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國立臺北科技大學

九十四學年度有機高分子研究所入學考試

材料科學與工程試題

填准考證號碼

注意事項：

1. 本試題共 7 題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. 解釋下列名詞 【各 5 分】

甲、Eutectic point (需畫相圖)
乙、Gibbs phase rule
丙、Brittle vs. tough plastics (需畫圖)
丁、Critical radius of nuclei (需畫圖)
戊、Bragg's law (需畫圖)
己、Extrinsic semiconductor (需畫圖)
庚、Arrhenius rate equation
辛、Fick's first and second law of diffusion

2. Is glass transition Tg is 'first order' or 'second order' transition? Why? How to measure Tg? 【10 分】

3. Using graph of Young's modulus vs. temperature to discuss 5 regions of visco-elastic behavior for polymers: linear amorphous, cross-linked and semi-crystalline. Specify Tg (glass transition temperature) in graph. What is typical Young's modulus value of elastomers and plastics?

【10 分】

4. What is the definition of engineer train, true stain and Poisson's ratio? What is typical Poisson's ratio value of elastomers and plastics?
【10 分】

5. What is "stress relaxation" and creep" behavior? Use Maxwell model to describe stress relaxation behavior (derive equation and draw a graph). Define relaxation time. 【10 分】

6. What is the definition of refractive index, n? What is the critical angle for light to be totally reflected when leaving a flat plate of glass (n =1.51) and entering air? 【10 分】

7. What is the definition of stress intensity factor, K_I, and fracture toughness (K_{IC})? Describe the property (behavior) of a material related to its K_{IC}.
【10 分】