BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BE **SEMESTER : III**
BRANCH: CHEMICAL **SESSION : MO/19**

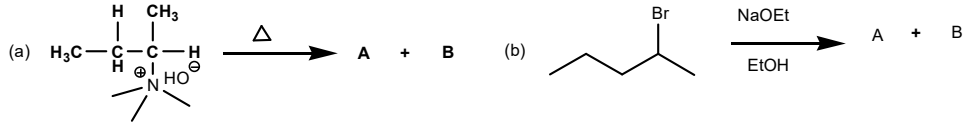
SUBJECT: CL206 CHEMICAL PRINCIPLES FOR CHEMICAL ENGINEERS

TIME: 3.00Hrs. **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) What is the difference between nucleophilicity and basicity? How nucleophilicity affect the rate of SN2 reaction? What is the increasing order of nucleophilicity of the following nucleophiles: $RCOO^-$, NH_2^-, $CH3O^-$, H_2O, $NO3^-$, CN^-? [5]

Q.1(b) What are the major and minor products of the following reactions? [5]



Q.2(a) What is law of Equipartition of energy? Illustrate Maxwell-Boltzmann speed distribution function. [5]

Q.2(b) Find the adiabatic exponent γ for mixture of μ 1 moles of monoatomic gas and μ2 moles of a diatomic gas at normal temperature. [5]

Q.3(a) Determine the rate law and reaction order with respect to each reactant and the overall order for the following reactions: (a) $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$; (b) $CH_3CHO(g) \rightarrow CH_4(g) + CO(g)$; (c) $H_2O_2(aq) + 3I^-(aq) + 2H^+(aq) \rightarrow I^{3-}(aq) + 2H_2O(l)$. [5]

Q.3(b) The decomposition of hydrogen iodide follow this reaction: $2HI(g) \rightarrow H_2(g) + I_2(g)$, The reaction has rate constants of $9.51x10^{-9}$ L/mol·s at 500 K and $1.10x10^{-5}$ L/mol·s at 600 K. Determine E_a. [5]

Q.4(a) Compare prokaryotic and Eukaryotic cells in terms of cell structure and cell size. [5]

Q.4(b) If one starts with 10,000 cells in a culture that has a generation time of 2 h, how many cells will be in the culture after 4, 24, and 48 h? [5]

Q.5(a) Briefly discus on the condensation and addition polymerization reactions with proper examples. [5]

Q.5(b) Demonstrate the reaction mechanism involve in synthesis of polyethylene by Ziegler-Natta catalyst. [5]

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