# UNIVERSITY OF JOHANNESBURG

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| **FACULTY** | : Education |
| **DEPARTMENT** | : Science and Technology Education |
| **CAMPUS** | : APK |
| **MODULE** | : EDUCATIONAL THEORY IN STEM. <br><br> (HETSSOY) |
| **SEMESTER** | : Second |
| **EXAM** | : SSA January 2021 |

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| **ASSESSOR(S)** | : DR ED SPANGENBERG (Chief assessor) <br> PROF P ANKIEWICZ, DR F VAN AS (Technology Ed) <br> DR V RAMDHANY (Mathematics Ed) <br> DR T DHURUMRAJ  (Science Ed) |
| **MODERATOR** | : DR LS VAN PUTTEN (UP) |
| **DURATION** | : 2 HOURS        **MARKS**        : 75 |

NUMBER OF PAGES:  4 PAGES

INSTRUCTIONS:

1.    Answer ALL THE QUESTIONS.

2.    Number your answers clearly.

3.    Write legibly and present your work neatly.

4.    Read the questions carefully before answering them.

## QUESTION 1

1.1 Discuss the fundamental reasons (rationale) for STEM education that consists mainly of two (2) broad arguments. **(6)**

1.2 Discuss three (3) possibilities of working across STEM subjects in the enacted curriculum. **(7)**

1.3 As a teacher it is your responsibility to help your learners connect their learning with real life and to provide them with the necessary skills to be successful in life. While all the 21st century skills identified during the last two decades are important, the 4C's i.e. **Critical Thinking**, **Communication**, **Collaboration**, and **Creativity and Innovation** are often considered to be the most important. Appraise the importance of the 4C's in STEM teaching and learning.

**(4 x 3 = 12)**

**[25]**

## QUESTION 2

2.1 STEM education, at its core, calls for integration of knowledge from different disciplines. Explain the rationale behind the call for an integrated STEM education. **(3)**

2.2 A typical curriculum can be distinguished according to the *specified curriculum, enacted curriculum and experienced curriculum.* Describe each of these briefly. **(3)**

2.3 Discuss whether you agree with the design of the 'pulley-system' framework of Kelly and Knowles (2016), by referring to the size and placement of the different STEM subjects in relation to each other. **(4)**

2.4

    2.4.1    Do you think a curriculum should be rigid or more flexible? **(1)**

    2.4.2    Discuss your answer by referring to the advantages and disadvantages of each type. **(4)**

2.5

    2.5.1    The physical environment of our schools and classrooms affect our attitudes towards teaching and learning. Do you agree with this statement? **(1)**

    2.5.2    Provide a motivation for your answer above. **(2)**

2.6

    2.6.1    STEM educators need to have deep and broad content knowledge. Do you agree with this statement? **(1)**

    2.6.2    Provide two (2) reasons for your answer. **(4)**

2.7    Suggest ways in which teachers can improve assessment practices so that assessment does not lose its value. **(3)**

**[25]**

## QUESTION 3

3.1    Socio-cultural theories of learning originated with Vygotsky in the 1930s. According to Vygotsky, learning is embedded in social events, and social interaction plays a fundamental role in improvement of learning.

    Using a suitable example critically discuss Vygotsky's Theory of the relationship between Thought and Language. Use a suitable sketch diagram to aid your explanation. **(16)**

3.2     Discuss the learning domains that are activated in STEM education and provide a suitable example of how you would tailor classroom instruction to cater for each domain.                                          **(9)**

**[25]**

**TOTAL: 75**