UNIVERSITY OF JOHANNESBURG

FACULTY	:	Education
DEPARTMENT	:	Science and Technology Education
CAMPUS	:	APK
MODULE	:	EDUCATIONAL THEORY IN STEM. (HETSSOY)
SEMESTER	:	Second
EXAM	:	January 2020

ASSESSOR(S)	:	DR ED SPANGENBERG (Chief assessor) PROF P ANKIEWICZ, DR F VAN AS (Technology Ed) PROF M NDLOVU, DR V RAMDHANY (Mathematics Ed) PROF U RAMNARAIN, DR L MAVURU, DR S RAMAILA (Science Ed)
MODERATOR	:	DR LS VAN PUTTEN (UP)
DURATION	:	2 HOURS **MARKS** : 75

NUMBER OF PAGES: 3 PAGES

INSTRUCTIONS:

1. Answer **each question** in a **separate** book.
2. Answer ALL THE QUESTIONS.
3. Number your answers clearly.
4. Write legibly and present your work neatly.
5. Read the questions carefully before answering them.

QUESTION 1

1.1 Explain the importance and goals of STEM education. **(6)**

1.2 Discuss what integrated STEM education is, and provide **two ways** in which STEM subjects can be integrated. **(9)**

1.3 Appraise the importance of the 21st century skills under Binkley et al.'s (2012) grouping, i.e. "ways of thinking" in STEM learning. **(10)**

[25]

QUESTION 2

2.1 What is the overarching goals of STEM Education? Name **three**. **(3)**

2.2 Define the meaning of the term **axiology** of STEM education. **(1)**

2.3 Discuss what an Enacted curriculum in STEM Education entails. **(3)**

[7]

QUESTION 3

3.1 In creating an environment for sustaining STEM Education, three main environments are identified. Discuss **four aspects pertaining** to the **physical environment**. **(4)**

3.2 Hargreaves (2001) identifies **five steps** to encourage knowledge creation in STEM Education. Name these steps. **(4)**

[8]

QUESTION 4

4.1 Explain, in your own words, what you think the main difference is between a teacher's content knowledge (CK) and pedagogical content knowledge (PCK). **(3)**

4.2 Do you think a teacher's PCK improves with experience? **(1)**

4.3 Provide one (1) motivation for your answer in 4.2 above. **(2)**

4.4 Discuss two (2) advantages of summative assessment. **(4)**

[10]

QUESTION 5

5.1 According to the National Research Council (2014), "building connected knowledge structures" is a key characteristic of effective STEM learning. Discuss this characteristic by using appropriate examples. **(10)**

5.2 Differentiate between the roles of a traditional (transmissive) teacher and that of a constructivist teacher. **(8)**

5.3 Discuss the role of mediation and scaffolding in supporting learners transition across the zone of proximal development in STEM education. **(7)**

[25]

TOTAL: 75