FACULTY	: Education
DEPARTMENT	: Childhood Education
CAMPUS	: SWC
MODULE	: MPSCTB3 : Teaching Methodology and Practicum: Science and Technology
SEMESTER	: Second
EXAM	: December Supp. Exam: 2019

DATE : DECEMBER 2019 **SESSION** :

ASSESSOR(S) : Dr. M.M. Kazeni (UJ)
: Mr. E. Libusha (UJ)

MODERATOR : Dr. B. Mofolo-Mbokane (WITS)

DURATION : 2 HOURS **MARKS** : 100

NUMBER OF PAGES: **8** PAGES

INSTRUCTIONS:

1. Answer ALL THE QUESTIONS.
2. Number your answers clearly
3. Answer ALL questions in the same exam booklet.

SECTION A: NATURAL SCIENCE

Question 1. Content Knowledge **[10]**

Answer the following multiple-choice questions by writing the letter, which represents the best answer next to the question number. For example 1A, if 'A' is the correct answer for question 1. (1 mark each).

1.1 The hot liquid-like substance that comes out of a volcano is known as

A. ash
B. lava
C. pumice
D. explosion

1.2 Which of the following organisms is a one-celled organism?

A. animals
B. bacteria
C. humans
D. trees

1.3 What is the site of protein synthesis in a cell?

A. vacuole
B. nucleus
C. lysosome
D. ribosome

1.4 The solid part of a solution, which dissolves in a liquid, is called a_____.

A. Saturation
B. solvent
C. solute
D. precipitant

1.5 Newton is a unit for measuring_____.

A. weight
B. distance
C. mass
D. force

1.6 What is the other name for a backbone?

A. spinal column
B. femur
C. spinal cord
D. collar bone

1.7 Which of the following takes place when wood is burned?

A. oxygen is released into the atmosphere
B. nitrogen is released into the atmosphere
C. carbon is released into the atmosphere
D. hydrogen is released into the atmosphere

1.8 The process in which oxygen is used to break down sugar molecules in both plant and animal cells is called _____.

A. fermentation
B. cell respiration
C. photosynthesis
D. differentiation

1.9 The digestive system includes the stomach, the small and large intestine, and the_____.

A. capillaries
B. brain
C. nose
D. oesophagus

1.10 What do we call the layer of the Earth on which people live? (1)

A. Crust
B. Mantle
C. Outer core
D. Inner core

Question 2: Pedagogy [30]

2.1 Teaching strategies [16]

John, a grade 5 teacher normally introduces his science lessons by asking learners to observe something and to ask questions about it. He then allows his learners to provide possible solutions to the questions raised. He proceeds by asking learners to search

for information, conduct experiments or discuss the topic on their own, in order to construct their own understanding of concepts, ideas or principles. Finally, he asks them to share their findings.

2.1.1 Name the teaching and learning strategy used by John. (1)

2.1.2 Discuss five (5) benefits and five (5) challenges of using the named teaching and learning strategy in South African Natural science classrooms. (10)

2.1.3 Suggest ways of addressing each of the challenges identified in question 2.1.2. (5)

2.2 Pedagogical Content Knowledge (PCK) (14)

Pedagogical Content Knowledge (PCK) is a form of practical knowledge used by teachers to guide their actions in highly contextualised classroom settings (Shulman, 1986). With the aid of a diagram, show the three main components of PCK and discuss in detail, how PCK guides the teaching of Natural Science.

Question 3: Assessment [30]

3.1 Jane, a novice teacher at Lesedi primary school noticed that the academic performance of most of her Grade 2 learners is poor. She believed that exposing her learners to a variety of assessments would enhance their academic performance. She therefore decided to assess the learners by asking each learner to read a paragraph, at the start of every lesson. Thereafter, she asks learners to recite a poem, and she gives prizes to successful learners. She then asks learners to read words and sentences on flash cards. Finally, she asks each learner to tell a story. During all these activities, Jane assess her learners' competency constantly.

Explain the weaknesses in Jane's methods of assessing her learners, using the principles of a good assessment. (15)

3.2 Discuss five (5) benefits of using contemporary (modern) assessments in science classrooms. Provide examples to substantiate your answers. (15)

SECTION B: TECHNOLOGY [30]

Question 4: Poster design [16]

Use **Appendix A** to design a poster suitable for grade 4 learners, based on "structures", and should focus on metals and non-metals. Your poster should be created on one full page.

