

Total number of printed pages-11

**3 (Sem-4/CBCS) MAT SEC**

**2021**

**MATHEMATICS**

(Skill Enhancement Course)

*Full Marks : 50*

Time : Two hours

***The figures in the margin indicate  
full marks for the questions.***

Answer **either** in English **or** in Assamese.

Paper : MAT-SE-4014

**(La Tex and HTML)**

**GROUP - A**

**( LA Tex )**

( Marks : 26 )

1. Answer the following questions :  $1 \times 6 = 6$

(a) What is La Tex ?

*Contd.*

(b) What is the preamble in starting La Tex document ?

(c) What is the LATEX commands for

$$\int_0^a \text{ and } \frac{a+b}{c+d} ?$$

(d) What are the LATEX commands for Greek letters  $\Lambda$  and  $\beta$  ?

(e) What are the commands for bold text and italic text ?

(f) What is PSTricks ?

2. Make the following equations in LATEX :

$$2 \times 5 = 10$$

(a)  $3^3 + 4^3 + 5^3 = 6^3$

(b)  $\sum_{k=1}^n k = \frac{n(n+1)}{2}$

$$(c) \lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$(d) \frac{\pi}{4} = \frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots$$

$$(e) \vec{\nabla} \times \vec{H} = \frac{\epsilon}{c} \frac{\delta \vec{E}}{\delta t}$$

3. Make the following multiline equations :  
**(any two)** 5×2=10

$$(a) \begin{aligned} 1 + 2 &= 3 \\ 4 + 5 + 6 &= 7 + 8 \\ 9 + 10 + 11 + 12 &= 13 + 14 + 15 \\ 16 + 17 + 18 + 19 + 20 &= 21 + 22 + 23 + 24 \\ 25 + 26 + 27 + 28 + 29 + 30 &= 31 + 32 + 33 + 34 + 35 \end{aligned}$$

$$(b) \begin{aligned} (a + b)^2 &= (a + b)(a + b) \\ &= (a + b)a + (a + b)b \\ &= a(a + b) + b(a + b) \\ &= a^2 + ab + ba + b^2 \\ &= a^2 + ab + ab + b^2 \\ &= a^2 + 2ab + b^2 \end{aligned}$$

(c)

$$\begin{aligned}\tan (\alpha + \beta + \gamma) &= \frac{\tan (\alpha + \beta) + \tan \gamma}{1 - \tan (\alpha + \beta) \tan \gamma} \\ &= \frac{\frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta} + \tan \gamma}{1 - \left( \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta} \right) \tan \gamma} \\ &= \frac{\tan \alpha + \tan \beta + \tan \gamma - \tan \alpha \tan \beta \tan \gamma}{1 - \tan \alpha \tan \beta - \tan \alpha \tan \gamma - \tan \beta \tan \gamma}\end{aligned}$$

$$\begin{aligned}(d) \quad \prod_p \left( 1 - \frac{1}{p^2} \right) &= \prod_p \frac{1}{1 + \frac{1}{p^2} + \frac{1}{p^4} + \dots} \\ &= \left( \prod_p \left( 1 + \frac{1}{p^2} + \frac{1}{p^4} + \dots \right) \right)^{-1} \\ &= \left( 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots \right)^{-1} \\ &= \frac{6}{\pi^2}\end{aligned}$$

## GROUP – B

### (HTML)

(Marks : 24)

4. Answer **any three** questions :  $8 \times 3 = 24$

(a) Write the full form of HTML. What are the four basic elements which are necessary in every HTML document and also write their uses.  $2+2+4=8$

(b) (i) Give an example of an element which may be opened and closed with a single tag.

(ii) Write a program in HTML to put an image of a mathematical object on your Webpage and describe the image.  $1+7=8$

(c) (i) Write the uses of the following elements :

strong,  $P, h(1 \leq n < 6), b_n$ .

(ii) Write a program to create a minimal Webpage.  $4+4=8$

- (d) (i) How can you include a special symbol in your Webpage ? Give an example.
- (ii) Make a Webpage with a list by showing some of your mathematical interests.  $2+6=8$
- (e) (i) Write the full form of HTTP and URL.
- (ii) Make a Webpage by putting a link.  $2+6=8$
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Paper : MAT-SE-4024

**( R Programming )**

1. Answer the following questions : 1×6=6

তলত দিয়া প্ৰশ্নবোৰৰ উত্তৰ কৰা :

(a) What is R Programming ?

R প্ৰগামিং কি ?

