Reg. No.:

Name :

VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act 1956)

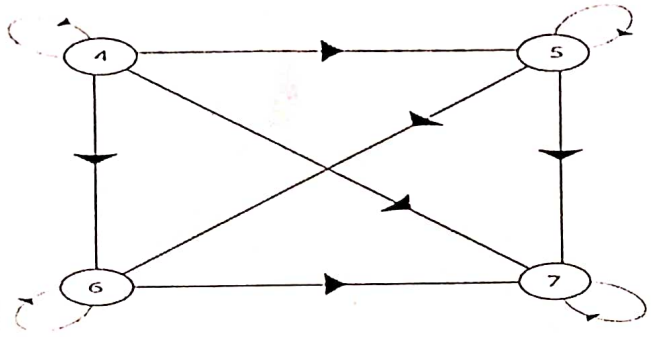
Continuous Assessment Test II – October 2022

Programme	: B.Tech.	Semester	:	FALLSEM 2022-23
Course Title	: Discrete Mathematics and Graph Theory	Code	:	BMAT205L
		Slot	:	D2+TD2+TDD2
Faculty(s)	: Dr. Balamurugan B J, Dr. Kalyan Banerjee, Dr. Uma Maheshwari S, Dr. Berin Greeni, Dr. Nathiya N, Dr. Somnath Bera, Dr. Devi Yamini S, Dr. Durga Nagarajan, Dr. Prasannalakshmi, Dr. Dhivya P, Dr. Pavithra R, Dr. Karan Kumar Pradh, Dr. Kamalesh Acharya, Dr. Amit Kumar Rahul	Class Nos.		CH2022231001488; CH2022231001464; CH2022231001466; CH2022231001468; CH2022231001470; CH2022231001477; CH2022231001480; CH2022231001482; CH2022231001484; CH2022231001490 CH2022231001493; CH2022231001495; CH2022231001497; CH2022231001500
Time	: 90 Minutes	Max. Marks	:	50

Answer ALL the Questions (5 X 10 = 50 Marks)

Q.No.	Sub. Sec.	Question Description	Marks
1.	a.	Find the code words generated by the parity check matrix $H = \begin{pmatrix} 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{pmatrix}$ corresponding to the encoding function $e: B^3 \to B^6$. Can all single errors in transmission be detected? Give justification. Decode the received words (a) 111000 and (b) 001110.	5
	b.	How many numbers must be selected from the set {1,3,5,7,9,11,13,15} to guarantee that there is at least one pair of numbers such that the sum of the two numbers is 16?	5
2.	a.	How many integers not exceeding 1000 are there divisible by 11, 13, 17?	5
	b.	Passwords on a certain system have exactly 5 letters that are either lowercase letters or uppercase letters. (a) How many possible passwords are there? (b) How many possible passwords are there that use only lowercase letters? (c) How many possible passwords are there with at least one uppercase letter and at least one lowercase letter?	5
3.	a.	Solve the following recurrence relation using generating function: $a_n = 3a_{n-1} - 4a_{n-2}, a_0 = 2\ a_1 = -1.$	7

$G_f(x) = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + \cdots$

	b.	Find a recurrence relation for the given sequence: $a_n = n + (-1)^n$.	3
4.		Let D_{150} be the set of divisors of 150 and | be the relation defined as $a\|b$ if and only if *a divides b*. a. Check whether the relation | (divides) is a partially ordered relation. b. Draw the Hasse diagram of the POSET $(D_{150}, \|)$ c. Find the least element and greatest element of the POSET if exists. d. Find the lower bound, upper bound, GLB and LUB of the following sets $\{5,10,25,50\}$ and $\{3,6,15\}$. e. Check whether the POSET is a Lattice or not.	10
5.	a.	i) Give an example of a POSET that is not a lattice along with the justification. (2 Marks) ii) Find the greatest and least elements of the POSET corresponding to the following digraph: (2 Marks)  	4
	b.	Let N denote the set of all natural numbers and R be a relation on $N \times N$ defined by $(a,b)R(c,d), if\ ad(b+c) = bc(a+d)$. Verify the following properties on the relation R: a) Reflexive b) Symmetric c) Antisymmetric d) Transitive.	6

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