IIITS/DSMA SQ1_S1

Date: 19-09-2025

Indian Institute of Information Technology, Sri City, Chittoor

Name of the Exam: DSMA SQ1

Duration: 20 Minutes

Name:

Roll No.

Instructions:

i) Tick the correct option.
ii) Do not do rough work on the question paper.
iii) Return the question paper along with the rough sheet before leaving the exam hall.

1. If the truth value of the compound proposition $\neg((\neg q \wedge \neg p) \rightarrow p)$ is true, then the truth values of the propositions p and q are, respectively, **[1M]**

Options: (a) F, F (b) T, T (c) T, F (d) F, T

2. Which of the following sentences is/are propositions? **[1M]**

I. The sum of two odd integers is an odd integer.
II. 9 is not a prime number.
III. The cardinality of $A \cup B$ is 5, where $A = \{1,2,3\}$, and $B = \{2,7,8\}$.
IV. Every student in this class is intelligent.

Options: (a) Only III **(b) I, II, and III** **(c)** I and III **(d)** I, II, and IV

3. Let p be a proposition. Which of the following statements is/are contradiction? **[1M]**

1. $p \vee \neg p$ 2. $\neg(p \vee \neg p)$
3. $\neg(\neg p \vee T)$ 4. $p \vee T$

Options: (a) 1, 2 (b) only 4 **(c) 2, 3** (d) 1, 4

4. Let p, q and r be the propositions such that:

p: "You have the flu."
q: "You miss the final exam."
r: "You pass the course."
Express the statement "If you have the flu, you will miss the final examination and fail the course" into logical expression. **[1M]**

Options: (a) $(p \wedge q) \vee (\neg q \wedge r)$ (b) $p \leftrightarrow \neg q \vee r$ (c) $p \rightarrow \neg q \wedge \neg r$ **(d) $p \rightarrow q \wedge \neg r$**

5. $\neg(p \leftrightarrow q)$ is equivalent to **[1M]**

I. $\neg q \leftrightarrow p$ II. $p \leftrightarrow \neg q$
III. $p \rightarrow q$ IV. $q \leftrightarrow p$

Options: (a) only IV (b) IV and III **(c) I and II** (d) None

6. Consider the following statements

   I. "If I am sick, there will be no lecture today."

   II. "Either there is a lecture today or the students are happy."

   III. "The students are not happy."

   What can be concluded from the above statements? **[1M]**

   (1) I am sick (2) I am not sick (3) There is a lecture today (4) The students are happy

   Options: (a) 1, 2 (b) only 2 (c) 2, 3 (d) None

7. If I study regularly, then I will pass the exam. If I do not play games, then I will study regularly. If I pass the exam, then I will get a scholarship. I did not get a scholarship. From the above arguments, what can you conclude? **[1M]**

   (1) I did not study regularly (2) I studied regularly

   (3) I did not play games (4) I played games

   Options: (a) 1, 2 (b) only 1 (c) 1, 2, 3 (d) 1, 4

8. What is the negation of the statement "Every student has applied for an internship"?

   (1) No student has applied for an internship

   (2) There is a student who has not applied for an internship

   (3) There is at least one student who has not applied for an internship

   (4) Every student has not applied for an internship

   Options: (a) 1, 2 (b) 2, 3 (c) 1, 2, 4 (d) 1, 2, 3 **[1M]**

9. Which of the followings is/are true? **[2M]**

   1. $\forall x P(x) \vee \forall x Q(x) \equiv \forall x \forall y (P(x) \vee Q(y))$
   2. $\forall x P(x) \wedge \exists x Q(x) \equiv \forall x \exists y (P(x) \wedge Q(y))$
   3. $\forall x P(x) \vee \exists x Q(x) \equiv \forall x \exists y (P(x) \vee Q(y))$
   4. $\forall x \forall y \exists z R(x, y, z) \equiv \exists z \forall x \forall y R(x, y, z)$

   Here all quantifiers have the same nonempty domain.

   Options: (a) 1, 3 (b) 2, 3, 4 (c) 1, 2, 3 (d) 2, 3

10. Which of the followings form a valid argument? **[1M]**

    1. Only intelligent students get good grade. Ram gets a good grade. Therefore, Ram is an intelligent student.
    2. Only intelligent students get good grade. Ram is not an intelligent student. Therefore, Ram does not get a good grade.
    3. Only intelligent students get good grade. Ram does not get a good grade. Therefore, Ram is not an intelligent student.

    Options: (a) only 1 (b) only 2 (c) 1, 2 (d) 2, 3