# **Scientific and Social Values MOT1442 Q2 2022/23 – Scientific Values Exam RESIT - (3 Hours) 13th April 2023 – 9:00-12:00**

**Please write your name in BLOCK CAPITALS, using the format ‘SURNAME, FORENAME.’**

**STUDENT NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**STUDENT NUMBER: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Instructions**

* The use of course materials – printed or digital – is not allowed.
* The use of a calculator is permitted.
* Any communication with other persons during the exam time is forbidden.
* Please complete answers to the multiple-choice portion of the exam (Question 1 to Question 20) using the multiple-choice answer sheet provided.
* Write your answer (to the final 3 open questions only) by pen on the separate answer booklet provided.
* We recommend sketching answers to the final question first on the note paper provided, before transferring a clean, legible answer to your answer sheet.
* At the end of the exam, please submit this booklet, your multiple-choice answer sheet, *and* your separate answer sheet for the open questions, *together*.
* Ensure that your student name and student number are recorded on everything you submit.
* **Questions 1 to 9 are worth 2 marks per question.**
* **Questions 10 to 25 are worth 4 marks per question.**
* **Questions 26, 27, and 28 are worth 6 marks per question.**
* There are **13 pages** in this booklet, with **28 questions** in total. Please notify an invigilator if any pages are missing.

**MOT1442 Exam Questions**

**True or false questions (2 marks each)**

**For the following true or false questions (Questions 1-9), please mark A for true, and B for false, of the four options available (A, B, C, and D) in the multiple-choice answer sheet provided.**

**Question 1.**

Consider the following statement:

1. ‘For an argument to be valid, the premises of that argument have to at least be true.’

Is this statement true, or false?

1. True
2. False

**Question 2.**

Consider the following argument:

P1. If it’s cold, then I wear a jacket

P2. I’m wearing a jacket

P3. It’s cold

This argument is deductively valid. True or false?

1. True
2. False

**Question 3.**

Consider the following argument:

P1. I’m not hungry, if and only if I eat breakfast

P2. I’ve not eaten breakfast

C. I’m hungry

This argument is deductively valid. True or false?

1. True
2. False

**Question 4.**

Consider the following argument:

P1. It’s raining, and not raining

C. It is raining

This argument is deductively valid. True or false?

1. True
2. False

**Question 5.**

Consider the following argument:

P1. If I’m hungry, I eat something

P2. If I eat something, I’m not hungry

P3. I’m hungry

C. I’m hungry, and I’m not hungry

This argument is deductively valid. True or false?

1. True
2. False

**Question 6.**

Consider the following argument:

P1. If a rectangle is 10cm wide, and 20cm long, then it’s 200cm3

P2. This rectangle is 200cm3

C. This rectangle is 10cm wide, and 20cm long

This argument is deductively valid. True or false?

1. True
2. ·False

**Question 7.**

P1. If today is Wednesday, then tomorrow is Thursday

P2. Today is not Wednesday

C. Tomorrow isn’t Thursday

This argument is deductively valid. True or false?

1. True
2. False

**Question 8.**

P1. If X, then not-Y

P2. Y

C. Not-x

This argument is deductively valid. True or false?

1. True
2. False

**Question 9.**

Consider the following argument:

P1. If Venus is the farthest planet from the Sun, then Pluto is the closest planet to the Sun

P2. Pluto is not the closest planet to the Sun

P3. Venus is not the farthest planet from the Sun

This argument is deductively valid ***and***it is sound. True or false?

1. True
2. False

**Multiple Choice Questions (4 marks each)**

**Question 10.**

Consider the following statements:

1. ‘All medical experiments should be double blind.’
2. ‘Salvador Dali was a major proponent of surrealism.’

Is it the case that:

1. Both statements are normative
2. Statement (1) is normative, and statement (2) is descriptive
3. Statement (1) is descriptive, and statement (2) is normative
4. Both statements are descriptive

**Question 11.**

Consider the following statements:

1. If a deductive argument is valid, then we can be certain that the conclusion of that argument is true.
2. If the premises of an inductive argument are valid, then the conclusion is likely to be true (where *likely* means that we can be greater-than-50% sure the conclusion is true).

Are statements (a) and (b):

1. Both true
2. Both false
3. (a) is false, (b) is true
4. (a) is true, (b) is false

**Question 12.**

Consider the following argument:

P1. There are 17.5 million people in The Netherlands.

P2. Of those 17.5 million people, 71% of them have blonde hair.

P3. If I pick a single person at random from the population of the Netherlands, then I have a 71% chance of picking a blonde person.

P4. I pick a single person at random from the population of The Netherlands.

C. I have a 71% chance of picking a blonde person.

This argument is:

1. Deductively valid
2. Deductively invalid
3. Inductively valid
4. Inductively invalid

**Question 13.**

P Q ¬Q → ¬P

1 1 1

1 0 0

0 1 1

0 0 1

In this truth table there is/are:

1. No errors
2. 1 error
3. 2 errors
4. 3 errors

**Question 14.**

Consider the following truth table.

