

**UNIVERSITY OF FORT HARE**

**MAT 304**

**MAIN DEGREE EXAMINATIONS**

**November 2018**

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**Time: 3 HOURS**

**Subject: History and Fundamental Concepts**

**Marks: 100**

**This paper consists of 3 pages including cover page**

**Internal Examiner**

**Dr S Ngcibi**

**External Examiner**

**Prof V Murali**

**Instructions**

**All questions may be answered**

**Write in full sentences**

**Sloppy work will be penalized**

### Question 1

1. What is the *aim* and *ambition* of a study of the History of Mathematics? [2]
2. If 12789 is a number expressed to the base 10, express it to the base 7. Verify that the expression is correct. [4]
3. Write short notes on *Babylonian mathematics*. [5]
4. While very little is known of ancient **Hindu** mathematics, the earliest history that comes from a city at **Mohenjo Daro** shows living conditions of people there that surely needed basic mathematics and **engineering**. Elaborate on this history. [5]
5. (a) Give some history of Hindu methods of computing with the *positional numeral system*, in particular their **algorithm** or method of computing. [4]  
(b) Illustrate their method of addition with the addition of 679 and 568. [2]

### Question 2

1. Describe the pattern of **material axiomatics** also known as **postulational method** [6]
2. Give a short history of **Euclid's Elements**, and list 2 'defects' in its logical structure. [6]
3. The only Euclidean tools are the **straightedge** and **compass**. Write the statement that shows that the two instruments are actually *equivalent*. [3]
4. What were the **Dark Ages**? [2]
5. (a) Discuss *Fermat's History* in detail. [6]  
(b) State and explain Fermat's *fundamental principle of analytic geometry*. [4]

### Question 3

1. State accurately the famous three *laws of planetary motion*. [6]
2. What were the four general steps in the development of *Calculus*? [4]
3. State the **Zeno's paradox** in relation to magnitude, and explain what it means. [4]
4. Discuss the so called 'Three important events' of the nineteenth century. [6]
5. Describe in detail the three famous problems'? [6]

#### Question 4

1. Describe and sketch Pythagoras' dissection type of proof of 'his' theorem. [5]
2. Give the name of the mathematician in question, in each case:
  - (a) His books on geometry and arithmetic were standard texts in the monastery schools for hundreds of years. [2]
  - (b) He was also one of the people who used basic Calculus without realizing that this was a science all on its own.. [2]
  - (c) His astronomical observations led him to support the Copernican theory that the planets revolve around the Sun. [2]
3. Discuss the lives and major mathematical works of the mathematicians listed below.
  - (a) **Euler** [5]
  - (b) **Riemann** [5]
  - (c) **Leibniz** [5]

END OF EXAMINATION