# **Scientific and Social Values MOT1442 Q2 2021/22 – Scientific Values Exam - (3 ½ Hours) 7th December 2021 – X-Sports Hall 3**

**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 2 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 all of them.
* **Questions 1 to 6 are worth 1 mark per question.**
* **Questions 7 to 20 are worth 2 marks per question.**
* **Questions 21 and 22 are worth 6 marks per question.**
* There are **10 pages** in this booklet, with **22 questions** in total. Please notify an invigilator if any pages are missing.

**MOT1442 Exam Questions**

**For the following true or false questions (Questions 1-6), 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.**

**(1 mark)**

Consider the following statement:

1. ‘If and only if the premises are true, the argument is valid’

Is this statement true, or false?

1. True
2. False

**Question 2.**

Consider the following argument:

P1. All birds have wings

P2. An aeroplane has wings

C. An aeroplane is a bird

This argument is deductively valid. True or false?

1. True
2. False

**Question 3.**

Consider the following argument:

P1. All mortals are men

P2. Socrates is a man

C. Socrates is a mortal

This argument is deductively valid. True or false?

1. True
2. False

**Question 4.**

Consider the following argument:

P1. If ghosts exist, then so do vampires.

P2. Ghosts exist

C. Vampires exist.

This argument is deductively valid. True or false?

1. True
2. False

**Question 5.**

Consider the following argument:

P1. The terminal velocity of every skydiver is 195 km/h relative to the ground.

P2. Skydivers reach terminal velocity 15 seconds after jumping from a plane.

P3. John jumps from a plane

C. In 15 seconds, John will be travelling at 195km/h relative to the ground.

This argument is deductively valid. True or false?

1. True
2. False

**Question 6.**

P1. Every observed galaxy has a supermassive black hole at the centre.

P2. Scientists at the CHiPS survey have discovered a new galaxy cluster, named G237.

C. Each galaxy in the newly discovered galaxy cluster G237 will have a supermassive black hole at the centre.

This argument deductively valid?

1. True
2. False

**Question 7.**

Consider the following statements:

1. ‘You should design experiments such that they only test one variable at a time’
2. ‘This experiment tests for one variable at a time’

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 8.**

Consider the following statements:

1. The truth of the conclusion of a deductive argument is guaranteed if the argument is valid.
2. The conclusion of an inductively valid argument is likely to be true (>50% chance of being 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 9.**

Consider the following argument:

P1. I know there are 100 balls in this bag

P2. 90 of the balls are red, 10 of the balls are blue.

P3. I pull 5 balls from the bag.

P4. Every ball I’ve pulled out of this bag so far has been red.

C. The next ball I pull out of this bag will be red.

This argument is:

1. Deductively valid, inductively valid
2. Deductively valid, inductively invalid
3. Deductively invalid, inductively valid
4. Deductively invalid, inductively invalid

**Question 10.**

P Q P <-> Q

1 1 1

1 0 0

0 1 0

0 0 1

In this truth table there is/are:

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

**Question 11.**

Consider the following truth table.

P Q P v Q

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:

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

**Question 12.**

Consider the following truth table:

P Q P v (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:

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

**Question 13.**

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

“I will go to the cinema, or I will go to the park. If I go to the park, I will take a jacket.”

1. (C -> P) -> J
2. C v P v J
3. (C v P) & (P -> J)
4. (C & P) <-> (C v J)

**Question 14.**

Which of the following statements is falsifiable?

1. Somewhere in the universe, there is a planet that is an exact duplicate of planet earth.
2. Given enough time, economic inequality will reduce.
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 15.**

Which of the following statements is falsifiable?

1. An atom of Uranium-235 has 143 neutrons.
2. Every atom of Uranium-235 has 143 neutrons.
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 17.**

Consider the following decision matrix. This matrix will be used in the following three questions (Q. 17, Q. 18, and Q. 19).

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

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 18.**

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 19.**

Suppose the following probabilities apply: S1 has a probability of 0.05, S2 has a probability of 0.9, and S3 has a probability of 0.15. 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 20.**

Which type of game offers the greatest individual reward for either participant, relative to all other possible individual rewards in that game for either participant, for cooperating?

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

**Question 21.**

Where are the pure Nash Equilibria in the following game:

|  |  |  |
| --- | --- | --- |
|  | Q1 | Q2 |
| P1 | 2,3 | 3,2 |
| P2 | 3,2 | 2,3 |

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

**Question 20.**

How many pure Nash Equilibria are in the following game:

|  |  |  |  |
| --- | --- | --- | --- |
|  | R1 | R2 | R3 |
| P1 | 4,5 | 5,4 | 6,4 |
| P2 | 3,6 | 6,7 | 7,2 |
| P3 | 2,5 | 4,4 | 9,9 |

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.

**Question 21.**

Construct a truth table for the following sentence: P v (Q ∧ ¬P)

**Question 22.**

Consider the following statement:

‘Science provides us with truths we can be certain of.’

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.