find all subgroups of Z_{28} and draw its subgroup diagram. 2) Show that every cyclic group is abelian.	AP	2
12	A) If X follows binomial distribution with mean 6 and variance $2/3$, then i) find the parameters ii) find $P(X = 2)$. iii) find $P(0 < X < 3)$ OR B) Two dice are thrown. (i) What is the probability that the sum of the numbers on the dice will be 5? (ii) What is the probability that the sum on the dice is divisible by 5?	AN	4
13	A) (i) Find the quotient q and remainder r when -38 is divided by 7. (ii) Prove that $3Z$ is a subgroup of Z under addition.	EV	2

Qn.No.	Question	CL	CO
	OR B) X is a normal variable with mean 30 and standard deviation 5. Find the probabilities that: 1. $26 \leq X \leq 40$ 2. $X \geq 45$ 3. $X - 30 > 5$		
14	A) Eight fair coins are tossed 256 times. In how many tosses do you expect at least one head. OR B) A basket contains 20 bad oranges and 80 good oranges. Three are drawn at random from this basket. Find the probability that out of 3: i) Exactly 2 are good ii) At least 1 is good iii) At most 2 are good	CR	3