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 :   1×6=6

    (a)   What is La Tex ?

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

(c) What is the LATEX commands for

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

(d) What are the LATEX commands for Greek letters Λ and β ?

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

(c) $\lim\limits_{x \to 0} \dfrac{\sin x}{x} = 1$

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

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

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

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

(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)

$$tan\ (\alpha + \beta + \gamma) = \frac{tan\ (\alpha + \beta) + tan\ \gamma}{1 - tan\ (\alpha + \beta)tan\ \gamma}$$

$$= \frac{\dfrac{tan\ \alpha + tan\ \beta}{1 - tan\ \alpha\ tab\ \beta} + tan\ \gamma}{1 - \left(\dfrac{tan\ \alpha + tan\ \beta}{1 - tan\ \alpha\ tan\ \beta}\right)tan\ \gamma}$$

$$= \frac{tan\ \alpha + tan\ \beta + tan\ \gamma - tan\ \alpha\ tan\ \beta\ tan\ \gamma}{1 - tan\ \alpha\ tan\ \beta - tan\ \alpha\ tan\ \gamma - tan\ \beta\ tan\ \gamma}$$

(d)

$$\prod_{p}\left(1 - \frac{1}{p^2}\right) = \prod_{p}\frac{1}{1 + \dfrac{1}{p^2} + \dfrac{1}{p^4} + \dots}$$

$$= \left(\prod_{p}\left(1 + \frac{1}{p^2} + \frac{1}{p^4} + \dots\right)\right)^{-1}$$

$$= \left(1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots\right)^{-1}$$

$$= \frac{6}{\pi^2}$$

GROUP – B

(HTML)

(Marks : 24)

4. Answer ***any three*** questions :   8×3=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 প্ৰগাৰ্মিং 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 কৰ্ম্মস্থান 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 : 2×5=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 মৌলকক্ষৰ 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 প্ৰগাৰ্মিং 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 নিৰেশ কৰা এটা ফলন নিৰ্ণয় কৰা যাৰ পৰিমানৰ তথ্য এই তিনিটা সংখ্যাতকৈ সৰু ।

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

তথ্য নিৱেশ সংখ্যা যুগ্ম অথবা অযুগ্ম হ্ৰা R প্ৰগ্ৰামটো 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 প্ৰগ্ৰামিং 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 প্ৰগ্ৰামিংত 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 স্ট্ৰিঙৰ 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 ফিবোনাকি অনুক্ৰমৰ n তম পদলৈ প্ৰদৰ্শন কৰা প্ৰগ্ৰামটো লিখা।

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