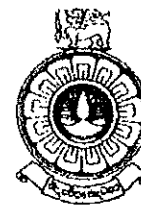


THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF BASIC SCIENCES
ACADEMIC YEAR 2018/2019



BACHELOR OF PHARMACY HONOURS
FMU3206 – ESSENTIAL MATHEMATICS FOR PHARMACY
FINAL EXAMINATION
DURATION: TWO HOURS

Date: 1st March 2019

Time: 2.00 pm – 4.00 pm

INDEX NO:

IMPORTANT INSTRUCTIONS/ INFORMATIONS TO CANDIDATES

- This question paper consists **04 Structured Essay Questions**;
total marks awarded = **200**
Write answers **ONLY** within the space provided
- Write your Index Number in the space provided.
- Do not remove any page/part of this question paper from the examination hall.
- Mobile phones and any other electronic equipment are **NOT** allowed. Leave them outside.
- Write down all relevant steps; marks will be awarded accordingly
- Non – programmable calculator is allowed

- 1 (a) Solve and express the solution in the complex number form, $a + ib$.

$$x^2 + 2x + 2 = 0$$

(12 marks)

- (b) Solve for x (i) $(x-1)^2 - 4 = 0$

(ii) $2x^2 + 3x + 1 = 0$

(12 marks)

- (c) Simplify (i) $(2a + b)^2 - 4b(a - b) - (a+b)(a-b) - 6b^2$

(ii)
$$\frac{b^3 \times (b^2)^4 \times a^{\frac{7}{2}} \times 10^{-34}}{b^7 \times 10^{23} \times \sqrt{a^3}}$$

(20 marks)

(d) (i) Given that $\cos(A+B) = \cos A \cos B - \sin A \sin B$, show that

- $\cos(A-B) = \cos A \cos B + \sin A \sin B$

- $\cos 2A = 1 - 2\sin^2 A$

- $\cos 0 = 1$

(ii) Prove that $\sec \theta - \tan \theta = \frac{\cos \theta}{1 + \sin \theta}$

(18 marks)

(e) Given that $\log_a b = \frac{\log_{10} b}{\log_{10} a}$

(i) Prove that $\log_a b = \frac{1}{\log_b a}$

(ii) Evaluate $\log_2 7$

(iii) Without the aid of a calculator or log tables, evaluate the following:

$$\frac{\log_2 8 + \log_4 64}{\log_2 \sqrt{64}} - \log_{25} 5 + [\log_{10}(0.01)]^2$$

(28 marks)

2. (a) A 70% dextrose solution (A) and a 40% dextrose solution (B) are available in stock; you have been asked to prepare two (2) litres of a 45% dextrose (C) solution by mixing appropriate amounts from each of the above two solutions, calculating the required ratio for mixing according to the **Allegation Method**. Determine the volumes of A and B that you would measure in order to prepare 2 litres of solution C

(12 marks)

(b) Derive the SI units of Force

(12 marks)

(c) Calculate the volume of methanol (density $8.0 \times 10^2 \text{ kg m}^{-3}$) and volume of water (1.0 g cm^{-3}) required to prepare a 1 dm^3 of a 1.0 M (mol dm^{-3}) aqueous solution of methanol; hence, calculate its **molality**

(24 marks)

3 (a) Find the limit of $\frac{x^2 - 4x + 3}{x - 1}$ as $x \rightarrow 1$

(06 marks)

(b) Find the first differential:

(i) $y = \cos 2\theta$

(ii) $u = e^{-3x} + \ln 2x$

(iii) $y = \frac{2-x}{2+x}$

(iv) $y = \sqrt{x} + \frac{1}{3x^2} - \frac{1}{\sqrt{x}}$

(v) $y = (3-2x)^9$

(25 marks)

4. (a) Integrate:

$$(i) \int \frac{2}{(x-1)(x-2)} dx$$

$$(ii) \int x \ln x dx$$

$$(iii) \int \left(\sqrt{x} + \frac{1}{3x^2} - \frac{1}{\sqrt{x}} \right) dx$$

$$(iv) \int [e^{2x} + \sin 2x] dx$$

(v) $\int \frac{2x}{x^2-1}$

(25 marks)

(b) Evaluate $\int_0^{\pi/2} \cos 2\theta d\theta$

(06 marks)