Question 5: Natural Sciences and Technology CAPS aims [6]

The Natural Sciences and Technology CAPS curriculum aims to provide learners with opportunities to make sense of nature. It also encourages learners to ask questions about nature, which could lead to further research and investigation. There are three specific aims in the Natural Sciences and Technology CAPS document:

Specific Aim 1: 'Doing Science and Technology'

Specific Aim 2: 'Understanding and connecting ideas'

Specific Aim 3: 'Science, Technology and Society

Explain the main objective of each of these specific aims.

Question 6: Lesson design [8]

Design a lesson plan based on the topic of "strengthening of materials" for grade 6 learners. Use **Appendix A** to guide you, and answer the question on the template provided at the end of the question paper (**Appendix B**).

APPENDIX A

GRADE 5 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks (7 hours)	**Metals and non-metals**	**Properties of metals** • metals are used to make things because they have certain properties • some properties of metals - shiny - hard - strong - can be hammered, shaped (malleable) and made into thin wires without breaking (ductile) - melt at high temperatures • metals are mined from the Earth* **Properties of non-metals** • non-metals are used to make things because they have certain properties • some properties** of solid non-metals - dull - can break easily (brittle)	• **Investigating, comparing and recording** the properties of some metal objects (such as copper wire, coins, nails, cooking pots, knives and forks) and some non-metal objects (such as a piece of chalk, a stone, a pile of sand, a piece of coal) • **Investigating** ways to make old and dull metal objects shiny again	• Examples of metal objects such as copper wire, coins, nails, cooking pots, knives and forks • Examples of non-metal objects such as a piece of chalk, a pile of sand, a piece of coal
Notes: * How and where metals are mined is covered in Social Sciences ** There are many different non-metals and they have a variety of different properties. Here the focus is only on two of the most general properties				

GRADE 4 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: STRUCTURES				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks (7 hours)	**Strengthening materials**	**Ways to strengthen materials** • there are different ways to strengthen materials (such as paper) to build a strong structure: - we can fold paper into hollow pillars which are circular, triangular or square - we can roll paper into long thin tubes (struts)	• **Investigating** which shape of pillar is the strongest (can support the most weight). Draw a bar graph of the results • making paper struts by rolling into long thin tubes (struts)	• Paper, wooden dowels (30cm X 10mm) or sticks, sticky tape, paper fasteners to make struts
2 ½ weeks (8 ¾ hours)	**Strong frame structures**	**Struts and frame structures** • struts are joined into triangular shapes making a strong, stable structure, such as in roof trusses, bridges, cranes, pylons and skeletons (limb bones are struts) **Indigenous structures** • indigenous, traditional homes such as a Zulu hut (uguqa), Xhosa (rontabile and ungqu-phantsi) and Nama (matjieshuis) make use of a framework of struts (such as branches)	• looking at pictures of frame structures strengthened with struts • exploring ways to join struts to make a strong structure (joining struts into triangular and square shapes) • **designing, making and evaluating** a strong structure using tubular struts, such as a model of a tower, bridge, pylon, chair *[This can be used as a possible project]*	• Pictures of frame structures • Paper, wooden dowels (30cm X 10mm) or sticks, sticky tape, paper fasteners

APPENDIX B

<table>
<tr><th colspan="7">UNIVERSITY OF JOHANNESBURG - FACULTY OF EDUCATION - DEPARTMENT OF CHILDHOOD EDUCATION</th></tr>
<tr><th colspan="7">EDDITED LESSON PLAN TEMPLATE</th></tr>
<tr><td colspan="7"></td></tr>
<tr><td colspan="2">Title of the lesson</td><td colspan="5"></td></tr>
<tr><td colspan="2">Learning area</td><td colspan="2"></td><td>Content area</td><td colspan="2"></td></tr>
<tr><td colspan="2">Grade</td><td colspan="2"></td><td>Date</td><td></td><td>Duration of lesson</td></tr>
<tr><td colspan="7">PART 1: GUIDING QUESTIONS</td></tr>
<tr><td rowspan="2">WHAT FOR</td><td rowspan="2">What are the aims and objectives of the lesson?</td><td>Aims</td><td colspan="4"></td></tr>
<tr><td>Objectives</td><td colspan="4"></td></tr>
</table>

PART 2: PHASES OF THE LESSON	
Phases of the lesson	**The role of the teacher (teacher activities)** *(In this section please state clearly what the teacher is expected to do)*
Invitation phase (introduction to the lesson) *In this phase learners are invited to reflect on their own experiences in relation to the learning content. Learners' pre-knowledge plays an important role in learning. The purpose of this phase is also to invite learner interest and attention.*	

THE END