



UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF CHEMICAL AND BIO-ENGINEERING TECHNOLOGY

FINAL EXAMINATION
OCTOBER 2025 SEMESTER

COURSE CODE : CPD22803
COURSE TITLE : OIL & FAT PROCESS TECHNOLOGY
PROGRAMME NAME : DIPLOMA IN CHEMICAL ENGINEERING TECHNOLOGY
DATE : 28 JANUARY 2026
TIME : 9:00AM - 12:00PM
DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
 2. This question paper is printed on both sides of the paper.
 3. This question paper consist of TWO sections.
 4. Section A consist 25 MCQ or EMQ questions. Answer ALL questions.
 5. Section B consist of four questions. Answer THREE (3) questions only.
 6. Please write your answer on the answer booklet provided.
 7. Please answer all questions in English only.
 8. Please answer MCQ/EMQ questions using OMR sheet. ☒ Tick if applicable
 9. Refer to the attached Formula/ Appendies. ☐ Tick if applicable
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THERE ARE 12 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 25 marks)

Answer ALL questions.

Please use the objective answer sheet provided.

1. Select the substances that are mainly removed during deodorization.
 - A. Waxes
 - B. Triglycerides
 - C. Phosphatides
 - D. Free fatty acids and odoriferous compounds

2. The following adsorbents can be used as a bleaching agent in the bleaching of edible oil except _____.
 - A. Air
 - B. Bleaching earth
 - C. Activated carbon
 - D. Silica

3. Identify the factor that does NOT significantly influence adsorption equilibrium during bleaching.
 - A. Temperature
 - B. Viscosity
 - C. Density of oil
 - D. pH

4. The main purpose of the bleaching process in edible oil refining is _____.
- A. To increase oil viscosity
 - B. To remove colour, pigments, and oxidizing bodies
 - C. To improve oil yield
 - D. To remove free fatty acids only
5. Wet acid degumming is especially suitable for oils with _____.
- A. High wax content
 - B. Low phosphatide content
 - C. High non-hydratable gum content
 - D. High moisture content
6. Degumming is considered a compulsory step in _____.
- A. Chemical refining
 - B. Physical refining
 - C. Enzymatic refining
 - D. Alkali refining
7. Identify the common step for both physical and chemical refining.
- A. Bleaching
 - B. Alkali washing
 - C. Alkali neutralization
 - D. Acid degumming

8. Identify the process that is NOT involved in the chemical refining of crude palm oil.
- A. Neutralization
 - B. Deodorization
 - C. Degumming
 - D. Dry fractionation
9. Identify a deodorization system that offers high heat recovery and low operating cost.
- A. Atmospheric system
 - B. Continuous system
 - C. Batch system
 - D. Semi-continuous system
10. Identify which process can generate soapstock as a by-product.
- A. Neutralization
 - B. Degumming
 - C. Bleaching
 - D. Deodorization
11. For physical refining, the phosphorus content after degumming should be reduced to _____.
- A. Less than 30 ppm
 - B. Less than 100 ppm
 - C. Less than 10 ppm
 - D. Less than 50 ppm

12. Deodorization of edible oil is best described as a process of _____.
- A. Chemical neutralization under pressure
 - B. Solvent extraction of impurities
 - C. Vacuum–steam distillation at high temperature
 - D. Adsorption using bleaching earth
13. Excessively high deodorization temperature may cause _____.
- A. Reduced energy consumption
 - B. Increased polymerization and trans-fat formation
 - C. Improved oil stability
 - D. Lower oxidation rate
14. Increasing deodorization temperature will generally _____.
- A. Increase vapor pressure of volatile components
 - B. Decrease volatility of odoriferous compounds
 - C. Reduce stripping efficiency
 - D. Increase deodorization time
15. In physical refining, free fatty acids are removed mainly by _____.
- A. Steam distillation during deodorization
 - B. Solvent extraction
 - C. Filtration
 - D. Caustic neutralization

16. Choose the substance that is NOT an odoriferous substance removed during deodorization.
- A. Triglycerides
 - B. Aldehydes
 - C. Alcohols
 - D. Ketones
17. Silica adsorbents are especially effective in removing _____.
- A. Carotenoids directly
 - B. Triglycerides
 - C. Saturated fatty acids
 - D. Polar contaminants such as soaps and trace metals
18. Identify the major disadvantage of natural bleaching earth.
- A. High cost.
 - B. Increase in free fatty acid content.
 - C. Poor adsorption of light pigments.
 - D. High oil retention and limited efficiency for dark pigments.
19. Identify the adsorption isotherm that best describes the bleaching of palm oil.
- A. Freundlich isotherm
 - B. BET isotherm
 - C. Henry's law
 - D. Langmuir isotherm

