UNIVERSITI KUALA LUMPUR
ROYAL COLLEGE OF MEDICINE PERAK

FINAL EXAMINATION
MARCH 2026 SEMESTER

COURSE CODE	:	RCB30903
COURSE NAME	:	HERBAL DRUG TECHNOLOGY
PROGRAMME NAME	:	BACHELOR IN PHARMACEUTICAL TECHNOLOGY (HONOURS)
DATE	:	29 JUNE 2026
TIME	:	9.00 AM – 11.00 AM
DURATION	:	2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read CAREFULLY the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of TWO (2) sections; Section A and Section B.
4. Answer ALL questions in Section A. For Section B, answer THREE (3) questions WITH AT LEAST ONE (1) question from question 3 or question 4.
5. Please write your answers on the OMR answer script and answer booklet provided.
6. Answer all questions in English language ONLY.

THERE ARE 10 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

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SECTION A (Total: 40 marks)

I) MULTIPLE CHOICE QUESTIONS (20 marks)

INSTRUCTION: Answer ALL questions.

Use the OMR sheet provided.

1. Select the herbal medicinal product delivered through oral routes.
   - A. Suppository
   - B. Lotion
   - C. Capsule
   - D. Infusion
   - E. Poultice

2. Choose the **CORRECT** statement about aqueous maceration for plants.
   - A. The maximum preparation time is 2 hours.
   - B. It is a suitable method for chemically sensitive plant samples.
   - C. The preparation method is preferred to be conducted at high temperatures.
   - D. Only dried plant samples can be used.
   - E. Plant samples must be immersed in 100% alcohol.

3. Identify the **CORRECT** preparation techniques of herbal products.
   - I. Poultice
   - II. Tincture
   - III. Capsule
   - IV. Compress
   - A. I and II
   - B. II and III
   - C. I, II, and III
   - D. I, III, and IV
   - E. II, III, and IV

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4. Select the extraction method that can only be performed by a skilled operator.

I. Supercritical fluid extraction
II. Ultrasound-assisted extraction
III. Aqueous extraction
IV. Cold-pressed extraction

A. I and II
B. II and III
C. III and IV
D. I, II, and IV
E. II, III, and IV

5. Identify polar aprotic solvents.

I. Dimethyl formamide
II. Dimethyl sulfoxide
III. Hexane
IV. Acetonitrile

A. I and II
B. II and III
C. I, II, and IV
D. I, III, and IV
E. I, II, III, and IV

6. Identify the advantage of percolation extraction method.

A. It is time consuming.
B. It is suitable for a potent drug.
C. Only can be performed by a skilled operator.
D. Prolonged contact with solvent is required.
E. It is an incomplete extraction.

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7. Select the parameters that influence the efficiency of microwave-assisted extraction method.

I. Size of microwave
II. Radiation power
III. Radiation frequency
IV. Room temperature

A. I and II
B. II and III
C. III and IV
D. I, II, and IV
E. II, III, and IV

8. Choose the best isolation method to separate the mixture of organic components based on polarity of solvents.

A. Sublimation
B. Fractional precipitation
C. Distillation
D. Liquid-liquid extraction
E. Freeze-dryer

9. Select the **CORRECT** separation principle of ion-exchange column chromatography.

A. Separation is based on molecular size.
B. Separation is based on molecular affinity.
C. Separation is based on ionic charges.
D. Separation is based on ion substitution.
E. Separation is based on compound evaporation power.

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10. Identify the suitable solvent removal method for an aqueous herbal extract.

I. Rotary evaporation
II. Freeze-drying
III. Speed-vacuum
IV. Spray-drying

A. I and II
B. I and III
C. I, II, and III
D. I, III, and IV
E. II, III, and IV

11. Choose the phase that acts as a sample transporter in chromatography separation technique.

A. The mobile phase
B. The liquid phase
C. The solid phase
D. The gaseous phase
E. The immiscible phase

12. Select the common stationary phase used in thin layer chromatography.

A. Inert nitrogen gas
B. C18 Sepharose column
C. Solid silica dioxide plate
D. Cellulose acetate paper plate
E. Nonpolar organic solvent

13. Identify the significance of particle size determination in product formulation.

I. Determines the formulation stability.
II. Improves sample bioavailability.
III. Ensures the suitability of the formulation administration route.
IV. Extend the shelf-life of finished products.

A. I and II
B. II and III
C. III and IV
D. I, II, and III
E. II, III, and IV

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14. Select the principles of International Conference on Harmonisation (ICH) guidelines.

I. To recommend storage conditions for products.
II. To develop manufacturing processes.
III. To establish a re-test period for drug substances.
IV. To establish the shelf-life for products.

