1	**Name of Course/ Module** : DISCRETE MATHEMATICS						
2	**Course Code** : DBM2033						
3	**Name (s) of academic staff** :						
4	**Rationale for the inclusion of the course/ module in the programme :** In math, students can exercise higher order conceptualization to focus on "decision making, reflection, reasoning, and problem solving", Mathematical foundations of computing studies: Logic, sets, relations, graphs and algebraic structures. Mathematics is one of the Body of Knowledge (BOK) area on ACM Curriculum Guidelines for Information Technology field.						
5	**Semester and Year offered:** Semester 2 / Year 1						
6	**Student Learning Time (SLT)**	**Dependent Learning (DL)**				**Independent Learning (IDL)**	**Total**
	L = Lecture P = Practical T = Tutorial O = Others	**L**	**P**	**T**	**O**	64	120
		28	0	28	0		
7	**Credit value** : 3						
8	**Prerequisites (if any)** : None						
9	**Learning Outcomes :** Upon completion of the course, students should be able to: CLO 1 : explain the basic terminology of basic logic, proofs, counting principles, functions, relations and sets. (C2, PLO1) CLO 2 : perform the standard operations associated with proposition logic, graphs and trees. (C3, PLO1) CLO 3 : solve related mathematical problems using appropriate concepts, formulas and techniques. (C4, A3, PLO1, PLO4)						
10	**Transferable Skills:** Skills and how they are developed and assessed, project and practical experience and Internship a. Knowledge b. Critical Thinking and Problem Solving Skills Skills are assessed through : Knowledge are assessed through theoretical methods (Quiz, Test and Final Examination). Generic Student Attribute (GSA) is assessed through Tutorial Task.						
11	**Teaching-Learning and assessment strategy** a. Teaching-Learning Strategy Implemented in Problem Based Learning (PBL), guided by lecturers through Face-to-Face and Blended Learning approach. b. Assessment Strategy The course assessment is carried out through Coursework Assessment (CA) and Final Assessment (FA).						
12	**Synopsis** DISCRETE MATHEMATICS course introduces students to logical and mathematical thinking. This course focuses on providing basic logic, sets, relations and functions, as well as graphs and trees which integrate symbolic tools, graphical concepts and numerical calculations. This course also addresses the counting principle as well as induction and recursion which are related to the information technology programme.						
13	**Mode of Delivery** Interactive Lecture, Discussion and Question & Answer session.						

14 Assessment Methods and Types

The course assessment is carried out in two sections:

a. Coursework (CA)- 60%

Coursework is continuous assessment that measures knowledge, technical skills and soft skills.

i.	Quiz	(4) -	15%
ii.	Tutorial Task	(4) -	20%
iii.	Assignment	(1) -	25%

b. Final Assessment (FA) – 40 %

Final Test	(1) -	40%

15 Mapping of the course/ module to the Programme Aims

Course Learning Outcome/ Programme Educational Objectives (PEO)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
i. Explain the basic terminology of basic logic, proofs, counting principles, functions, relations and sets. (C2, PLO1)	√				
ii. Perform the standard operations associated with proposition logic, graphs and trees. (C3, PLO1)	√				
iii. Solve related mathematical problems using appropriate concepts, formulas and techniques. (C4, A3, PLO1, PLO4)	√	√			

Programme Educational Objectives (PEO)

PEO 1 : Possess relevant knowledge, skills and aptitude to meet job specifications, organisational and system needs;

PEO 2 : Can utilise current computing tools and techniques by applying knowledge and interpreting information to solve problems, can execute and be responsible for routine tasks;

PEO 3 : Have effective communication skills to convey information, problems and solutions;

PEO 4 : Have teamwork and interpersonal skills, entrepreneurial awareness and are aware of their social and ethical responsibilities; and

PEO 5 : Possess skills for life-long learning and career development.

16 Mapping of the course/ module to the Programme Learning Outcomes

Course Learning Outcome (CLO)/ Programme Learning Outcomes (PLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9
i. Explain the basic terminology of basic logic, proofs, counting principles, functions, relations and sets. (C2, PLO1)	√								
ii. Perform the standard operations associated with proposition logic, graphs and trees. (C3, PLO1)	√								
iii. Solve related mathematical problems using appropriate concepts, formulas and techniques. (C4, A3, PLO1, PLO4)	√			√					

Programme Learning Outcomes (PLO)

PLO 1 : Apply the foundation of computing, mathematics and soft skills to be competent and possess strong understanding in related Information Technology (IT) fields;
PLO 2 : Practice technical skills by applying appropriate methodologies, models and techniques in IT fields;
PLO 3 : Communicate effectively with IT Professionals, other professionals and community;
PLO 4 : Demonstrate strong analytical and critical thinking skills to troubleshoot and solve problems within realistic constraints by applying knowledge, principles and skills in IT;
PLO 5 : Demonstrate an awareness of and consideration for society, health, safety, legal and cultural issues and their consequent responsibilities;
PLO 6 : Acquire life-long learning and professional development to enrich knowledge and competencies;
PLO 7 : Inculcate entrepreneurial skills in the related discipline that contributes towards national growth and be competitive in IT industries;
PLO 8 : Adhere to professional codes of ethics and enhance humanistic values to adapt to the real challenges in working environment; and
PLO 9 : Demonstrate effective leadership and teamwork skills.

17 Content outline of the course/ module and the SLT per topic

Course Outline (Suggested Sequence of Topics)	Recommended Time Allocation					
	L	P	T	O	IDL	Total
1.0 BASIC LOGIC AND PROOFS a. Propositional Logic. b. Compound proposition. c. Truth table. d. Bitwise operations. e. Formulae in proposition logic f. Applications of propositional logic. g. Predicate Logic. h. Proofs. i. Logical equivalence rules. j. Inference to validate arguments k. Rules of inference.	5	0	5	0	8.75	18.75

	2.0 SETS, RELATIONS AND FUNCTIONS a. Sets and set operations b. Discrete structures built with the help of sets. c. Set notation and operation on sets. d. Venn diagram to represent set operations. e. D'Morgan's Law. f. Relations. g. Functions. h. Graphs of the Floor and Ceiling functions i. Standard operations associated with sets, functions, and relations.	6.25	0	5	0	11.75	23.00
	3.0 GRAPHS AND TREES a. Concept of graphs. b. Properties of graph. c. Graph representations. d. Types of graphs. e. Paths, cycles and planarity in graphs. f. Isomorphic graphs. g. Euler paths and Euler circuits in graphs. h. Hamilton paths and Hamilton circuits in graphs. i. Travelling Salesman Problem (TSP) j. Concept of trees. k. Spanning trees. l. Binary search tree. m. Tree traversals.	5.25	0	7	0	16.75	29.00
	4.0 INDUCTION AND RECURSION a. Mathematical induction. b. Induction proofs steps: Basis and Inductive Step c. Recursion	6.25	0	7	0	11.75	25.00
	5.0 BASIC COUNTING RULES a. Counting principle. b. Decomposition rules/ counting principle c. Complex counting problems typically require a combination of the sum and product rules. d. Permutations and combinations	5.25	0	4	0	15.00	24.25
	TOTAL	**28**	**0**	**28**	**0**	**64.00**	**120.00**

18

- **Main references supporting the course**

Kenneth H. Rosen, (2018). *Discrete Mathematics and Its Applications,* 8th Edition. USA: McGraw-Hill Education (ISBN: 9781260091991)

- **Additional references supporting the course**

Ferland, Kevin, (2017), *Discrete Mathematics and Applications (2nd)*, Chapman & Hall (GB). (ISBN:9781498730655)

19 **Other additional information :**

None