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**UTHM**  
Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2019/2020**

COURSE NAME : HERBAL TECHNOLOGY  
COURSE CODE : BWJ 40903  
PROGRAMME CODE : BWW  
EXAMINATION DATE : DECEMBER 2019 / JANUARY 2020  
DURATION : 3 HOURS  
INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

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- Q1** (a) Define phytoconstituents. (2 marks)
- (b) You are the Chief Executive Officer of a newly set-up herbal company called BioHerbs Sdn. Bhd. The mission of your company is to design and develop new herbal healthcare products based on demand. Recommend your approaches in developing new generation of herbal healthcare products using a flowchart. (10 marks)
- (c) There are **FOUR (4)** basic principles of herbal extraction. Explain **ALL** of them. (8 marks)
- Q2** (a) (i) Describe what herbal processing is. (2 marks)
- (ii) You are the herbalist expert who is very grateful for the advance and modern technology in herbal processing. Analyze **TWO (2)** modern machineries and explain why these machineries have made your life easier. (8 marks)
- (b) (i) Define Post-Harvest Management (PHM). (2 marks)
- (ii) One of the technical specifications of PHM is a trained and skilled personnel. Demonstrate **FOUR (4)** responsibilities of the personnel handling medicinal plant material. (8 marks)
- Q3** (a) Discuss why chewables tablets are usually reserved for children. (4 marks)
- (b) There are **FIVE (5)** reasons that cause a shift from traditional to modern herbal preparation. Explain **THREE (3)** reasons only. (6 marks)
- (c) In your opinion, propose whether liquid herbal extracts are better than herbal pills based on **FIVE (5)** points as stated below: (10 marks)
- (i) Freshness
  - (ii) Absorption and Digestion
  - (iii) Convenience
  - (iv) Shelf life
  - (v) Palatability/taste

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**Q4** The development of nanoparticle-based herbal formulations has yielded the opportunities to address and treat challenging diseases.

(a) Examine the necessity of nanoparticle-based herbal formulations for therapeutic and diagnostic agent.

(8 marks)

(b) Determine the principle of following electron microscopy techniques on physicochemical characteristics of nanoparticle-based drug formulations.

- (i) Scanning electron microscopy (SEM)
- (ii) Transmission electron microscopy (TEM)
- (iii) Atomic force microscopy (AFM)
- (iv) Differential scanning calorimetry (DSC)

(12 marks)

**Q5** National Pharmacy Regulatory Agency (NPRA) under the Malaysian Ministry of Health (MOH) is responsible for natural product registration, licensing, monitoring and surveillance activities.

(a) According to Drug Registration Guidance Document (DRGD), natural products are classified in few categories. Distinguish between traditional medicine and finished herbal product.

(8 marks)

(b) For product registration, natural products sample shall be submitted to the Drug Analysis Division for quality control analysis. Describe the control limits of heavy metals.

(6 marks)

(c) Certain ingredients are prohibited or banned in natural products formulation. Categorize **TWO (2)** ingredients with examples.

(6 marks)

- END OF QUESTIONS -

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