



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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Table of Contents Calculus Past Exam Papers

1. Understanding the eBook Calculus Past Exam Papers
 - The Rise of Digital Reading Calculus Past Exam Papers
 - Advantages of eBooks Over Traditional Books
2. Identifying Calculus Past Exam Papers
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Calculus Past Exam Papers
 - User-Friendly Interface
4. Exploring eBook Recommendations from Calculus Past Exam Papers
 - Personalized Recommendations
 - Calculus Past Exam Papers User Reviews and Ratings
 - Calculus Past Exam Papers and Bestseller Lists
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 - Adjustable Fonts and Text Sizes of Calculus Past Exam Papers
 - Highlighting and Note-Taking Calculus Past Exam Papers
 - Interactive Elements Calculus Past Exam Papers
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 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Calculus Past Exam Papers
 9. Balancing eBooks and Physical Books Calculus Past Exam Papers
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Calculus Past Exam Papers
 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
 11. Cultivating a Reading Routine Calculus Past Exam Papers
 - Setting Reading Goals Calculus Past Exam Papers
 - Carving Out Dedicated Reading Time
 12. Sourcing Reliable Information of Calculus Past Exam Papers
 - Fact-Checking eBook Content of Calculus Past Exam Papers
 - Distinguishing Credible Sources
 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development

- Exploring Educational eBooks
- 14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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