SCHEME OFCOURSEWORK

CourseDetails:

CourseTitle	DiscreteMathematicalStructures		
CourseCode	15BM1106	L T P C	3 0 0 3
Program:	B.Tech.		
Specialization:	InformationTechnology		
Semester	III Semester		
Prerequisites	• Fundamentals of Set theory • ElementaryalgebraandCalculus		
Coursestowhichitis a prerequisite	TheoryofComputation,DesignandanalysisofAlgorithms,CompilerDesign,Principlesof ProgrammingLanguages,DataStructures.		

CourseOutcomes(COs):Attheend oftheCourse,Studentwillbeableto:

1. Rewritemathematical argumentsusinglogical connectives and quantifiers andverifythevalidityoflogicalflow of argumentsusing propositional,predicatelogic andtruthtables.
2. Identify and giveexamplesof various typesof relations and describevariousproperties oftherelations.Classifycertainbasicalgebraicstructures and discusstheirproperties.
3. demonstrate theabilityto solveproblemsusingCombinatorics
4. Determineisomorphismof graphs andspanningtreeof agivengraph usingDFS / BFS.Alsodetermineminimalspanningtreeofa givengraph.
5. Explainfundamentalconceptsoffuzzysetsandapplythemtoan expertsystem.

PROGRAMOUTCOMES:

AgraduateofInformationTechnologyEngineeringwillbeableto

PO1:Applytheknowledgeofmathematics,science,engineeringfundamentalsandprinciplesofInformationTec hnologytosolveproblemsindifferentdomains.

PO2:Analyzeaproblem,identifyandformulatethecomputingrequirementsappropriatetoitssolution.

PO3:Designanddevelopsoftwarecomponents,patterns,processes,Frameworksandapplicationsthatmeetspe cificationswithintherealisticconstraintsincludingsocietal,legalandeconomictoservetheneedsofthesoci ety

PO4:Designandconductexperiments,aswellasanalyzeandinterpretdata PO5:Useappropriatetechniquesandtoolstosolveengineeringproblems.

PO6:UnderstandtheimpactofInformationtechnologyonenvironmentandtheevolutionandimportanceofgree ncomputing.

PO7:Analyzethelocalandglobalimpactofcomputingonindividualaswellasonsocietyandincorporatetheresultsi ntoengineeringpractice.

PO8:Demonstrateprofessionalethicalpracticesandsocialresponsibilitiesinglobalandsocietalcontexts.

PO9:Functioneffectivelyasanindividual,andasamemberorleaderindiverseandmultidisciplinaryteams.

PO10:Communicateeffectivelywiththeengineeringcommunityandwithsocietyatlarge.

PO11:Understandengineeringandmanagementprinciplesandapplythesetoone’sownwork,asa memberandleaderinateam,tomanageprojects.

PO12:Recognizetheneedforupdatingtheknowledgeinthechosenfieldandimbibinglearningtolearnskills.

Course OutcomeversusProgramOutcomes:

S -Stronglycorrelated,M-Moderatelycorrelated,Blank-No correlation

Assessment Methods:	Assignment/Quiz /Seminar /CaseStudy/ Mid-Test/End Exam

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	2	3	3	2										
CO-2	3	2		3	3										
CO-3	3	2	3	2	3										
CO-4	3	3	2	3	3										
CO-5	3	3	2	3	3										

Teaching-LearningandEvaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNINGSTRATEGY	Assessment Method&Schedule
1	Statements and notations,connectives,Wellformedformulastautologies, TautologicalImplications,equivalenceofformulas,Dualitylawotherconnectives	CO-I	Showthefollowingimplicationwithoconstructingtruthtable □□P□□□P□□□□Q□□□□□□P□□□P□□□□R□□□Q□□R	Lecture/ Problem solving	Assignment(Week2-4) / Mid-Test1 (Week9)
2	Normalforms, Rules of inferenceConsistencyof premisesandIndirectmethod of proof.	CO-I	Obtaintheprincipalconjunctivenorform mandprincipaldisjunctivenormal formof □□P□□R□□□□Q□□P□□	Lecture/Problemsolving	Assignment(Week2-4) / Mid-Test1 (Week9)
3	Rules of inference, ConsistencyofpremisesandIndirect method ofproof.Predicates, the statementfunction,variablesandquantifiers	CO-I	ShowthatR□□Scanbederived frthepremises P□□(Q□□S),□R□□P Q and	Lecture/ Problem solving	Assignment(Week2-4) / Mid-Test1 (Week9)
4	predicateformula,freeand boundvariables, universeof discourse,inference theoryof thepredicatecalculus	CO-I	Showthat □□□x□□□p□□x□□□q□□x□□□ □□□□x□□p□□x□□□□□□x□□q□□x□□	Lecture/ Problem solving	Assignment(Week2-4) / Mid-Test1 (Week9)
5	Relations,properties of binaryrelations in a set,RelationmatrixandGraph ofa relation	CO-II	IfRandSareequivalencerelationson thesetA,prove that(R□□S)isanequivalencerelation .	Lecture/ Problem solving	Mid-Test1 (Week9)/ Quiz

