NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, Plot 91 Cadastral Zone, Nnamdi Azikiwe Express Way, Jabi - Abuja.

FACULTY OF SCIENCES
DEPARTMENT OF PURE AND APPLIED SCIENCES
JULY 2017 EXAMINATION

COURSE CODE: **CHM 302**

COURSE TITLE: **POLYMER CHEMISTRY 1**

TIME: **2 HOURS**

INSTRUCTION: **Question one is compulsory. Answer question one and any other three questions.**

QUESTION ONE

1ai) Differentiate between the following:

i. Polymers
ii. Monomers
iii. Polymerization (3 marks)

1aii) Expatiate on condensation polymerization. (6 marks)

1bi) Which will you prefer as an industrialist to produce polythene between the following methods? Justify your answer.

i.) Process of high pressure [ICI] technique which involve minute amount of oxygen as free radical initiator,1500atm and temperature of 200^0C as operating condition.The polymeric chain produced is of low density of 0.92g/cm^3 and has methyl branching.

ii.) Zeigler process which occurs at 50-75^0C and 2-7atm, $TiCl_4$ and $Al(CH_3)_3$ act as catalyst. Polymerization is by ionic mechanism. Product obtained has moderate high density of 0.945cm^3, with softening temperature of 120-128^0C. ($4^1/_2$ marks)

1bii) Explain briefly crystallinity in polymers. (5 marks)

ci) What factors determine the rate of dissolution of polymers. . ($1^1/_2$ marks)

1cii) How does polymer biodegradation and polymer degradation differ? (5 marks)

QUESTION TWO

2a) Write short note on the following:

i. Homopolymers
ii. Bifunctional
iii. Copolymers
iv. Terpolymers ($10^{1}/_{2}$ marks)

2b) Give the name of the polymer formed from the monomers below and state their applications.

a. Vinyl acetate
b. Tetrafluoroethylene
c. Vinyl alcohol ($4^{1}/_{2}$ marks)

QUESTION THREE

3a) Enumerate on the effect of chain length on the physical properties of polymers.

(9 marks)

3b) Highlight the main differences between elastomers and fibers. (6 marks)

QUESTION FOUR

4a) What is the effect of the following on the solubility of polymers.

i. Temperature
ii. Pressure
iii. Polarity
iv. Surface area (6 marks)

4b) Explain briefly isotactic, syndiotactic and atactic polymer configurations, and state their effect on polymer properties. (9 marks)

QUESTION FIVE

5a) Discuss addition polymerization by radical mechanism. (9 marks)

5b) Outline the difference between addition and condensation polymerization. (6 marks)