

UNIVERSITY OF JAFFNA, SRI LANKA
 BACHELOR OF PHARMACY
 Second Year First Semester Examination- 2016
 PHAMM2111-Pharmaceutical Mathematics

Answer All Questions

Time Allowed: One hour

1. (a) Find the value of the discriminant and describe the nature of the roots of the following quadratic equations:

i. $x^2 + 12x + 32 = 0$;

ii. $-8x^2 + 5 = -4x$;

iii. $-6x^2 + 5 = -4x + 8$.

(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) Write down the expression for $\sin(A+B)$ and $\cos(A-B)$. Use the above expressions to find the following:

i. $\sin 225^\circ$;

ii. $\cos 15^\circ$.

(d) Solve the following equations in the domain $0 \leq x < 2\pi$.

i. $\cos^2 x - \cos x - 2 = 0$;

ii. $\sin x = \frac{1}{2}$.

2. (a) Find the following limits:

i. $\lim_{\theta \rightarrow 0} \frac{\theta^2 + 2\theta}{\sin 2\theta}$;

ii. $\lim_{x \rightarrow \infty} \frac{5x^3 + 1}{10x^3 - 3x^2 + 7}$.

(b) Differentiate the following with respect to x , simplifying your answer where possible:

i. $\frac{x^3 + 5x^2 - 2x + 4}{x^2 + 9}$;

ii. $\sin^6 x \cos^3 2x$;

iii. $(x^2 + 7x) \ln(2x^3 - 5x)$.

(c) By making a suitable substitution, find each of the following integrals:

i. $\int (5x^3 - 8)^{\frac{1}{3}} x^2 dx$;

ii. $\int (\cos(\sec x)) \sec x \tan x dx$;

iii. $\int \frac{x^3}{x^4 + 9} dx$;

iv. $e^{\sin x} \cos x dx$.

End of Exam