MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR
FIRST SECOND SEMESTER

SCHOOL OF PURE APPLIED AND HEALTH SCIENCES
MASTER OF SCIENCE IN CHEMISTRY

COURSE CODE: CHE 8210

COURSE TITLE: APPLIED CHEMISTRY

DATE: 13/5/2024 **TIME: 1100-1300 HRS**

INSTRUCTIONS TO CANDIDATES

Answer Question **ONE** and any other **TWO** questions.

QUESTION ONE (20 mks)

a) Interpret the terms stripping and rectification as used in distillation**(2mks)**
b) Illustrate one application of unit operations **(2mks)**
c) A solution of common salt in water is prepared by adding 20 kg of **salt** to 100 kg of **water**, to make a liquid of density 1323 kg/m^3. Calculate the concentration of salt in this solution as a (a) weight fraction, (b) weight/volume fraction, (c) mole fraction, (d) molar concentration**(4mks)**
d) i) Justify the application of instrumentation in a chemical plant**(3mks)**
   ii) Account for the benefit of research in industry **(1mk)**
e) With examples assess design constraints**(4mks)**
f) Debate the preference of recycling to disposal of waste**(4mks)**

QUESTION TWO

a) i) Distinguish material balance from energy balance **(1mk)**
   ii) Analyze the aspects that form the basis for preparation of a process flow chart**(4mks)**
   iii) Examine the importance of material and energy balances **(3mks)**
   iv) What two guidelines form the basis for preparation of material and energy balance **(2mks)**
b) i) Examine the three aspects of transport phenomena**(6mks)**
   ii) A plastic panel of area 929 cm^2 and thickness 0.640 cm was found to conduct heat at a rate of 3 w at steady state with temperature T_1 = 24 ^oC and T_2 = 26 ^oC imposed on the two main surfaces. What is the thermal conductivity of the plastic. **(4 mks)**

QUESTION THREE

a) Describe and justify the existence of patents **(4mks)**
b) In your judgement, is the research component necessary in industry **(2mks)**
c) What key results accrue from research in chemical processing **(4mks)**
d) Evaluate froth floatation**(4mks)**
e) Discuss the two principles applied in size reduction machines **(4mks)**
f) Identify and classify any two unit operations in a sugar manufacturing plant **(2mks)**

QUESTION FOUR

a) Recognize the two types of flow sheets**(2mks)**
b) What is the importance of flowsheets **(2mks)**
c) Distinguish the two types of line symbols on a flow sheet**(2mks)**
d) Rate the application of incinerators as far as environmental conservation is concerned **(4mks)**
e) Inspect the two methods applied to obtain activated carbon which serves as an adsorbent in chemical industry **(4mks)**
f) Distinguish primary recycling from mechanical recycling of plastics **(2mks)**
g) Describe the recycling of any two waste materials **(4mks)**

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