Subject Code: R232131

R23

KALLAM HARANADHAREDDY INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

II B. Tech I Semester (R23)

DISCRETE MATHEMATICS & GRAPH THEORY

Common to CSE, IT, CSE(AI&ML), CSE(DS)&CSE(AI&DS)

Q. No.		Questions	CO	BTL
		Unit-I		
1	i	What is a Well Formed Formula? What are rules of the Well Formed Formulas? Explain	1	3
	ii	Prove or disprove the validity of the following arguments using the rules of inference. All men are fallible. All kings are men. Therefore, all kings are fallible.	1	2
2.	i	Verify the principle of duality for the following logical equivalence: $(P \vee Q) \wedge (\neg P \wedge (\neg P \wedge Q)) \Leftrightarrow (\neg P \wedge Q)$	1	2
	ii	Show that the following premises are inconsistent. "If Jack misses many class through illness, then he fails high school. If Jack fails high school, then he is uneducated. If Jack reads lot of books, then he is not uneducated. Jack misses many classes through illness and read a lot of books."	1	1
3.	i	Write down the following proposition in symbolic form and find its negation: " All integers are rational numbers and some rational numbers are not integers".	1	3
	ii	What is principle conjunctive normal form? Find the PCNF of $(\neg P \rightarrow R) \wedge (Q \rightarrow R)$	1	3
4.	i	Prove that $[(p \vee q) \rightarrow r] \wedge (\neg p) \rightarrow (q \rightarrow r)$ is a tautology.	1	3
	ii	If A works hard, then either B or C will enjoy themselves. If B enjoys himself, then A will not work hard. If D enjoy himself, then C will not. Therefore, if A Works hard, D will not enjoy himself. Show that these statements constitute a valid argument.	1	2
5.	i	What is principal disjunctive normal form? Find the PDNF of $(P \wedge Q) \vee (\neg P \wedge R) \vee (Q \wedge R)$	1	1
	ii	Prove that the following argument is valid: No Mathematicians are fools. No one who is not a fool is an administrator. Sita is a mathematician. Therefore, Sita is not an administrator.	1	3
		Unit-II		
1.	i	State and prove De Morgans laws for any two sets A and B.	2	2
	ii	Let X={1,2,3,4,5,6,7} and R={ $(x, y) / x - y$ is divisible by3}.Show that R is an equivalence relation. Draw the graph of R.	2	1
2.	i	Among a group of students, 49 study Physics, 37 study English and 21 studies Biology. If 9 of these student's study Physics and English, 5 study English and Biology, 4 study Physics and Biology and 3 study Physics, English and Biology, find the number of students in the group.	2	2

	ii	Show that the relation R=$\{(a,b)/a-b$ is divisible by $n\}$is an equivalence relation on the set of integers where n is a positive integer greater than 1.	2	3
3.	i	Define Transitive Closure of relation R on X ? Let the relation R be R= {(1,2),(2,3),(3,3)} on the set A={1,2,3}.What is the transitive closure of R?	2	1
	ii	Draw the Hasse diagram for the poset $(P(S),\subseteq)$,where S={ 1,2,3,4 }.	2	
4.	i	If A is a set with ‘m’ elements and B is a set with ‘n’ elements then find the number of relations from A to B.	2	1
	ii	Define Lattice and write its properties.		
5.	i	If a finite set A has ‘n’ elements, then prove that the power set of A has 2^n elements.	2	2
	ii	Define Relation? List out the Properties of Binary operations.	2	2

Course Advisor BoS Chairman

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Short Questions

Q. No.	Questions	CO	BTL	Total Marks
Unit-I				
1	What is the negation of the below statement "If the processor is fast, then the printer is slow".	1	1	2M
2	Construct truth table for the statement: $p \to (\neg q \wedge r)$	1	1	2M
3	Define tautology? Explain with an example?	1	1	2M
4	Verify the proposition $(p \wedge q) \wedge (\neg(p \vee q))$ is a contradiction.	1	1	2M
5	Explain the Law of duality.	1	1	2M
6	Write the inverse for the statement "If a triangle is not isosceles, then it is not equilateral".	1	1	2M
7	Explain contra positive with example.	1	1	2M
8	Symbolize the expressions i) All men are giants ii) Some men are clever	1	1	2M
9	Explain Free and Bound variables.	1	1	2M
10	Show that (∃x) (P (x) Λ Q (x)) ⇒ (∃x) P (x) Λ (∃x) Q (x)			
Unit-II				
11	If A,B and C are any three sets then prove that $A-(B \cup C)=(A-B)\cap(A-C)$	2	1	2M
12	State Principle of inclusion and exclusion for three sets.	2	2	2M
13	If A= {1,2,3}, B= {4,5}. Find A X B and B X A?	2	1	2M
14	If A={1,2}, how many relations are there from A to A?	2	1	2M
15	Define Equivalence relation?	2	1	2M
16	Show that $R \cap S$ is symmetric if R and S are symmetric on a set A.	2	1	2M
17	Define Partial order relation.	2	1	2M
18	A function $f: Z \times Z \to Z$ is defined as $f(x,y)=4x+3y$. Prove that f is onto, but not one-to-one.	2	1	2M
19	Explain permutation functions.	2	1	2M
20	Find fog and gof ,where f(x)= x^2 +1 and g(x)= x+2,are functions from **R** to **R.**	2		