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

22/12/23 (M) Lib

[This question paper contains 8 printed pages.]

22.12.23(M)

Your Roll No.....

Sr. No. of Question Paper : 4274 **G**

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).

(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 $$n=0,1,2,3 \ldots$$

(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

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

\end{document}

(iv) Make a parametric plot of lemniscate

$x = \frac{\cos t}{1+\sin^2 t}$ and $y = \frac{\sin t \cos t}{1+\sin^2 t}$ $0 \le t \le 360°$

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}

\tan^{-1} x + c &=& \int \frac{1}{1+x^2}\, dx\\

&=& \int[1-x^2+x^4-\cdots]\, dx   (-1 < x < 1)\\

&=&  \summation_{n=0}^{\infty}  (-1)^n
\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] → ℝ be a function such that

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

Then ∃ atleast one point c ∈ (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 $\vec{a} = < a_1, a_2, a_3 >$ and $\vec{b} = < b_1, b_2, b_3 >$ be vectors in R^3. Then the cross product is given by

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

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