Velegapudi Ramakrishna Siddhartha Engineering College::Vijayawada **VR20**

(Autonomous)

II /IV B Tech Degree Examinations

Third Semester

Department of Mathematics

20ES3102 DISCRETE MATHEMATICAL STRUCTURES

Time:3Hrs	**MODEL QUESTION PAPER**	Max Marks:70

Part – A is Compulsory

Answer one (01) question from each unit of Part – B

Answers to any single question or its part shall be written at one place only

Cognitive Levels(K): K1-Remember;K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create

Q. No		Question	Marks	Course Outcome	Cog. Level
Part - A			**10X1=10M**		
1	a	Define propositional function.	1	CO1	K1
	b	Define Universe of Discourse.	1	CO1	K1
	c	Define quantifiers.	1	CO1	K1
	d	How many ways the sum can be obtained of 8 when two indistinguishable dice are rolled	1	CO2	K1
	e	Is the “divides” relation on the set of positive integers reflexive?	1	CO2	K1
	f	Define partially ordered set.	1	CO3	K1
	g	Define a group and give an example.	1	CO3	K1
	h	Define group homomorphism.	1	CO3	K5
	I	Define Planar graph.	1	CO4	K1
	j	What is a Graph coloring?	1	CO4	K2
Part - B			**4X15 =60M**		
		UNIT - I			
2	a	Obtain the truth table for the following proposition: $((p\to\sim q)\to r))\to(r\to(q\vee r))$.	7M	CO1	K3
	b	Test the validity of the following argument. All the integers are rational numbers. Some integers are power of 2. Therefore, some rational numbers are powers of 2.	8M	CO1	K5
		(OR)			
3	a	If P is an odd prime, then show that P has the form 6n+1 or 6n+5 or P=3	7M	CO1	K3
	b	Find the number of solutions of $e_1+e_2+e_3=17$ where $0<e_i$ for each i, with $2\leq e_1\leq 5$, $3\leq e_2\leq 6$, $4\leq e_3\leq 7$	8M	CO1	K3
		UNIT - II			
4	a	Let m be a positive integer with m> 1. Show that the relation R= { (a,b) / a ≡b (mod m) } is an equivalence relation on the set of integers.	7M	CO2	K5
	b	Solve the recurrence relation $a_n - 5a_{n-1}+6a_{n-2}=4^n$ for $n\geq 2$.	8M	CO2	K5
		(OR)			
5	a	Find the solution to the recurrence relation $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ for $n\geq 3$.	7M	CO2	K3

	b	Draw the Hasse diagram for the partial ordering $\{(A, B) / A \subseteq B\}$ on the power set P(S), where S = { a,b,c} .	8M	CO2	K5
UNIT - III					
6	a	Let (G,*) be a group. Then the following hold good: (1) $(x*y)^{-1} = y^{-1} * x^{-1}$ for all x, y in G. (2) $x * y = x * z \rightarrow y = z$ (Left cancellation law) (3) $y * x = z * x \rightarrow y = z$ (Right cancellation law) (4) For any two elements a, b of G, the linear equation a * x =b and x * a =b have unique solutions in G (5) e is only idempotent element in G.	7M	CO3	K3
	b	Let f: G ⟶ G' be a group homomorphism from (G,*) to (G', o). Let e and e' be the identity elements of G and G' then (i) f(a) = e' (ii) $f(a^{-1}) = (f(a))^{-1}$ for all a in G. (iii) $f(a*b^{-1}) = f(a)\ o\ (f(b))^{-1}$ for all a, b in G . (iv) f(H) is a subgroup of G whenever H is a subgroup of G..	8M	CO3	K3
(OR)					
7	a	Show that any subgroup of a cyclic group (G,*) is cyclic .	7M	CO3	K3
	b	A finite group (G,*) of order n is isomorphic to a group of permutations of G .	8M	CO3	K3
UNIT - IV					
8	a	If G is a connected graph then show that $\|V\| - \|E\| + \|R\| = 2$ Where $\|V\|$ denotes the number of vertices of G, $\|E\|$ denotes the number of edges of G $\|R\|$ denotes the number of regions of G.	7M	CO4	K3
	b	Use Grinberg's theorem to show that there are no planar Hamiltonian graphs with regions of degree 5,8,9 and 11 with exactly one region with degree 9.	8M	CO4	K5
(OR)					
9	a	Prove that, a complete graph K_n is planner if and only if $n \leq 4$.	7M	CO4	K3
	b	Show that the digraphs D_1 and D_2 given in figure are isomorphism 	8M	CO4	K3

Designation	Name in Capitals	Signature with Date
Course Coordinator	Dr. E.S.R.RAVI KUMAR	
Module Coordinator		
Program Coordinator		
Head of the Department	Dr. Ch. BABY RANI	