6	Partitionandcoveringofa set,equivalence relations, Compatiblerelation, Composition of binaryrelations.	CO-II	If R is aRelation in thesetofintegerdefinedby$R = \{(x,y)/$ x andyintegersand$(x - y)$isdivisibleby thenprove that$R$ is an equivalerelation.	Lecture/ Problem solving	MidTest1(Week9)/Quiz
7	Partialordering, partiallyordered setHassediagrams	CO-II	Let$A = \{a,b,c\}$, $p(A)$ isthe power setof A. Let$\leq$ be theinclusionrelationontheelements of$p(A)$.DrawHassediagramof $(p(A),\leq)$.	Lecture/ Problem solving	Mid-Test1 (Week9) /Quiz
8	Definitionsandexamples of somesimple algebraic systems, DefinitionandExamples of semigroupandmonoid, generalproperties.Groups:Definition	CO-II	Provethatthesetofidempotentelement sofMforanyabelian monoid$(M, \cdot)$ formsasubmonoid.	Lecture/ Problem solving	Mid-Test2 (Week10)/ Quiz
9	MidExam-I				

10	Basics ofcounting, Combinationsandpermutations,Enu meratingCombinationsandpermutatio ns withrepetitions,	CO-III	Findthenumberof4digitnumbersfor medbythedigits1,2,3,4,5,6, 7and8whicharemorethan5000,ifeach digitisnotusedmorethanonceinanum ber.	Lecture/ Problem solving	Mid-Test2 (Week18)/ Assignment (12-14)
11	Multinomial theorems,GeneratingFunctions of sequences,Calculatingcoefficients	CO-III	FindthegeneratingfunctionoftheFibo naccisequence.	Lecture/ Problem solving	Mid-Test2 (Week18)/ Assignment (12-14)
12	ofRecurrencerelations, generatingfunctions, SolvingRecurrencerelationsbysubstit ution,generatingfunctions andthe methodof characteristic roots	CO-III	Solvetherecurrence $U_n-8U_{n-1}+21U_{n-2}-18U_{n-3}=0$ forn≥ 3,$U_0=2$;$U_1=8$,$U_2=31$	Lecture/ Problem solving	Mid-Test2 (Week18)/ Assignment (12-14)

13	Basicconcepts:Graph,DirectedGraph, Multi Graph, Degreeofvertexand theirproperties,	CO-IV	Ineverygraph,showthatthesumofdegreesofalltheverticesistwicethenumberofedges.	Lecture/ Problem solving	Mid-Test2 (Week18)/ Assignment (12-14)
14	AdjacencyMatrix, CycleGraph,Bipartitegraphs,IsomorphismandSubgraphs,	CO-IV	Determinewhetherthefollowinggraphsareisomorphic	Lecture/ Problem solving	MidTest2(Week18)/Quiz
15	Treesand their properties, Spanningtrees:DFS,BFS, Kruskal'sAlgorithm for findingminimalSpanningtree.	CO-IV	Findtheminimalspanningtreeofthe weightedgraph	Lecture/ Problem solving	MidTest2(Week18)/Quiz
16	Introduction to FuzzySets, FuzzyRelations,Applications of Fuzzysettheory	CO-V	Given$U_l=U_2=1+2+3$,- $A_l=.5/1 + 1./2 + .6/3$and $A_2 =1./1+ .6/2$,Find$A_1 \square\square A_2$		MidTest2(Week18)/Quiz
17	Possibilitytheory, Possibility–Probabilityrelationship	CO-V	Show that thefuzzysetAdefined over $\mathbb{R}$ withmembershipfunction A $\square\square$ $\square\square$ $\square$ $\square$ a is convex	a$\square$ $\square$ $\square$,	Mid-Test2 (Week18)
18	MidExam-II				
19/20	END EXAM				