IIITS/M-2022/Mid Sem - 1(B) Exam Date: 21-12-2022

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]**

$$[(p \rightarrow r) \wedge (r \rightarrow q)] \rightarrow (p \rightarrow q)$$

2. Let L(p,q) means that student p likes movie q, where the domain for p consists of all students at your college and the domain for q consists of all movies in India. Express the following statement by a simple English sentence. **[2]**

$$\forall p \forall z \exists q \, (L(p, q) \leftrightarrow L(z, q))$$

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

   No UG1 or UG2 student enrolled in a physical education class. Mary enrolled in physical education class. Therefore Mary is not a UG1 student.

4. Write the converse, inverse and contrapositive of the following statement: **[3]**

If today is Sunday, then it is a holiday.

5. Prove or disprove. For all $x \in R$, If $x > 0$, then $x^2 + 4 > 0$. **[1]**

6. Determine whether f is a bijective function from R to R if $f(x) = 2x^4 - 8$. **[2]**

7. Let A and B be two sets. Prove that $A - B = A \cap B^c$. (without venn diagram) **[1]**

8. Suppose $A = \{Red, Blue\}$, $B = (0, 2] \cap \mathbf{Z}$ and $C = B \cup \{100\}$, where **Z** is the set of all integers. Find $C \times A$. **[1]**