



# UNIVERSITY OF THE PUNJAB

First Semester – 2019

Examination: B.S. 4 Years Program

Roll No. in Fig. ....

Roll No. in Words. ....

PAPER: Calculus (IT)-I

MAX. TIME: 30 Min.

Course Code: MATH-131 Part – I (Compulsory)

MAX. MARKS: 10

Signature of Supdt.:

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

**Q.1. Encircle the right answer cutting and overwriting is not allowed. (1x10=10)**

Q.1	MCQs (1 mark each)
(i)	Domain of $\ln(1 - x^2)$ is (a) $-1 \leq x \leq 1$ (b) $x \leq 0$ (c) $x \geq 0$ (d) $-1 < x < 1$
(ii)	If slope of $f(x)$ is decreasing at "c", then (a) $f'(x) > 0$ (b) $f'(x) < 0$ (c) $f'(x) = 0$ (d) none of these
(iii)	Every integrable function is (a) differentiable      (b) continuous      (c) piece-wise continuous      (d) none of these
(iv)	Every polynomial function is _____ (a) continuous      (b) trigonometric      (c) differentiable      (d) both (a) and (c)
(v)	$\lim_{x \rightarrow \infty} \frac{9x^3 - 3x^2 - 1}{81x^3} = ?$ (a) 9      (b) $\frac{2}{9}$ (c) $\frac{9}{2}$ (d) $\frac{1}{9}$
(vi)	$\lim_{x \rightarrow 0} \frac{\sin 2x}{3x} = ?$ (a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) 2      (d) 3
(vii)	$\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3} = ?$ (a) 0      (b) 6      (c) 9      (d) 4
(viii)	First order Differential equation has atmost _____ independent solutions (a) 0      (b) 1      (c) 2      (d) 3
(ix)	The instantaneous rate of change at $t = \pi$ for the function $f(t) = \cos^3 t$ is (a) 1      (b) 0      (c) -1      (d) -3
(x)	Solution set of the inequality $\frac{6-x}{4} > \frac{3x-4}{2}$ is (a) $[2, \infty)$ (b) $[2, 6)$ (c) $(2, \infty)$ (d) none of these



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First Semester – 2019

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PAPER: Calculus (IT)-I

Course Code: MATH-131 Part – II

MAX. TIME: 2 Hrs. 30 Min.

MAX. MARKS: 50

**ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED**

Q.2	SHORT QUESTIONS	
(i)	Find the slope of the circle $x^2 + y^2 = 16$ at the point (7,-8).	(4)
(ii)	Evaluate the integral: $\int_{\frac{\pi}{2}}^0 \frac{1+\cos 2x}{2} dx$ .	(4)
(iii)	Find limits (a) $\lim_{x \rightarrow 0} \frac{\sin^2(9x)}{5x^2}$ and (b) $\lim_{t \rightarrow 2} \frac{t^4-16}{t-2}$ .	(4)
(iv)	Solve the inequality $ \frac{x+1}{2}  \geq 1$ .	(4)
(v)	Find domain and range of the function $f(x) = 5 + \frac{x^2}{x^2+4}$ .	(4)

LONG QUESTIONS		
Q.3	Find the linearization at a suitably chosen integer near 8.5 at which the function $\sqrt[3]{x}$ and its derivatives are easy to evaluate.	(6)
Q.4	Find $\frac{d^2y}{dx^2}$ if $2x^5 - 3y^3 = 6$ .	(6)
Q.5	Find the integral: $\int \left(\frac{x^2}{\sqrt{x+5}}\right) dx$ .	(6)
Q.6	Solve the differential equation $\frac{dy}{dx} + xy = x, \quad y(0) = -6$	(6)
Q.7	For what values of a, m and b does the function $f(x) = \begin{cases} 3, & x = 0 \\ -x^2 + 3x + a, & 0 < x < 1 \\ mx + b, & 1 \leq x \leq 2 \end{cases}$ Satisfy the hypothesis of the mean value theorem on the interval [0,2].	(6)