

 <b>VIT-AP</b> UNIVERSITY	<b>Continuous Assessment Test - 1   Fall Semester (2025-26) - August 2025</b>	
	Maximum Marks: 50	Duration: 90 Minutes
Course Code: MAT1003	Course Title: Discrete Mathematical Structures	
Set No: 4	Exam Type : <b>Closed Book</b>	School: SAS
Date: 19/08/2025	Slot: B1	Session: FN
<b>Keeping mobile phone/smart watch, even in 'off' position is treated as exam malpractice</b>		
<b>General Instructions:</b> 1. "fx series" - non-Programmable calculator are permitted: YES 2. Reference tables permitted: NO		

Answer ALL Questions, Each Question Carries 10 Marks (5×10=50 Marks)

- Obtain principal disjunctive normal form (PDNF) for the Boolean expression  $P \rightarrow (Q \rightarrow R)$ .  
(5 M+5M)
  - Show that  $\sim(P \leftrightarrow Q) \equiv P \oplus Q$ .
- Without using Resolution principle, show that the hypotheses “Allen is a bad boy or Hillary is a good girl” and “Allen is a good boy or David is happy” imply the conclusion “Hillary is a good girl or David is happy.”  
(10 M)
- Prove or disprove the following statements:
  - if  $ab \equiv 0 \pmod n$  then  $a \equiv 0 \pmod n$  or  $b \equiv 0 \pmod n$ ,  $n$  is a positive integer.
  - The negation of “some snakes are poisonous” is “some snakes are not poisonous”.  
(5+5 M)
- Verify the validity of the following argument:

Every living thing is a plant or animal.  
John’s gold fish is alive and it is not a plant.  
All animals have heart.  
Therefore, John’s gold fish has a heart.  
(10 M)
- Find the GCD of 198 and 252.
  - Find integers  $x < 0$  and  $y > 0$  such that  $(198, 252) = 198x + 252y$ .
  - Find integers  $x > 0$  and  $y < 0$  such that  $(198, 252) = 198x + 252y$ .  
(4+3+3 M)