Hall Ticket Number:

Code No. : 12035 (B)

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (C.S.E. : CBCS) II-Semester Main Examinations, January-2021

Discrete Structures

Time: 2 hours Max. Marks: **60**

*Note: Answer any NINE questions from **Part-A** and any **THREE** from **Part-B***

Part-A (9 × 2 = 18 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Translate "You cannot ride the roller coaster if you are under 4 feet tall unless you are older than 16 years old" into a logical expression.	2	1	1	1,12
2.	R: Naveen is rich H: Naveen is happy are two statements. Convert the following statements in symbolic form "Naveen is neither rich nor happy".	2	1	1	1,12
3.	Find the gcd(1529, 14039).	2	1	2	1,12
4.	State the fundamental theorem of arithmetic.	2	1	2	1,12
5.	Define partial order relation.	2	1	3	1,12
6.	How many arrangements are there with the letters of the word MISSISSIPPI.	2	2	3	1,12
7.	Write the characteristic equation of $a_n = a_{n-1} + 6a_{n-2}$.	2	3	4	1,12
8.	Write the general form of the homogeneous linear recurrence relation.	2	1	4	1,12
9.	Define subgroup of a group.	2	1	5	1,12
10.	Find the identity element of the Ring $(Z, \oplus, \odot)$ where $x \oplus y = x + y - 7$ and $x \odot y = x + y - 3xy$ for all $x, y \in Z$.	2	3	5	1,12
11.	Write the negation of the statement Real number x, if $x > 3$ then $x^2 > 9$	2	2	1	1,12
12.	If a|b then prove that a|bc for all a,b,c $\in Z$.	2	2	2	1,12
	Part-B (3 × 14 = 42 Marks)				
13. a)	Determine whether $[\sim q \wedge (p \longrightarrow q)] \longrightarrow \sim p$ is a Tautology.	7	3	1	1,12
b)	State and prove generalized pigeon-hole principle.	7	2	1	1,12

Contd... 2

14.	a)	i) Define linear congruence. Solve the linear congruence $290x \equiv 5 \ (mod\ 357)$	7	5	2	1,12
	b)	What is meant by reductive absurdum. Use it to prove that $\sqrt{2}$ is not a rational number.	7	4	2	1,12
15.	a)	Let $X = \{1,2,3,4,5,6,7\}$ and $R = \{(x,y)/x - y \text{ is divisible by } 3\} in\ X$. Show that R is an equivalence relation.	7	4	3	1,12
	b)	How many positive integers not exceeding 1000 are divisible by 7 or 11?	7	3	3	1,12
16.	a)	Solve the recurrence relation $a_n - a_{n-1} - 12a_{n-2} = 0,\ a_0 = 0, a_1 = 1$	7	4	4	1,12
	b)	Use generating functions to solve the recurrence relations $a_r = a_{r-1} + a_{r-2}$ with $a_1 = 2$ and $a_2 = 3$	7	3	4	1,12
17.	a)	Show that $(A,*)$ is a non-abelian group where A= R x R and (a,b) * (c,d) = (ac, bc+d).	7	4	5	1,12
	b)	If (F, +, .) is a field then prove that it is an Integral Domain.	7	2	5	1,12
18.	a)	Show that $\sim(p \vee (\sim p \wedge q)$ and$(\sim p \wedge \sim q)$ are logically Equivalent.	7	5	1	1,12
	b)	State and prove Fermat's Little theorem.	7	2	2	1,12
19.		Answer any *two* of the following:				
	a)	Show that congruence modulo m is an equivalence relation on integers.	7	3	3	1,12
	b)	Find all solutions of the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$	7	4	4	1,12
	c)	If H is a non-empty sub-group of a group G then prove that H is a sub-group if and only if a) for all $a, b \in H,\ ab \in H$ b) for all a$\in H, a^{-1} \in H$.	7	2	5	1,12

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	38
2	Knowledge on application and analysis (Level-3 & 4)	62
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	0

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