

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI  
SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY  
DEPARTMENT OF POLYMER AND TEXTILE ENGINEERING

2014/2015 HARMATTAN SEMESTER EXAMINATION

PTE 521: POLYMER PROCESSING ENGINEERING TECHNOLOGY III

TIME: 2½ HRS DATE: APRIL 27, 2015. INSTRUCTIONS: ANSWER FIVE QUESTIONS



1(a) State the mixture rule used in composites formulation

(b) Using the **parallel model** for estimation of modulus of fibre reinforced composites (FRPs),

prove that:

$$\frac{1}{E_{total}} = \sum_{i=1}^n \frac{\delta_i}{E_i}$$

(c) Explain one practical application of composite materials in the renewable energy industry

2(a) List any five (5) composites fabrication techniques

(b) Explain any three (3) out of the 5 composite fabrication techniques mentioned above

3 (a) With the aid of diagrams where applicable, explain any four (4) types of casting techniques

(b) What are the differences between casting and injection moulding

(c) List four (4) polymer products that could be made by casting technique

4 (a) Why do we machine plastics

(b) Describe the various types of chips formed during plastic machining

(c) What are the factors that affect the cutting action in plastics

5 (a) Define the following engineering terms

- i. Strength of a material
- ii. Ductility
- iii. Brittleness
- iv. Plasticity

(b) Discuss the effect of work material properties in plastic machining

6 (a) Write short notes on the following as it relates to joining polymeric materials

- (i) Mechanical fastening (ii) Adhesive/Solvent bonding (iii) Welding

(b) Classify the different welding methods of polymeric materials.