Hall Ticket Number:

Code No. : 13216

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (CSE: CBCS) III-Semester Main Examinations, December-2018

Discrete Structures

Time: 3 hours Max. Marks: 60

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Q. No	Stem of the Question	M	L	CO	PO
	Part-A (10 × 2 = 20 Marks)				
1.	Show that $[(r \wedge s) \rightarrow q] \rightarrow [\neg (r \wedge s) \vee q)]$ is a tautology.	2	2	1	1
2.	Define principle of duality and Write the dual of $\neg p \vee \neg q \wedge T_0$	2	2	1	1
3.	Compute the prime factors of 540, 504	2	2	2	1,2
4.	What is partition? Compute the partitions for set A={2,3,5,6,7,1,9}	2	2	2	1
5.	Compute the recurrence relation for the number of comparisons to sort n numbers using bubble sort	2	2	3	1
6.	Compute the generating function for $P_d(n)$where P_d is number of partitions o positive integer n into distinct Summands	2	3	3	1
7.	Define commutative Ring	2	2	4	1,2
8.	What is Euler's Totient function? and calculate Euler's Totient of 35	2	3	4	1,2
9.	G={0,1,2,3,4,5} be a group under addition modulo 6. Find the inverse of 5	2	2	5	1,2
10.	What is the minimum distance of a code consisting of the code words 001010,011100,010111,011110,101001?	2	4	5	1,2
	Part-B (5 × 8 = 40 Marks)				
11. a)	Justify $\neg p$ is a valid conclusion from $p \rightarrow r$, $r \rightarrow s$, $t \vee \neg s$, $\neg t \vee u$, $\neg u$	4	2	1	1
b)	Find gcd(a,b) if a=1820 and b=231 using Euclidian algorithm	4	2	1	1
12. a)	Let A={1,2,3,4}, b={a,b,c} and c={w,x,y,z} with f:A->B and g:B->C given by f={(1,a),(2,a),(3,b),(4,c) and g={(a,x),(b,y),(c,z)} for each element of A. Show that $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$	4	3	2	1
b)	In how many ways can the 26 letters of the alphabet be permuted so that non of the patterns car, dog, pun occurs?	4	2	2	1
13. a)	Solve the recurrence relation $2a_n = 7a_{n-1} - 3a_{n-2}$, $n \geq 2$.and $a_0=2$, $a_1=5$	4	3	3	1,2
b)	Find coefficient of x^8 in the series $\frac{1}{(1-2x)^2(1-3x)}$	4	2	3	1,2
14. a)	Find the minimum value of X which satisfies the following simultaneous equations $X \equiv 14 \pmod{31}$ $X \equiv 16 \pmod{32}$ $X \equiv 18 \pmod{33}$	4	4	4	1,2
b)	Compute 342^{15} mod 61 using Euler's theorem	4	3	4	1

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15. a) Verify G={0,1,2,3,4,5,6,7} is a group under addition modulo 8.	4	2	5	1
b) Prove that the set of idempotent elements of M for any abeleian monoid (M,*) forms a sub monoid	4	3	5	1,2
16. a) Apply Mathematical induction to verify $\sum_{i=1}^{n} i(2^i)=2+(n-1)2^{n+1}$	4	2	1	1
b) Find prime factorization of 327236910	4	2	2	1
17. Answer any *two* of the following:				
a) There are four colors poker chips –red, white, green and blue . Find and solve the recurrence relation for the number of ways to stack n of these poker chips so that there are no consecutive blue chips.	4	2	3	1,2
b) Show that (M, *) is an abelian group where $M= \{A, A^2, A^3, A^4\}$ where $A=\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ And * is an ordinary matrix multiplication, Also prove that (M, .) is isomorphic to the abelian group (G, X) G={1,-1,i,-i}where X is an ordinary multiplication	4	2	4	1,2
c) Define the encoding function E: Z_2^3 -> Z_2^6 by means of the parity-check matrix H given as below a) determine all code words b) Does this code correct all single errors in transmission $H=\begin{bmatrix} 1&0&1&1&0&0 \\ 1&1&0&0&1&0 \\ 1&0&1&0&0&1 \end{bmatrix}$	4	3	5	1,2

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)	60
2	Knowledge on application and analysis (Level-3 & 4)	40
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	---