FIRST SEMESTER UG INTERNAL EXAMINATION, OCTOBER 2025

Major Course in Mathematics

MAT1CJ101 – DIFFERENTIAL CALCULUS

Malabar Christian College, Calicut

Time: One Hour Maximum: 35 Marks

Name:	Marks Scored	Section A		Total Marks
Class:		Section B		
		Section C		

Section A

(Each question carries 3 marks, Maximum marks for section - 7)

1. Find the domain and range of the following:
   i) $y = \sqrt{(1 - x^2)}$
   ii) $y = \frac{1}{x}$

2. Evaluate
   i) $\lim_{x \to 1} \frac{\sqrt{(2+h)} - \sqrt{2}}{h}$
   ii) $\lim_{h \to 0} \frac{\sqrt{x^2+8} - 3}{x+1}$

3. At what points are the functions continuous?
   i) $y = (2 - x)^{1/3}$
   ii) $y = \frac{x+3}{x^2-3x-10}$

Section B

(Each question carries 6 marks, Maximum marks for section - 18)

4. If $f(x) = x - 1$ and $g(x) = \frac{1}{x+1}$. Find the following
   i) $f(g(\frac{1}{2}))$
   ii) $g(f(\frac{1}{2}))$

iii) $f(g(x))$
iv) $g(f(x))$
v) $g(g(2))$
vi) $f(f(2))$

5. Find an equation for the circle with the given centre $c(h,k)$ and radius a. Then sketch the circle in the xy plane. Include the circle's centre in your sketch. Also label the circle x,y intercepts (if any), with their coordinate pairs.
   i) $c(0,2)\ ;\ a=2$
   ii) $c(-\sqrt{3},-\sqrt{2})\ ;\ a=2$

6. Graph the parabolas in the following questions label the vertex, axis and intercepts in each case
   i) $y=x^2-2x-3$
   ii) $y=-x^2-6x-5$

7. Evaluate the following
   i) $\lim_{x\to-7} 2x+5$
   ii) $\lim_{x\to-2}\left(\frac{-2x-4}{x^3+2x^2}\right)$

Section C

(Answer any 1 Question, each question carries 10 marks)

8. Find $\frac{dy}{dx}$, if
   i) $y=(1-x^2)^{\frac{1}{4}}$
   ii) $2y=x^2+\sin y$
   iii) $y=(4-3x)^9$

9. Shift the following graph:
   i) $\frac{1}{2}(x+1)+5$
   ii) $(x-4)^2-2$