



UNIVERSITY OF JOHANNESBURG
FACULTY OF EDUCATION
NOVEMBER EXAMINATION 2016

PROGRAMME: PGCE
MODULE: TEACHING METHODOLOGY AND PRACTICUM:
 FET ENGINEERING GRAPHICS AND DESIGN
CODE: MPFEDY1
TIME: 2 hours
MARKS: 100
EXAMINER: Mr W Engelbrecht
MODERATOR: Mr J Oosthuizen (NWU)

(This paper consists of **ten (10)** pages)

INSTRUCTIONS

Read the following instructions carefully before answering the questions:

1. Answer all the questions.
2. You may consult the NCS, CAPS and your lesson plans.

QUESTION 1

- 1.1 Briefly explain the nature of engineering graphics and design. (3)
- 1.2 Briefly describe the rationale for Engineering Graphics and Design as a school subject. (3)
- (6)**

QUESTION 2

The official curriculum for Engineering Graphics and Design as contained in the CAPS document is the intended blueprint for teaching of the Department of Basic Education. A good teacher will realise that the CAPS can only be used as a guideline and will develop his/her own work schedule. Briefly describe all the aspects you will take into consideration when developing a work schedule for a grade for one year. **(8)**

QUESTION 3

Practical assessment tasks (PAT) are designed to develop and demonstrate a learner's ability to integrate a variety of skills in order to solve a problem. The PAT also uses the technological process to guide the learner on the steps that need to be followed to arrive at a solution for the problem at hand. The PAT consists of a design portfolio, working drawings and a product/model.

The following scenario (project brief) is given in the guidelines for a PAT in Engineering Graphics and Design:

You are employed as a draughtsperson by a drafting firm that specialises in providing design services on PORTABLE HAND-OPERATED JACKS/LIFTING DEVICES for MOTOR VEHICLES.

You are tasked with investigating and analysing the design features of existing portable hand-operated jacks/lifting devices, with a lifting capacity of less than 1 500 kg, and to come up with new or improved ideas. The improvement(s) to the jack/lifting device, device could be one or more of the following:

- To improve efficiency
- To strengthen its current design
- To simplify its application

The PAT requires the following stages:

- The first stage involves selecting/finding a suitable portable hand-operated jack/lifting device for motor vehicles, which must include mechanical parts/components and movement as part of its operation/function.

NOTE: You are not required to purchase a new jack/lifting device. The selected jack/lifting device should therefore be one that is already available to you.

- The second stage involves the dismantling of the selected jack/lifting device so that all the mechanisms and parts/components can be revealed, investigated and measured.
- The third stage involves the identification of ONE of the main parts/components or a combination of parts/components of the selected jack/lifting device which could be improved, modified or redesigned in some way. This will necessitate the application of the design process, as stipulated by the presentation requirements for this PAT.

Requirements and specifications of the selected jack/lifting device:

- The jack/lifting device, or a set of detailed photographs thereof if it is too large to submit, must be submitted as part of the PAT presentation.
- Your teacher must approve the jack/lifting device in order to ensure that it meets all the requirements and that a PAT of an appropriate higher-order Grade 12 complexity can be produced.
- The jack/lifting device must be portable and hand-operated with a lifting capacity of less than 1 500 kg. Electrical and/or pneumatically (air) operated jacks/lifting devices may therefore not be used.
- The jack/lifting device must be an assembly consisting of a minimum of FOUR different mechanical parts/components, e.g. a scissor jack, trolley jack, axle jack, floor jack, screw jack, bottle jack etc., with a lifting capacity of less than 1 500 kg that includes mechanical movement as part of its operation/function.

- 3.1 Distinguish between the two types of technological knowledge needed by the learner to successfully execute this task. Illustrate your answer by referring to examples. (10)
 - 3.2 Briefly describe the skills needed to complete the design. (4)
 - 3.3 It is stated in the PAT document that the learner's work should not leave the classroom/workshop. Briefly discuss the educational value of this statement. (4)
 - 3.4 Both formal and informal assessment should be conducted on the different stages that constitute the PAT. Briefly discuss how you will assess each stage. (10)
- (28)**

QUESTION 4

4.1 When teaching the learners a new skill the teacher will start the lesson with a more behavioural instructional approach and proceed towards a more constructivist instructional approach. Briefly motivate this way of teaching by referring to the following:

- Approach
- Focus
- Educator control
- Thinking
- Strategies.

