



UNIVERSITY OF THE PUNJAB

First Semester 2015
Examination: B.S. 4 Years Programme

Roll No. 0120148

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

PAPER: Calculus-I
Course Code: MATH-121

Attempt this Paper on Separate Answer Sheet provided.

Note: Attempt all the questions.

Section-II (Subjective)

Q. No. 2 Briefly give the short answers of the following questions. $2 \times 10 = 20$

1. Find the following limit

$$\lim_{x \rightarrow a} (x-a) \operatorname{cosec} \left(\frac{\pi x}{a} \right)$$

Using L-Hospital Rule

- ii. Define the convergence sequence. (9)
- iii. What is an ellipse? Also write the equation for the ellipse? (2/4)
- iv. Define the continuity of a function.

3. Write the Taylor's series?

v. What do you mean about differentiation? Also write the differentiate the following function

$$f(x) = \frac{x}{x-1}$$

$$\frac{x}{x-1} = \frac{x-1+1}{x-1} = 1 + \frac{1}{x-1}$$

$$1-x$$

- vii. What are the polar coordinates? Also write the relation of the polar coordinates with the Cartesian coordinates.
- viii. Find the distance between the points $P_1(2, 1, 5)$ and $P_2(-2, 3, 0)$.
- ix. Find the unit vector perpendicular the plane of $P(1, -1, 0)$, $Q(2, 1, -1)$ and $R(-1, 1, 2)$.

2. Evaluate the limit

$$\lim_{x \rightarrow 0} \frac{\sin ax}{\sin bx}$$

$$PQ = 2-1 \quad 1-1 \quad -1-0$$
$$= (1, 2, -1)$$

$$PQ \times PR$$
$$= \begin{vmatrix} 1 & 2 & -1 \\ 1 & 1 & 2 \end{vmatrix}$$

$$P_1(x_1, y_1, z_1), P_2(x_2, y_2, z_2)$$
$$|P_1 P_2| = \sqrt{(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2}$$

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