P Q P ∨ ¬P

1 1 (a) \_

1 0 (b) \_

0 1 (c) \_

0 0 (d) \_

The missing spaces, (a), (b), (c), and (d) should be filled by the following values, respectively:

1. 1, 1, 1, 1
2. 1, 0, 0, 1
3. 0, 1, 1, 0
4. 0, 0, 0, 0

**Question 15.**

Consider the following truth table:

P Q (Q ∨ ¬Q) ↔ ¬P

1 1 (1) \_

1 0 (2) \_

0 1 (3) \_

0 0 (4) \_

The missing spaces, (1), (2), (3), and (4), should be filled by the following values, respectively:

1. 1, 1, 1, 1
2. 1, 1, 0, 0
3. 0, 1, 1, 0
4. 0, 0, 1, 1

**Question 16.**

Which of the following sentences in propositional logic is the best translation of the following English sentences:

“If I miss the bus, I should get the train instead. My OV-chipkaart works for both of them.”

1. (B ∧ T) → C
2. (B → T) ∧ C
3. (B → T) → C
4. (B → T) → (B ∧ T)

**Question 17.**

Which of the following statements is falsifiable?

1. No star has a radius larger than 1700 solar radii.
2. A star exists with a radius of 10,000 solar radii.
3. Both are falsifiable.
4. Neither are falsifiable.
5. Statement (1) is falsifiable, while statement (2) is *not* falsifiable.
6. Statement (1) is *not* falsifiable, while statement (2) is falsifiable.

**Question 18.**

Which of the following statements is falsifiable?

1. Ghosts exist.
2. Ghosts don’t exist.
3. Both are falsifiable
4. Neither are falsifiable
5. Statement (1) is falsifiable, while statement (2) is *not* falsifiable
6. Statement (1) is *not* falsifiable, while statement (2) is falsifiable

**Question 19.**

Consider the following decision matrix. Note: this matrix will be used in the following four questions (Q. 19, Q. 20, Q. 21, and Q. 22).

|  |  |  |  |
| --- | --- | --- | --- |
|  | S1 | S2 | S3 |
| A1 | 11 | 10 | 2 |
| A2 | 9 | 6 | 5 |
| A3 | 3 | 1 | 12 |
| A4 | 8 | 7 | 4 |

What would the decision rule ‘maximax’ say to do, in this scenario?

1. Action A1
2. Action A2
3. Action A3
4. Action A4

**Question 20.**

What would the decision rule ‘maximin’ say to do, in this scenario?

1. Action A1
2. Action A2
3. Action A3
4. Action A4

**Question 21.**

What would the decision rule ‘minimax regret’ say to do, in this scenario?

1. Action A1
2. Action A2
3. Action A3
4. Action A4

**Question 22.**

Suppose the following probabilities apply: S1 has a probability of 0.1, S2 has a probability of 0.1, and S3 has a probability of 0.8. Given these probabilities, what would the decision rule ‘maximise expected utility’ say to do, in this scenario?

1. Action A1
2. Action A2
3. Action A3
4. Action A4

**Question 23.**

Which type of game best fits as a description of the following game?

Two participants in a game, A and B, will both suffer if they do not cooperate. If either one cooperates and the other doesn’t, then the non-cooperant enjoys a benefit, and the cooperant suffers a severe drawback (severe relative to the minor consequence they would have faced, had both cooperated). If both cooperate, both cooperants suffer a penalty less severe than they would have faced had neither cooperated, *and,* less severe than they would have faced individually had they cooperated whilst their opponent did not.

1. A stag hunt
2. A prisoner’s dilemma
3. A chicken game
4. None of the above

**Question 24.**

Where are the pure Nash Equilibria in the following game:

|  |  |  |
| --- | --- | --- |
|  | Q1 | Q2 |
| P1 | 0,1 | 1,0 |
| P2 | 1,0 | 0,1 |

1. P1, Q2
2. P2, Q1
3. P2, Q1, and P2, Q1
4. There are no pure Nash Equilibria.

**Question 25.**

How many pure Nash Equilibria are in the following game:

|  |  |  |  |
| --- | --- | --- | --- |
|  | R1 | R2 | R3 |
| P1 | 3,5 | 5,4 | 0,3 |
| P2 | 2,0 | 7,1 | 0,0 |
| P3 | 2,0 | 6,2 | 1,3 |

1. There is 1 pure Nash Equilibrium in this game
2. There are 2 pure Nash Equilibria in this game
3. There are 3 pure Nash Equilibria in this game
4. There are no pure Nash Equilibria in this game.

**Open Questions (6 marks each)**

**Question 26.**

Construct a truth table for the following sentence: (C → C) ↔ ¬((A → B) → C)

**Question 27.**

Construct a truth table for the following *argument,* and, using that truth table, demonstrate whether that argument is valid or not:

P1. B → A

P2. ¬B

C. ¬A

**Question 28.**

‘Whether a theory is falsifiable or not is an important criterion for deciding whether or not a theory should be considered as scientific.’

Using the concept of *falsificationism,* in *no more than* *300 words*, explain why you agree or disagree with this statement.

Ensure in your answer that you: (1) give an accurate definition of the concept, and (2) provide a brief argument for your conclusion.

Do not worry if you are below this word count; answers of a word count of more than 100 words canbe entirely sufficient.

Please note: we are not assessing the quality of your English writing. The quality of your writing only matters to the extent that your argument is properly conveyed.