(b) What do you mean by CRAN ?

CRAN মানে কি বুজা ?

(c) What is the use of ( ) in R ?

( ) ৰ R ত ব্যৱহাৰ কি?

(d) What is the workplace in R ?

R ৰ কৰ্মস্থান কি ?

(e) Which of the following statement in R is invalid ?

তলত উল্লেখ কৰা কোনটো উক্তি R ত বৈধ নহয় ?

(a)  $x \leftarrow c(1+0i, 2+4i)$

(b)  $x \leftarrow c(TRUE, FALSE)$

(c)  $x \leftarrow c(T, F)$

(d) None of the mentioned

(এটাও নহয়)

(f) Which of the following R syntax is correct for while loop ?

তলত কোনটো R বাক্যবিন্যাস while loop ত শুদ্ধ হয় ?

- (a) while (statement1) statement 2
- (b) while (statement1) else statement 2
- (c) while (statement1) do statement 2
- (d) while (statement2) do else statement 2

2. Answer the following questions :  $2 \times 5 = 10$

তলত দিয়া প্ৰশ্নবোৰৰ উত্তৰ কৰা :

(a) Write down the *two* advantages of R.

R ৰ দুটা সুবিধা লিখা।

(b) What do you understand by Data Frame ?

তথ্যৰ গাঠনি বুলিলে কি বুজা ?

(c) What is the difference between seq(4) and seq\_along(4) ?

seq(4) আৰু seq\_along(4) ৰ মাজত পাৰ্থক্য কি ?



(d) What is the use of subset( ) and sample( ) function in R ?

R ত subset( ) আৰু sample( ) ফলনৰ ব্যৱহাৰ কি ?

(e) Explain general format of Matrices in R.

R ত মৌলিকৰ সাধাৰণ সজ্জাৰ বৰ্ণনা কৰা।

3. Answer **any two** of the following questions :  
5×2=10

তলৰ যিকোনো দুটা প্ৰশ্নৰ উত্তৰ কৰা :

(a) Explain *five* of the common syntax in R Programming language.

R প্ৰগামিং ভাষাত পাচটা বাক্যবিন্যাস বৰ্ণনা কৰা।

(b) Write a function that takes three numbers a, b and c as input and returns the smallest number of the three.

a, b, c তিনিটা সংখ্যা তথ্য নিবেশ কৰা এটা ফলন নিৰ্ণয় কৰা যাৰ পৰিমাণৰ তথ্য এই তিনিটা সংখ্যাতকৈ সৰু।

(c) Write a R Program to check the input number is odd or even.

তথ্য নিৰেৰে সংখ্যা যুগ্ম অথবা অযুগ্ম হ'ব R প্ৰোগ্ৰামটো লিখা।

(d) Explain the data import in R language.

R ভাষাত তথ্য আমদানিৰ বিষয়ে বৰ্ণনা কৰা।

4. Answer **any three** of the following questions :

3×8=24

তলৰ যিকোনো তিনিটা প্ৰশ্নৰ উত্তৰ কৰা :

(a) Explain the file format used in R programming language.

R প্ৰোগ্ৰামিং ভাষাত ফাইল ফ'ৰমেটৰ file format ব্যৱহাৰ লিখা।

(b) Write a R programming to find sum of natural numbers without formula.

সূত্ৰ ব্যৱহাৰ নকৰাকৈ স্বাভাৱিক সংখ্যাৰ যোগফল উলিওৱা সূত্ৰটো R প্ৰোগ্ৰামিংত লিখা।

(c) Write a function to reverse the case of a string (all capitals are sent to lowercase and all lowercase are sent to capitals) in R programming.

এটা স্ত্ৰিঙৰ বিপৰীত ঘটনা ঘটা (বৰ ফলাক-সৰু ফলালৈ আৰু সৰু ফলাক-বৰ ফলালৈ ৰূপান্তৰ কৰা) ফলনটো R প্ৰগ্ৰামিংটো লিখা।

(d) Write a R Programming to find all primes smaller than 1000.

1000 তকৈ সৰু মৌলিক সংখ্যা উলিওৱা R প্ৰগ্ৰামিংটো লিখা।

(e) Program to display the Fibonacci sequence up to  $n$ -th term using recursive functions.

বাক্যৰচিত ফলন ব্যৱহাৰ কৰি এটা ফিবোনাৰ্চি অনুক্ৰমৰ  $n$  তম পদলৈ প্ৰদৰ্শন কৰা প্ৰগ্ৰামটো লিখা।

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