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**School of Computing Science and Engineering**

Bachelor of Computer Applications

Mid Term Examination - Nov 2023

Duration : 90 Minutes

Max Marks : 50

**Sem I - C1UC124T - Math Puzzles and Games**General Instructions*Answer to the specific question asked**Draw neat, labelled diagrams wherever necessary**Approved data hand books are allowed subject to verification by the Invigilator*

- 1) Define permutation of  $n$  objects taking  $r$  objects at a time. K2 (2)
- 2) Let  $A = \{\varnothing, \{\varnothing\}\}$ . Determine whether each of the following statements is TRUE or FALSE (i)  $\{\{\varnothing\}\} \subseteq A$  (ii)  $\{\{\varnothing\}\} \in P(A)$  (iii)  $\{\{\varnothing\}\} \in A$  K1 (3)
- 3) Give two proper subsets and two supersets of the set of vowels of the English alphabet. K2 (4)
- 4) If  $A = \{7, 9, 11\}$ , and  $B = \{1, 2\}$ , then find the cardinality of  $A \times B$  and find all the possible subsets of  $A$  and  $B$ . K2 (6)
- 5) Let  $A = \{\varnothing, \{\varnothing\}\}$ . Determine whether each of the following statements is TRUE or FALSE. (i)  $\varnothing \in P(A)$  (ii)  $\varnothing \subseteq P(A)$  (iii)  $\{\varnothing\} \subseteq P(A)$  (iv)  $\{\varnothing\} \subseteq A$  K3 (6)
- 6) Prove that the relation, " $a|b$ " i.e.,  $a$  divides  $b$ , on set of natural number is not an equivalence relation. K3 (9)
- 7) Let  $A = \{1, 2, 3\}$  and  $B = \{5, 7\}$ , then find (i)  $A \times B$  (ii)  $B \times B$  (iii)  $B \times A$  (iv)  $A \times A$  K4 (8)
- 8) Evaluate the following: (i) How many numbers are there between 99 and 1000 having 7 in the units place. (ii) How many numbers are there between 99 and 1000 having at least one of their digits 7. K4 (12)

**OR**

- A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has (i) no girls (ii) at least one boy and one girl (iii) at least three girls. K4 (12)