

Reg. No.: .....



W7043

Name: .....

**University of Kerala**

Third Semester FYUGP Degree Examination, November 2025

Discipline Specific Core Course

**MATHEMATICS**

**UK3DSCMAT211-Discrete Mathematics**

Academic Level: 200-299

2024 Admission

**Time: 2 Hours (120 Mins.)**

**Max. Marks: 56**

**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	Define Boolean Algebra.	RE	3
2	Define proposition with example	RE	1
3	what is the converse of $p \rightarrow q$	UN	1
4	When do you say that two compound propositions are equivalent?	UN	1
5	Define Disjunctive normal form	UN	2
6	A set of premises is said to be inconsistent if their conjunction implies a _____	UN	3

**Part B 10 Marks.Time:20 Minutes (Cognitive Level:Understand(UN)/Apply(AP))Two-three sentences.2 marks each.Answer all questions**

Qn.No.	Question	CL	CO
7	Write the dual of the following propositions 1. $p \rightarrow (q \wedge r)$ 2. $(p \wedge (p \leftrightarrow q)) \rightarrow q$	UN	1
8	Explain tautology with example.	UN	1
9	Express the negation of the following statement using quantifiers and translate into English sentence "If the teacher is absent, then some student don't keep quiet"	AP	4
10	Obtain the DNF of $((p \rightarrow q) \wedge \neg q)$	AP	2
11	Define a set and give two simple examples.	AP	3

Qn.No.	Question	CL	CO
--------	----------	----	----

Part C 16 Marks.Time:35 Minutes.(Cognitive Level :Apply(AP)/Analyse(AN))Short Answer:4 marks each, Answer all 4 questions,choosing among options \* within each question

Qn.No.	Question	CL	CO
12	<p>A)</p> <p>Identify the truth value of the statement 'If <math>5 &lt; 3</math>, then <math>2 + 2 = 4</math>.'</p> <p>OR</p> <p>B)</p> <p>a) What is the truth value <math>P(0)</math> and <math>P(6)</math> where <math>P(x)</math> is "x is less than or equal to 4"</p> <p>b)Translate the statements using quantifiers</p> <ol style="list-style-type: none"> <li>1. All humming birds are richly colored</li> <li>2. There is a bird which is not richly colored.</li> </ol>	AP	2
13	<p>A)</p> <p>(A) (i) Prove that the identity element in a group is unique.</p> <p>(ii)Prove that <math>(ab)^{-1} = b^{-1}a^{-1}</math> ,for all a b are elements of the group G.</p> <p>OR</p> <p>B)</p> <p>Use truth tables to verify the commutative laws</p> <p>a) <math>p \vee q \equiv q \vee p</math></p> <p>b) <math>p \wedge q \equiv q \wedge p</math></p>	AP	3
14	<p>A)</p> <p>a) Express the statement “<b>Every student in this class has studied calculus</b>” using predicates and quantifiers.</p> <p>b) Express the statement “<b>For every person x, if person x is a student in this class then x has studied calculus.</b>”using predicates and quantifiers.</p> <p>OR</p> <p>B)</p>	AN	4

Qn.No.	Question	CL	CO
	Explain the terms Truth value, Tautology, Contradiction, and Contingency		
15	<p>A)</p> <p>Draw the group table for <math>Z_5</math> under <math>+_5</math></p> <p>OR</p> <p>B)</p> <p>Find CNF of <math>\neg(p \vee q) \leftrightarrow (p \wedge q)</math></p>	AN	3

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

Qn.No.	Question	CL	CO
16	<p>A)</p> <p>Compare minterms and maxterms of three variables</p> <p>OR</p> <p>B)</p> <p>Explain the Communication model?</p>	AN	1
17	<p>A)</p> <p>Let <math>(G, *)</math> be a Group,. For <math>a, b, c \in G</math></p> <p>1) <math>a*b=a*c</math> implies <math>b=c</math> (left cancellation Law)</p> <p>2) <math>b*c=c*a</math> implies <math>b=c</math> (right cancellation Law)</p> <p>OR</p> <p>B)</p> <p>Evaluate that <math>(p \rightarrow q) \wedge (q \rightarrow r) \rightarrow (p \rightarrow r)</math> is a tautology.</p>	EV	3
18	<p>A)</p> <p>State and Prove De-Morgans Law.</p> <p>OR</p> <p>B)</p>	EV	2

Qn.No.	Question	CL	CO
	<p>Consider the following and express the negations of the following statements using quantifiers and in English:</p> <p>(a) If the teacher is absent, then some students do not keep quiet.</p> <p>(b) All the students keep quiet and the teacher is present.</p> <p>(c) Some of the students do not keep quiet or the teacher is absent.</p> <p>(d) No one has done every problem in the exercise.</p>		
19	<p>A)</p> <p>If <math>*</math> is defined on <math>Z</math> such that <math>a*b=a+b-ab</math> for <math>a,b</math> in <math>Z</math>. Show that <math>(Z,*)</math> is an abelian group</p> <p>OR</p> <p>B)</p> <p>Give a direct proof for the implication <math>p \rightarrow (q \rightarrow s), (\neg r \vee p), q \Rightarrow (r \rightarrow s)</math>.</p>	CR	3