

UNIVERSITY OF JAFFNA, SRI LANKA
FACULTY OF ALLIED HEALTH SCIENCES
Second Year First Semester Examination in B.Pharm Hons-2020
PHAMM 2111-PHARMACEUTICAL MATHEMATICS

Date :17.06.2022

Time: One hour

Answer All Questions

1. (a) i. Show that the roots of the equation $x^2 + (mx + c)^2 = a^2$ are equal if $c^2 = a^2(1 + m^2)$.
- ii. Prove that if α and β are roots of the equation $x^2 - px - p - c = 0$ then $(1 + \alpha)(1 + \beta) = 1 - c$.
- (b) Use the logarithm laws to write each of the following expression as a single logarithm:
- i. $\ln(a + 1) - \frac{1}{3}\ln(b - 1) - 3[\ln(c + 2) - \ln(d - 2)]$;
- ii. $\frac{1}{2}\log_2 u + \frac{1}{3}\log_2 y - \frac{1}{2}(\log_2 a + \log_2 b)$.
- (c) Prove that
- i. $\cos^4 \theta - \sin^4 \theta = 1 - 2\sin^2 \theta$;
- ii. $\frac{\sec x - \cos x}{1 + \cos x} = \sec x - 1$.
- (d) Find the values of $\sin \theta$, $\cos \theta$ and $\tan \theta$, when
- i. $\theta = -180^\circ$;
- ii. $\theta = \frac{11\pi}{3}$.

Continued

2. (a) Differentiate the following with respect to x :

i. $y = e^{3x} \tan x$;

ii. $y = \sqrt{x}(2x - 1)(x^3 - x)$;

iii. $y = \frac{\sin 3x}{4 + 5 \cos 2x}$.

(b) Find the value of $\frac{dy}{dx}$ at the point specified:

i. $x^2 + y^2 = 25$ at $(3, -4)$;

ii. $x^2 + 4xy - 2y^2 - 8 = 0$ at $(0, 2)$;

iii. $x \sin y + y^2 = 1 + \frac{\pi^2}{4}$ at $\left(1, \frac{\pi}{2}\right)$.

(c) Find the following integrals:

i. $\int \left(\frac{1}{3x} - \frac{3}{2x^2} + e^2 + \frac{\sqrt{x}}{2} \right) dx$;

ii. $\int \sin^2 x \, dx$;

iii. $\int \frac{2x \ln(x^2 + 1)}{x^2 + 1} dx$, you may use the substitution $t = x^2 + 1$.

End of Exam