20. Bleaching of edible oil is mainly based on the principle of _____.
- A. Distillation
 - B. Crystallization
 - C. Neutralization
 - D. Adsorption
21. In water degumming, too much water can cause _____.
- A. Increased phosphorus content
 - B. Incomplete gum hydration
 - C. Dark oil color
 - D. Excess oil loss through hydrolysis
22. Phosphatides present in crude oil are mainly classified as _____.
- A. Simple and complex phosphatides.
 - B. Hydratable and non-hydratable phosphatides.
 - C. Acidic and basic phosphatides.
 - D. Saturated and unsaturated phosphatides.
23. The main purpose of the degumming process in edible oil refining is _____.
- A. To improve colour of oil.
 - B. To remove pigments.
 - C. To remove free fatty acids.
 - D. To remove phosphatides and colloidal impurities.

24. Identify two main effects involved in the oil during deodorization.
- A. Neutralization and filtration
 - B. Extraction and condensation
 - C. Stripping and temperature effect
 - D. Adsorption and oxidation
25. Select the chemical that is commonly used in the neutralization step of chemical refining.
- A. Sodium hydroxide
 - B. Sulfuric acid
 - C. Citric acid
 - D. Phosphoric acid

SECTION B (Total: 75 marks)

Answer **THREE (3)** questions only.

Please use the answer booklet provided.

Question 1

Analysis is crucial, particularly for evaluating products and developing new products.

- (a) A crude edible oil sample shows a rapid increase in free fatty acids and develops off-flavour during processing. Identify the possible non-fatty impurity presence in the sample and apply ONE Quantitative and ONE Qualitative analysis to determine it.

(7 marks)

- (b) Two edible oils have iodine values of 80 and 130, respectively. Apply the concept of iodine value to compare the degree of unsaturation and stability of these oils.

(5 marks)

- (c) A finished edible oil has poor consumer acceptance due to rancid odour. Select TWO rancidity tests and explain how the tests result relates to oil quality.

(8 marks)

- (d) During storage, an edible oil shows a gradual loss of oxidative stability. Explain how tocopherol analysis can be used to evaluate this change in oil quality.

(5 marks)

Question 2

Fats and oils are essential raw materials and functional ingredients for several products such as soap, confectionery, bakery, ice creams, emulsions and sauces, shortenings, margarines, and other specially tailored products.

- (a) Use the amphiphilic properties in the surfactants to explain how surfactants remove oil-based dirt from fabric during the washing process.

(10 marks)

- (b) Compare anionic and nonionic surfactants and justify their suitability for different cleaning applications based on their properties.

(8 marks)

- (c) A margarine product shows oil separation and poor spreadability during storage. Examine the possible causes based on emulsion stability and processing conditions and suggest improvements.

(7 marks)

Question 3

An edible oil refinery wants to separate palm oil into palm olein for cooking oil and palm stearin for solid fat applications.

- (a) Apply the fractionation process to explain how this separation is carried out and the purposes of carrying out the fractionation process.

(9 marks)

- (b) Explain the key stages involved in the fractionation process.

(4 marks)

- (c) Relate the factors of temperature, reaction time and agitation in the formation and character of the crystals during fractionation.

(6 marks)

- (d) Describe the Lanza Fractionation (Detergent Fractionation) method in fractionation.

(6 marks)

Question 4

In palm oil refining, the crude palm oil (CPO) is purified by removing undesirable components and impurities through degumming, bleaching, and deodorization processes.

- (a) Explain why degumming is a critical step for physical refining but optional in chemical refining.

(5 marks)

- (b) A palm oil refiner observes high peroxide values after the bleaching process. Apply your knowledge to suggest possible causes during the bleaching process.

(5 marks)

- (c) A crude palm oil sample contains high free fatty acids (FFA) but low gum content. Select the most suitable refining method for this oil and describe the main processing steps involved in the refining process.

(10 marks)

- (d) Describe the effect of excessive temperature during deodorization process.

(5 marks)

END OF EXAMINATION PAPER