A. I and II
B. II and III
C. III and IV
D. I, II, and IV
E. II, III, and IV

15. Choose the **CORRECT** property of herbal cool cream.

A. Disappears immediately once applied to the skin.
B. The cream emulsion system starts to melt upon interaction with skin.
C. Provides a cooling sensation upon application to the skin.
D. Cream formulation must contain a high percentage of menthol.
E. A base cream for the incorporation of active ingredients.

16. Identify the essential steps for utilisation of herbal skincare.

I. Polishing
II. Cleansing
III. Moisturising
IV. Nourishing

A. I and II
B. II and III
C. III and IV
D. I, II, and IV
E. II, III, and IV

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17. Select the **CORRECT** statements regarding herbal industry in Malaysia.

I. Herbal monograph is available in Malaysia.
II. Malaysian Pharmacopoeia is used as reference.
III. Traditional medicine is sold as over-the-counter medicine.
IV. Registration for traditional medicine is through control of drugs and cosmetics regulations.

A. I, II, and III
B. I, II, and IV
C. I, III, and IV
D. II, III, and IV
E. I, II, III, and IV

18. Select the aspects that must be followed by a global supplier of herbal medicine.

I. Proper botanical identification of all medicinal plants.
II. Research documents are not presented to the public.
III. Characterisation of acute ingredients including inorganic constituents.
IV. Standardisation to ensure uniformity.

A. I, II, and III
B. I, II, and IV
C. I, III, and IV
D. II, III, and IV
E. I, II, III, and IV

19. Select the **CORRECT** sectors that utilise herbal products in Malaysia.

I. Food
II. Healthcare
III. Agriculture
IV. Nutraceuticals

A. I, II, and III
B. I, II, and IV
C. I, III, and IV
D. II, III, and IV
E. I, II, III, and IV

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20. Identify the challenges faced by herbal industry in Malaysia.

I. Lack of biodiversity.

II. Insufficient documentation.

III. Regulatory issues.

IV. Lack of clinical trials.

A. I, II, and III

B. I, II, and IV

C. I, III, and IV

D. II, III, and IV

E. I, II, III, and IV

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II) SHORT ANSWER QUESTIONS (20 marks)

INSTRUCTION: Answer ALL questions in the answer booklet provided.

Each question carries TWO (2) marks.

1. Describe **TWO (2)** drying methods of herbal raw materials.

2. State **TWO (2)** properties of a good solvent in herbal extraction.

3. Describe liquid-liquid extraction.

4. Describe sublimation process to obtain pure phytoconstituents.

5. Describe how micronisation improves sample solubility.

6. List **TWO (2)** roles of preservatives in formulation development.

7. Define excipients in herbal product formulation.

8. State **TWO (2)** major components in herbal hair shampoo.

9. List **TWO (2)** ideal physiological properties of a topical semi-solid dosage form.

10. Describe quantitative bioassay.

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SECTION B: MODIFIED ESSAY QUESTIONS (Total: 60 marks)

INSTRUCTION: This section consists of FOUR (4) questions.
You are required to answer THREE (3) questions in the answer booklet provided.
Question 1 and 2 are COMPULSORY.
Answer EITHER Question 3 OR 4.

Question 1

(a) Describe **TWO (2)** raw herbal preparations using water as the solvent.

(5 marks)

(b) Outline the working principle of Soxhlet extraction method.

(5 marks)

(c) Justify why the primary selection of a solvent used for extraction is based on its polarity.

(5 marks)

(d) A phytochemist wants to qualitatively detect the presence of certain active components in a plant extract. Suggest **ONE (1)** rapid chromatography technique, supported with the stepwise procedure for the separation and detection of the compounds.

(5 marks)

Question 2

(a) Explain the post-harvesting technique used in processing aromatic spices and herbs.

(10 marks)

(b) Explain the principles of High-Performance Thin Layer Chromatography (HPTLC) and its application for basic fingerprinting analysis of targeted bioactive compounds.

(10 marks)

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Question 3

(a) Differentiate **THREE (3)** characteristics between low and high energy emulsification methods.

(6 marks)

(b) Outline the semi-quantitative solubility determination process.

(4 marks)

(c) Describe **FOUR (4)** importance of herbal monograph.

(4 marks)

(d) Describe **SIX (6)** important applications of bioassay in herbal drug development.

(6 marks)

Question 4

(a) Explain the ICH guidelines for product stability based on stress testing and evaluations.

(6 marks)

(b) Outline a standard procedure for formulating herbal products using high energy emulsification method.

(4 marks)

(c) Differentiate the macroscopic and microscopic evaluations in the standardisation of herbal drugs.

(4 marks)

(d) Explain the advantages of *in vitro* toxicity test over *in vivo* toxicity test.

(6 marks)

END OF EXAMINATION PAPER

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