(10)**QUESTION 5**

5.1 Write your name and student number on the lesson plan template provided. Use this lesson plan template and design a 40 minute lesson on the following:

- Grade: **10**
- Term: **1**
- Topic: **Geometrical construction**

Note: According to the CAPS, 16,5 hours are allocated for teaching geometrical construction. This is equal to approximately 25 periods of 40 minutes each.

(21)

5.2 Design a suitable assessment instrument for the lesson you designed in 5.1.

(8)**(29)****QUESTION 6**

Briefly discuss at least four (4) questions you will ask yourself to help you develop your own teaching philosophy as an Engineering Graphics and Design teacher. **(4)**

QUESTION 7

Read the passage below and answer the questions that follow:

Before the Industrial Revolution, product liability laws did not exist. The purchaser had the responsibility to buy carefully and to use the product prudently. If the product broke or caused damage, the manufacturer was not required by law to stand behind it, although the better manufacturers gave warranties with their products. Around the mid-1800s the concept of privity came into use. Privity means that liability could occur only between those who entered into a contract or a direct transaction. The courts held that the injured party could sue only the party in privity. Thus, if a consumer was blinded by a broken hammer, he or she could sue only the retailer who sold him the tool; the retailer, in turn, could sue only the wholesaler, who in turn could sue the manufacturer. A significant change occurred in 1916, when a court allowed an automobile owner to sue the manufacturer for negligence. This established the precedent that manufacturers are directly liable to consumers. Clearly, from the viewpoint of recovering monetary damages it is advantageous to directly sue the manufacturer, whose resources are likely to be much greater than those of a local retailer.

- 7.1 Analyse the passage above and briefly comment on the moral dilemma involved. (4)
- 7.2 Name four types of moral dilemmas that engineers are confronted with. (4)
- (8)**

QUESTION 8

- 8.1 Engineering and technology are constantly changing our environment to create a better world for us to live in. These developments have a huge impact on the natural environment. Briefly discuss this statement. (5)
- 8.2 Where in the Engineering Graphics and Design curriculum could you sensitise learners toward the above mentioned matter? (2)
- (7)**

TOTAL: 100

LESSON PLAN TEMPLATE

NAME: _____ STUDENT NUMBER: _____

SUBJECT: _____

PHASE: _____

GRADE: _____

TITLE/TOPIC OF LESSON: _____

Big idea 1	Big idea 2	Big idea 3

(2)

1.1 SITUATION ANALYSIS (Who? When? Where?)

- | |
|---|
| <ul style="list-style-type: none"> • What are the difficulties/limitations with regard to teaching these ideas? • What knowledge about learners' thinking will influence your teaching of these ideas? • What other factors will influence your teaching of these ideas? |
|---|

(2)

1.2 LEARNING OUTCOMES/SPECIFIC AIMS (What for?)

National Curriculum Statement (NCS), p. _____

Curriculum and Assessment Policy Statement (CAPS), p. _____

(2)

1.3. **LESSON OBJECTIVE** (What for?)

(1)

2.1. **LEARNING CONTENT** (What?)

What do you intend the learners to learn about this idea?

Procedural knowledge: (Thinking processes and skills) _____

(2)

Conceptual knowledge (Factual knowledge: Definitions, concepts, rules, etc.)

(2)

NATIONAL CURRICULUM STATEMENT (NCS)	CURRICULUM AND ASSESSMENT POLICY STATEMENT (CAPS)
Assessment standard(s), p. _____ (Indicators of content, processes and context that learners should master – only aspects you will be focussing on) <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	Focus/Content, concepts and skills, p. _____ <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

(3)

(3)

What else do you know about this idea (that you do not intend learners to know yet)?

(1)

2.2. **TEACHER ACTIVITIES** (How?)

2.2.1 Setting the context

Why is it important for learners to know this?

(3)

2.2.2 Instruction

What teaching procedures will you use (and particular reasons for using these to engage with this idea)?

a) Instructional approach

(2)

b) Instructional strategy(ies)

(2)

c) Instructional skill(s)

(2)

2.3. **LEARNER ACTIVITIES** (Types of tasks) (What for?)

(2)

2.4. **RESOURCES**

2.4.1 Instructional media

(2)

2.5. **QUESTIONS** (Questions to be asked: relate to Bloom's taxonomy)

(3)

2.6 **ASSESSMENT**

Which specific ways of ascertaining learners' understanding or confusion around this idea will you use?

National Curriculum Statement (NCS), p. _____

(1)

Assessment standard (Demonstration of learner achievement) _____

(2)

2.6.1 Type (Person, time, manner)

(3)

2.6.2 Technique

(1)

2.6.3 Instrument

(1)

$$[42 \div 2] = [21]$$

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