

## Indian Institute of Information Technology Sri City (IIITS)

Name of the Exam: DSMA

Duration: 1.5 hrs

Max. Marks: 15

**Instructions:**

1. Clearly write your **Roll Number** and **Name** in **capital letters** on the **top right corner** of every page of the answer sheets. It is mandatory.
2. **All questions are mandatory.**
3. Marks are indicated in [ ] after each question.
4. Rough Work should be done separately, not in the answer sheet.
5. **Answers should be reasoned and derived clearly, not a single word answer.**
6. You are required to write the answers in **A4 sheets**.
7. Preferably use a **ballpoint pen**. The writing should be **readable after scanning**. (This is very important)
8. This is a proctored exam. You need to keep your **video on** throughout the exam.
9. After finishing the writing part, you are expected to **submit the scanned copy of the hand written answer sheets in one consolidated PDF format to the link provided**. The link will be provided to upload the pdf.
10. Copying in any form will be dealt with strictly. Both "copied to" and "copied from" will be penalized.

1. Find whether the following statement is a tautology or not, by using truth tables. Show the truth table. [2]

$$(p \vee r) \wedge (\neg p \vee q) \rightarrow (r \vee q)$$

2. Let  $G(m,n)$  means that student  $m$  likes to play game  $n$ , where the domain for  $m$  consists of all students in your class and the domain for  $n$  consists of all online games. Express the following statement by a simple English sentence. [2]

$$\forall m \forall z \exists n (G(m, n) \leftrightarrow G(z, n))$$

3. Verify whether the given argument is valid or not and explain why? [3]

No UG3 or UG4 student enrolled in Discrete Mathematics class. Raj enrolled in Discrete Mathematics. Therefore Raj is not a UG4 student.

4. Write the converse, inverse and contrapositive of the following statement: [3]  
If  $5x - 1 = 9$ , then  $x = 2$ .
5. Prove or disprove. For all  $x \in \mathbb{R}$ , If  $x^2 + 2 < 0$ , then  $x^5 \geq 5$ . [1]
6. Determine whether  $f$  is a bijective function from  $\mathbb{R}$  to  $\mathbb{R}$  if  $f(x) = -3x^2 + 7$ . [2]
7. Let  $A$  and  $B$  be two sets. Show that  $A \cup (B - A) = (A \cup B)$ . (without venn diagram) [1]
8. Suppose  $A = \{\text{Red, Blue}\}$ ,  $B = (10, 12] \cap \mathbb{Z}$  and  $C = B \cup \{200\}$ , where  $\mathbb{Z}$  is the set of all integers. Find  $C \times A$ . [1]