NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ENGINEERING

DEPARTMENT OF FIBRE AND POLYMER MATERIALS ENGINEERING

PLASTICS TECHNOLOGY I

TFE 3101

First Semester Examination Paper

December 2024

This examination paper consists of 2 pages.

Time Allowed: **3 hours**

Total Marks: **100**

Special Requirements: N/A

Examiner's Name: **Prof. L. N. Ndlovu**

INSTRUCTIONS

1. Answer **ANY FOUR** questions.
2. The first fifteen minutes should be spent reading the question paper and making notes.
3. **DO NOT** open your answer sheet until told to do so.
4. Marks will be awarded for skill in appreciating the scope of questions, clarity of argument and conciseness of presentation as well as for the knowledge displayed by a candidate.

MARK ALLOCATION

QUESTION	MARKS
1.	**25**
2.	**25**
3.	**25**
4.	**25**
5.	**25**

QUESTION 1

a. Define the following terms:
   (i) Thermoplastics. **[2 Marks]**
   (ii) Curing. **[2 Marks]**
   (iii) Additives. **[2 Marks]**
   (iv) Regrind. **[2 Marks]**
   (v) Palletisation. **[2 Marks]**

b. Distinguish the following mixing techniques:
   (i) Distributive Mixing. **[5 Marks]**
   (ii) Dispersive mixing. **[5 Marks]**
   (iii) Laminar mixing. **[5 Marks]**

QUESTION 2

a. List any seven physicochemical properties which can be achieved using compounding ingredients. **[7 Marks]**
b. Define compounding and state its objectives. **[8 Marks]**
c. Outline the advantages of compounding. **[10 Marks]**

QUESTION 3

a. Explain the functions of the following additives:
   (i) Nucleating agents. **[3 Marks]**
   (ii) Plasticisers. **[6 Marks]**
   (iii) Antifogging agents. **[6 Marks]**
b. Name two classes of lubricants and outline their functions in plastics. **[10 Marks]**

QUESTION 4

a. Explain in detail, methods used in production of cellular/foam plastics. **[10 Marks]**
b. Discuss five factors to consider on regrind usage in compounding. **[15 Marks]**

QUESTION 5

With illustrations, describe compounding using a twin-screw extruder and highlight the possible configurations of the screws in the barrel. **[25 Marks]**

END OF EXAMINATION QUESTION PAPER