



UNIVERSITY OF THE PUNJAB

First Semester – 2019

Examination: B.S. 4 Years Program

Roll No. in Fig.

Roll No. in Words.

PAPER: Calculus-I
Course Code: MATH-121 Part-I (Compulsory)

MAX. TIME: 30 Min.
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)	The derivative at $y = 1$ for the function $S(y) = \frac{y}{y+1}$ is (a) $-\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $-\frac{3}{2}$ (d) $\frac{1}{3}$
(ii)	The height s of a rocket at t sec after its launching is given by $s(t) = -t^3 + 2t^2 + 3$. The instantaneous velocity of the rocket at $t = 2$ sec is (a) -4 (b) 4 (c) 0 (d) none of these
(iii)	$\lim_{x \rightarrow 0^-} \sqrt{x} = ?$ (a) 0 (b) 1 (c) undefined (d) none of these
(iv)	What is the magnitude of the complex number $-1 - i\sqrt{3}$ (a) 2 (b) -2 (c) 0 (d) none of these
(v)	Differentiation of a function implies _____ (a) existence of limit (b) integrality (c) continuity (d) all a, b and c
(vi)	Domain of $\sqrt{4 - x^2}$ is (a) $ x \leq -2$ (b) $x \leq 0$ (c) $ x \leq 2$ (d) none of these
(vii)	$\lim_{x \rightarrow 0} \frac{x}{\tan x} = ?$ (a) 0 (b) 1 (c) 2 (d) ∞
(viii)	For what value of x , the inequality $-12(x - 3) > -5x + 6$ is satisfied (a) 2 (b) 1 (c) 0 (d) all of these
(ix)	$\int_0^{2\pi} \tan 2x \, dx = ?$ (a) 0 (b) 1 (c) -1 (d) none of these
(x)	Every integrable function is (a) differentiable (b) continuous (c) piece-wise continuous (d) none of these



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PAPER: Calculus-I

Course Code: MATH-121 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 $\frac{dy}{dx}$ if $y^2 = x^2 + \sin xy$.	(4)
(ii)	Discuss the continuity of the function $f(x) = \begin{cases} 4x^2 - 36 & \text{if } x \neq 3 \\ x - 3 & \text{if } x = 3 \end{cases}$ at $x = 0$.	(4)
(iii)	Evaluate $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{x^3}$.	(4)
(iv)	Solve: $ 5x - 8 \geq 10$ and draw the solution on real line.	(4)
(v)	Evaluate $\int \frac{1}{\sqrt{16+4x^2}} dx$.	(4)

LONG QUESTIONS		
Q.3	Evaluate $\int x^5 \sqrt{x^3 + 11} dx$.	(6)
Q.4	Find the Maclaurin series of $f(x) = \ln(1 + x)$ with its remainder term.	(6)
Q.5	Evaluate $\lim_{y \rightarrow 0} \frac{(1+y)^{\frac{1}{y}} - e}{y}$.	(6)
Q.6	Determine the centre, foci and vertices of the hyperbola $y^2 - x^2 - 10y + 6x = 0$	(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)