

*This question paper contains 4 printed pages.*

*Your Roll No. ....*

*of Paper : 255*

**I**

*ue Paper Code : 42353327*

*e of the Paper : Mathematical Typesetting System:  
LaTeX*

*e of the Course : B.Sc. (Prog.) : SEC*

*ster : III*

*tion : 2 hours*

*imum Marks : 38*

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*All questions are compulsory.*

Fill in the blanks in any four parts of the following:

$$4 \times 0.5 = 2$$

(i) The preamble in a LaTeX document begins with a ----- command whose argument is predefined article class.

(ii) The title page of a LaTeX document is generated by a ----- command which comes ----- the `\begin{document}`.

(iii) ----- command is used to produce  $\mathbb{Z}$  in math mode of LaTeX document.

P. T. O.

- (iv) The `-----` command typesets its argument in LR mode and then produces its mirror image.
- (v) In LaTeX, the command `-----` produces a centered ellipsis.

2. Answer any *eight* parts from the following:

- (i) Write the output of the command:

`\( f(x)\stackrel{\text{def}}{=}x^2-1 \)`

- (ii) Write the code in LaTeX to produce the following expression:

$$f(x) = \begin{cases} 0 & \text{for } x = 0; \\ x \sin\left(\frac{1}{x}\right) & \text{for } x \neq 0. \end{cases}$$

- (iii) Write two differences between LaTeX and PSTricks picture environment.

- (iv) Write the command to draw an arrow of length 15 units in the direction of (1, 1).

- (v) Use `\graphpaper` command to get a graph paper with left corner at (-2, 3) width 50 and height 10 with one line every 8 units.

- (vi) Write the code in LaTeX to produce the following expression:

If  $|x - y| < \delta, \forall \delta > 0$ , then  $x = y$ .

- (vii) Typeset the following in LaTeX:

$$\tan\left(\frac{\pi}{4} + \theta\right) = \frac{\tan(\pi/4) + \tan \theta}{\tan(\pi/4) - \tan \theta}$$

$$= \frac{1 + \tan \theta}{1 - \tan \theta}$$

(viii) Write the following postfix expression in standard form:

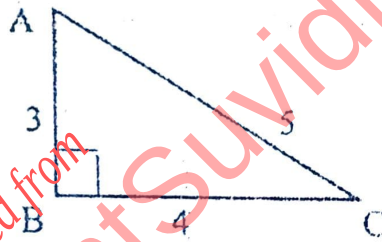
xx 2 exp 1 sub mul x 2 exp 1 add div

(ix) Give a command to draw an arc of a circle of radius 2 units centered at the point (2, 2), making an angle of 30 degree.

3. Answer any *three* parts from the following:

$$4+4+4=12$$

(a) In the picture environment make a 3 - 4 - 5 Pythagorean triangle:



(b) Write the code in LaTeX using delimiters or otherwise:

$$f(x) = \begin{cases} -x^2, & x < 0 \\ x^2, & 0 \leq x \leq 2 \\ 4, & x > 2 \end{cases}$$

(c) Write the code for the following in LaTeX environment:

$$F_r(\mathbf{x}) = \left( \frac{x_1^r + x_2^r + \dots + x_n^r}{n} \right)^{1/r}, \quad r \in \mathbb{R} \setminus \{0\},$$

where  $\mathbf{x} = (x_1, x_2, \dots, x_n) \in (\mathbb{R})^n$ .

P. T. O.

(d) Plot the oscillating function  $y = \sin(1/x)$ .

4. Write a presentation containing in beamer with the following content:

Slide-1: Title: There is No Largest Prime Number,

Author: ABC

Slide-2: Proof. We shall prove the result in four steps:

**Step-1.** Suppose the number of primes is finite.

Slide-3: **Step-2.** Let  $p$  be the number of all primes

Slide-4: **Step-3.** Then  $p + 1$  is *not* divisible by any prime.

Slide-5: **Step-4.** Therefore,  $p + 1$  is also a prime, a contradiction.