

## 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.

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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]

$$\text{If } 5x - 1 = 9, \text{ then } x = 2.$$

5. Prove or disprove. For all  $x \in \mathbf{R}$ , If  $x^2 + 2 < 0$ , then  $x^5 \geq 5$ . [1]

6. Determine whether  $f$  is a bijective function from  $\mathbf{R}$  to  $\mathbf{R}$  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  $A = \{\text{Red, Blue}\}$ ,  $B = (10, 12] \cap \mathbf{Z}$  and  $C = B \cup \{200\}$ , where  $\mathbf{Z}$  is the set of all integers. Find  $C \times A$ . [1]