FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI
SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY
DEPARTMENT OF POLYMER AND TEXTILE ENGINEERING
2018/2019 RAIN SEMESTER EXAMINATION

INTRODUCTION TO POLYMER AND TEXTILE ENGINEERING PTE 202
DATE: 22/10/2019 **TIME: 3 HOURS.**

Instruction: Answer question number one and any other four questions

1a. Write briefly on the following: (i). Polymer (ii). Polymerization (iii). Degree of polymerization (iv). Functionality and (v). Heterochain polymers.

b. Distinguish between: (i). Thermoplastics and Thermosets (ii). Step-growth and Chain-growth polymerizations.

c. State the condition (s) for polymerization reactions to produce non-linear polymers.

2a. Write the chemical formulae of the following polymers: (i). Poly oxymethylene (ii). Poly (methyl methacrylate). (iii). Poly (vinyl alcohol) (iv). Poly acrylonitrile (v). Poly vinyl acetate.

b. Using chemical formulae only, show the copolymerization reactions between: (i) Styrene and acrylonitrile (ii) Acrylonitrile, styrene and polybutadiene.

c. Many thermoplastics are now accepted as engineering materials. Discuss.

3a. (i) How are free-radicals produced (ii) Using equations only, show the thermal decomposition of Benzoyl peroxide into free-radicals (iii) What are initiators.

b. Write briefly on the following steps during chain-growth (free radical) polymerization reactions:(i) Initiation (ii) Propagation and (iii) Termination

c. (i) Calculate the number-average molecular weight, $\bar{M}n$, weight-average molecular weight, Mw, and Z-average molecular weight, Mz for three molecules having molecular weights of 1.00×10^5, 2.00×10^5, and 3.00×10^5.
(ii) State the relationship between ($\bar{M}n$), ($\bar{M}w$) and ($\bar{M}z$), for: (i). Heterogeneous systems and (ii). Homogeneous systems.

4a. Mention three (3) responsibilities of a quality control officer in a polymer and textile plant.

b. Calculate the linear density of a 33.2-tex continuous filament acetate yarn.

c. Enumerate three (3) primary properties of textile fibres.

d. State any three (3) objectives of the speed frame.

5a. Define the following textile terms: (i) Technical fibres (ii) Ultimate fibres (iii) Filaments

b. What is the worsted count of a 30-tex yarn? Take constant for worsted count and tex as 885.8

c. State any three (3) non-cellulosic based synthetic fibre.

d. A fibre has an elastic recovery of 100%. Explain what you understand by that statement

6a. What do you understand by yarn count of a textile fibre.

b. Calculate the moisture regain of a fibre whose weight at room condition is 36 g and the oven dry weight is 30 g.

c. Enumerate the general plant layout of a textile manufacturing plant.