UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	CHEMICAL PROCESS AND SUSTAINABILITY
COURSE CODE	:	DAK 22103
PROGRAMME	:	DAK
EXAMINATION DATE	:	DECEMBER 2019 / JANUARY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1 (a) Most of the industrial plants have built up some complex process lines just to meet the target in getting an efficient productions.

(i) In order to achieve a sustainability environment in the plant, describe the **two (2)** key factors to be considered.

(2 marks)

(ii) Explain **five (5)** possible tools that may help in achieving the sustainable objective.

(5 marks)

(iii) As the steps were taken, determine **three (3)** advantages to the industry.

(3 marks)

(b) Catalysis is important in ensuring a sustainable chemical processes in the industry. It may help in accelerating the chemical reactions for the purpose of maintaining the dynamic plant operation.

(i) Describe the **three (3)** examples of catalysis applications in the recent studies.

(3 marks)

(ii) Determine **three (3)** possible industries that may apply the catalysis.

(3 marks)

(c) Hazards might be predicted if the situation and environment expressed their own risks.

(i) If there is a chemical industry would like to apply a sustainable environment throughout the plant, compute the **three (3)** methods of green chemistry suitable to be applied in the industry to reduce the industrial hazards.

(3 marks)

(ii) State the approaches in designing a safer chemical process.

(2 marks)

(iii) Describe **four (4)** general strategies should be taken in reducing hazards with engineering when conducting a process design.

(4 marks)

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Q2 (a) A sustainable industrial chemistry can be achieved when there are actions in designing a proper plant processes. Catalyst is one of the effective tools in giving rise to a better stoichiometric reactions.

(i) Define the meaning of catalyst.

(1 mark)

(ii) Relate the **three (3)** importance concept of catalyst that may beneficial for sustainable chemical productions.

(3 marks)

(iii) Indicate **three (3)** possible driven factors that contribute to high demand of catalyst.

(3 marks)

(b) There are emerging concept of catalysts have been found by the researchers in order to achieve the specific functions of processes.

(i) Demonstrate **four (4)** types of catalyst used in industries.

(8 marks)

(ii) Distinguish the differences between homogenous and heterogenous catalysts.

(6 marks)

(iii) Exhibit the concept of biocatalyst action.

(4 marks)

Q3 (a) The ecosystems are interconnected and always conveying the information about the nature. Every living things and natural occurrence are translated into ecological indicators.

(i) Describe **three (3)** benefits in having ecological indicators.

(3 marks)

(ii) Explain the **three (3)** types of footprints that detect the changes of ecosystems.

(6 marks)

(iii) Determine **four (4)** specific actions that were done to reach the focus on relevant long term public health and ecosystem sustainability.

(4 marks)

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(b) Metrics are the assessment of the engineering designs that may function to evaluate the environmental impacts and ecosystems efficiency.

(i) Demonstrate **five (5)** categories in sustainable metrics that relates to every aspect of living things.

(10 marks)

(ii) Express the objectives of developing Environmental Performance Index (EPI).

(2 marks)

Q4 (a) Renewable energy is the transformation that correlates in providing the same resources for the purpose of sustainability. In order to ensure the supplies are continuously meet the demands, the advanced research are carried out towards the pilot scale.

(i) Identify **four (4)** different sources of renewable energy.

(4 marks)

(ii) Explain the **three (3)** types of solar radiation.

(6 marks)

(iii) Describe the characteristics of tidal power.

(3 marks)

(b) Biofuel is one of the renewable energy that aims to completely replace the use of petroleum.

(i) Identify the drawbacks during the first generation of biofuels.

(3 marks)

(ii) Outline the process of producing lipids from microorganisms to generate biodiesel.

(4 marks)

(iii) Explain the advantages of using biomass feedstock to produce biofuel.

(5 marks)

- END OF QUESTIONS -

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