STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
(For candidates admitted during the academic year 2019 – 20 & thereafter)
                                            SUBJECT CODE: 19ID/IC/MS55
B.Sc. DEGREE EXAMINATION, NOVEMBER 2022
BRANCH I – MATHEMATICS
FIFTH SEMESTER
COURSE: INTERDISCIPLINARY CORE
PAPER   : MATHEMATICS THROUGH SCIENTIFIC SOFTWARE
TIME   : 3 HOURS   MAXIMUM MARKS: 100

SECTION –A

Answer *ALL* the questions (20×1=20)

1.   _____ method CANNOT be used to enter data in a cell in Excel.
    a) Pressing an arrow key   c) Pressing the Esc Key
    b) Clicking the Enter button in the formula bar   d) Pressing the Tab Key

2.   Which of the following is an absolute cell reference?
    a) A2   c) #A2
    b) A:2   d) A2

3.   _____ shortcut opens an existing workbook.
    a) Ctrl + W   c) Ctrl + F4
    b) Ctrl + C   d) Ctrl + O

4.   _____function in Excel checks whether the condition is true or not.
    a) SUM   c) COUNT
    b) IF   d) AVERAGE

5.   GIMP is an acronym for _____
    a) GNU Image Manipulation Program   c) GNU Image Maintain Program
    b) GNU Image More Program   d) Graphical Image Program

6.   _____acts as a slider to change the transparency of the selected layer.
    a) Hidden   c) Opacity
    b) Mode   d) Mask

7.   _____ are transparent sheets stacked one on top of the other .
    a) Canvas   c) Windows
    b) Layers   d) None of these

8.   _____ is the shortcut for perspective tool
    a) P   c) Shift + P
    b) Ctrl + P   d) Alt + P

9.   Every Mathcad equation and text paragraph is a separate object called a _____
    a) edit cursor   c) region
    b) worksheet   d) edit screen

10. To view the built-in functions in MATHCAD, select Functions from _____ menu.
    a) FILE   c) EDIT
    b) INSERT   d) MATH

11. Part of a name can be a subscript by pressing _____
    a) comma (,)   c) period (.)
    b) underscore (_)   d) none

12. In MATHCAD, the middle placeholders on each of the axes are to hold _____
    a) range values   c) $f(x)$
    b) numeric values   d) arguments

13. In Box plot *varwidth* is a _____ value.
    a) numeric value   c) logical value
    b) character value   d) None of the above

14. In **R**, to view only the diagonal elements of the matrix *A*, we use____
    a) dia(A)   c) Dia(A)
    b) diag(A)   d) D(A)

15. In **R**, the command $B \leftarrow matrix(c(1,2,3,4,5))$ will produce _____
    a) one column   c) one row
    b) warning message   d) error message

16. In a data frame, the members must all be vectors of _____ length
    a) equal   c) unequal
    b) specified   d) any

17. The _____ can be a better measurement for centrality if the data is skewed.
    a) mean   c) median
    b) mode   d) All of the above

18. Correlation coefficient in **R** can be computed using the function
    a) cor()   c) corr()
    b) corr.test()   d) cor.testing()

19. A relationship model in **R** is created using _____
    a) lmd()   c) rm()
    b) im()   d) None of the above

20. This function gives the cumulative binomial probability of an event.
    a) qbinorm()   c) qbinom()
    b) pbinorm()   d) pbinom()

B

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SECTION –B

Answer *ANY FOUR* the questions (4×20=80)

21. Create an excel sheet that contains 15 students record with the data fields Consumer No, Name, Jewels, No of grams, Wastage, Net amount.

(10 marks)

Select Jewels from the list (Chain, Bangles, Ring, Stud).
If the Jewel is Chain, Wastage = 10% from the grams purchased .
                Bangles, Wastage = 8% from the grams purchased.
                Ring, Wastage = 12% from the grams purchased
                Stud, Wastage = 15% from the grams purchased
The gold rate /gram is assumed to be Rs. 5000.

(10 marks)

a) Calculate Subtotal = No_of _grams * gold rate + Wastage
b) Calculate Netamount = Subtotal – Discount.
c) Filter the Bangles record alone
d) Compare various jewels purchased by the customers using Bar chart.

22. a) Create logo using the given image   **(10 marks)**
    b) Create an image on your own and animate the image   **(10 marks)**

23. a) Draw the parametric curve for $\begin{pmatrix} t - \sin(t) \\ 1 - \cos(t) \end{pmatrix}$.   **(5 marks)**

    b) Solve the given system of linear equations   **(5 marks)**

$$10x + 2y + z = 9$$
$$x + 10y - z = -22$$
$$-2x + 3y + 10z = 22$$

    c) Use symbolic computation to find the inverse, transpose and determinant for the

matrix $\begin{pmatrix} 3 & -b & 9 \\ d & 5 & -2 \\ 3 & e & 7 \end{pmatrix}$ **(4 marks)**

d) Solve $x^5 - 3x^4 - x^2 + 1 = 0$, $\prod_{k=1}^{20}\left(1 - \frac{1}{k^3}\right)$, $\sum_{i=3}^{10}\frac{(-1)^{i+1}}{i}$ **(6 marks)**

24. a) Use any dataset from the **R** environment, view the data and create a box plot

between any two related columns of data.   **(5 marks)**

b) Create a data frame for the number of people who are unemployed in the four states
– Tamil Nadu, Kerala, Andra Pradesh and Gujarat in the last 6 years and represent it
by a multiple line plot using different colours, give labels, heading and a key.

(10 marks)

c) In **R**, create a matrix of order 4×4, using sequence operator and find its inverse.

(5 marks)

5. a) Analyze the following pairs of data sets, such as its mean, variance, correlation
(between X_i and Y_i, $i = 1,2$), scatter plot (X_i $versus$ Y_i, $i = 1,2$) and evaluate the
relationship between the two variables using correlation test.   **(15 marks)**

b) Create a sample of 100 numbers which are incremented by 2, create the binomial
distribution and plot the graph for the sample.   **(5 marks)**

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