

MANIPAL UNIVERSITY JAIPUR
School of Computing & IT
I Semester BCA Make-up Examination
MA1122 Mathematics-I
QUESTION PAPER (Closed Book Exam)

July 2018

Duration: 3hrs

Max Marks: 100

Note: Answer any **FIVE** full questions

Any missing or misprinted data may be assumed suitably.

Scientific calculator is allowed.

Q1. a. What is the domain of the following functions: [5+5]

$$(i) y = \sqrt{\left(\frac{1}{x} - 2\right)} \quad (ii) y = \frac{2x}{2x+7}$$

b. If the functions f, g and h be defined as $f(x) = \sin x$, $g(x) = 2x$, and $h = \log x$. Then find the functions $((f \circ g) \circ h)(x)$ and $(h \circ (g \circ f))(x)$. [10]

Q2. a. Evaluate [5+5]

$$(i) \lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2} \quad (ii) \lim_{x \rightarrow \infty} (7x^3 + 8x^2 + 5x - 7)$$

b. Discuss the continuity of the function [10]

$$f(x) = \lim_{n \rightarrow \infty} \left[\frac{\log(2+x) - x^{2n} \sin x}{1 + x^{2n}} \right] \text{ at } x = 1.$$

Q3. a. If $f(x) = \begin{cases} x, & x < 1 \\ 2 - x, & 1 \leq x \leq 2 \\ -2 + 3x - x^2, & x > 2 \end{cases}$ then discuss the derivability of the function $f(x)$ at $x = 1, 2$. [10]

b. Find the derivative of the following functions: [5+5]

$$(i) y = \frac{x+1}{3x+2} \quad (ii) y = \log(x^2 + x + 1)$$

Q4. a. Find the value of dy/dx if [5+5]

$$(i) y = x^{\sin x} \quad (ii) x^y \cdot y^x = 1$$

b. Find the value of dy/dx if [5+5]

$$(i) x = a \cos t, \quad y = \sin t \\ (ii) x = e^{-t}, \quad y = \tan(2t + 1)$$

Q5. a. Evaluate $\int \frac{\sin x}{\sin(x+a)} dx$. [10]

b. Evaluate $\int \frac{\cos x - \sin x}{\cos x + \sin x} dx$ [10]

Q6. a. Evaluate $\int x e^{2x} dx$ [10]

b. Find the value of $\int_0^{\pi/2} \cos^2 x dx$ [10]