

4274

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to <http://pgadmission.uod.ac.in> and <http://www.du.ac.in/index.php?page=ph.d> respectively.

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4274

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Unique Paper Code : 32353301

Name of the Paper : SEC: LaTeX and HTML

Name of the Course : **B.Sc. (H) Mathematics**

Semester : III

Duration : 2 Hours

Maximum Marks : 38

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **All** questions are compulsory.

1. Fill in the blanks: (4×½=2)

- (i) The symbol ∞ can be produced in LaTeX using the command _____ .
- (ii) The _____ produces a line of length 40 in the direction given by the vector (0,1).

(1000)

P.T.O.

(iii) _____ tag is used for separating a line of text in the HTML.

(iv) The first command after the preamble _____ generates the title page in beamer.

2. Attempt any **eight** parts : (8×2=16)

(i) Correct the following input as per LaTeX commands and write its output If $\Theta = n\pi$ then $\sin n\pi = 0$ for all $n = 0, 1, 2, 3 \dots$

(ii) Write the input command in LaTeX to produce the following :

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \quad \& \quad B = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix}$$

(iii) Write the LaTeX commands to draw a rectangle using the picture environment.

(iv) Write the command to include the figure, "myfig.eps" in a LaTeX document.

(v) Give the LaTeX command to draw a sector of a circle.

Put $x=0$ and use $\tan^{-1} 0 = 0$, we get

$$\tan^{-1} x = x - \frac{x^3}{3} + \frac{x^5}{5} - \dots \quad (-1 < x < 1)$$

`\end{document}`

(iv) Make a parametric plot of lemniscate

$$x = \frac{\cos t}{1 + \sin^2 t} \quad \text{and} \quad y = \frac{\sin t \cos t}{1 + \sin^2 t} \quad 0 \leq t \leq 360^\circ$$

Draw axes, label it and set unit-length of axes equal to 3 cm.

(v) Write an HTML code to generate the webpage under given instructions :

(a) Font face of the text should be "Arial"

(b) Text color of the main heading should be blue

(c) Make the text "Postgraduate" and "PhD" as a link by clicking the text the user reach

Further, $\|\vec{a} \times \vec{b}\| = \|\vec{a}\| \|\vec{b}\| \sin \theta$ where $\|\cdot\|$ and θ denote the length of the vector and angle between the vectors \vec{a} and \vec{b} respectively.

- (iii) Find the errors and write the correct version of LaTeX source code (highlight your corrections in the answer). Also, write its output.

```
\begin{document}

\title{Maclaurin series for  $\tan^{-1} x$ }

\author{ABC}

\maketitle

\begin{alignment}

\mathit{\tan}^{-1} x + c &= & \int \frac{1}{1+x^2} dx \\
&= & \int [1-x^2+x^4-\dots] dx \quad (-1 < x < 1) \\
&= & \sum_{n=0}^{\infty} (-1)^n \\
& \quad \frac{x^{2n+1}}{2n+1}

\end{alignment}
```

- (vi) Write the following postfix expressions in standard form :

e x exp 1 x 2 exp div x 2 exp add mul

- (vii) Write the HTML code to put an image and hyperlink with an example.

- (viii) What does the `<title>....</title>` section of a Web page contain? Where does the resulting text appear?

- (ix) Correct the following input of beamer commands and write output

```
\documentclass {Beamer}

\title{My Topic}

\author{XYZ}

\institute{University of Delhi}

\begin{Frame}

\titlepage

\end{Frame}
```

```

\begin{document}
\begin{Frame}
\Huge{Thank You}
\end{Frame}
\end{document}

```

- (x) Correct the following input as per HTML commands

```

<p> This is <bf><it> bold and italics
<\bf><\it><p>

```

3. Attempt any **four** parts : (4×5=20)

- (i) Create the following presentation with the following slides using the beamer:

Slide 1: Title- Mean value Theorem; Author- ABC; Institute: XYZ University

Slide 2: Frame title- Statement

Let $f: [a, b] \rightarrow \mathbb{R}$ be a function such that

1. f is continuous on $[a, b]$
2. f is differentiable on (a, b)

Then \exists atleast one point $c \in (a, b)$ such that

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

Slide 3: Frame title- Examples

- $\sin x$ in $[0, \pi]$
- $1 + 1 + \sqrt[3]{x-1}$ in $[2, 9]$

Slide 4: Thank You.

- (ii) Write a code in LaTeX to typeset the following :

Let $\vec{a} = \langle a_1, a_2, a_3 \rangle$ and $\vec{b} = \langle b_1, b_2, b_3 \rangle$ be vectors in \mathbb{R}^3 . Then the cross product is given by

$$\begin{aligned} \vec{a} \times \vec{b} &= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix} \\ &= \begin{vmatrix} a_2 & a_3 \\ b_2 & b_3 \end{vmatrix} \hat{i} - \begin{vmatrix} a_1 & a_3 \\ b_1 & b_3 \end{vmatrix} \hat{j} + \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix} \hat{k} \end{aligned}$$