D 13225 (Pages : 3) Name.....

Reg. No.....

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS—UG)

Applied Statistics with Data Science

MST 1C 01—MATHEMATICS 1 : DIFFERENTIAL CALCULUS, LOGIC AND BOOLEAN ALGEBRA

(2021 Admissions)

Time : Two Hours Maximum : 60 Marks

Section A

Answer atleast **eight** *questions.*
Each question carries 3 *marks.*
All questions can be attended.
Overall ceiling 24.

1. Find the derivative of the function $u = \dfrac{5x+1}{2\sqrt{x}}$ with respect to x.

2. Find $\dfrac{d^2y}{dx^2}$, where $y = \sec x$.

3. Find the slope of the tangent to the curve $y = 2\tan\left(\dfrac{\pi x}{4}\right)$ at $x = 1$.

4. State the mean value theorem.

5. Define critical point of a function f and find the critical points of $f(x) = 8x - x^4$.

6. Find the function $f(x)$ whose derivative is 2 and whose graph passing through the point (0, 5).

7. Find the domain and range of the three variable function $w = \sqrt{x^2 + y^2 + z^2}$.

8. Evaluate $\lim\limits_{(x,y)\to(1,0)} = \dfrac{x \sin y}{x^2 + 1}$.

9. Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ for the function $f(x, y) = e^{xy} \ln y$.

10. Show by truth table that $(p \wedge q) \rightarrow (p \rightarrow q)$ is a tautology.

11. Define contra positive of a statement and give an example.

12. Express the statement :

"Every student in this class has studied calculus", as a universal quantification.

(8 × 3 = 24 marks)

Section B

Answer atleast **five** *questions.*
Each question carries 5 *marks.*
All questions can be attended.
Overall ceiling 25.

13. Find $\frac{d^2y}{dx^2}$ if $ax^2 + 2hxy + by^2 = 1$,where a, b, h are constants.

14. Find $\frac{d^2y}{dx^2}$ at $t = \frac{2\pi}{3}$ when $x = \cos t, y = \sqrt{3} \cos t$.

15. State and Prove Rolle's Theorem.

16. Find $\lim_{(x,y)\rightarrow(0,0)} = \frac{x^2 - xy}{\sqrt{x} - \sqrt{y}}$.

17. Express $\frac{\partial w}{\partial r}$ and $\frac{\partial w}{\partial s}$ in terms of r and s if $w = x + 2y + z^2$, $x = \frac{r}{s}$, $y = r^2 + \ln s$ and $z = 2r$.

18. Construct a truth table for each of the following compound propositions :

(a) $p \wedge \neg p$.

(b) $(p \vee \neg p) \rightarrow q$.

(c) $(p \vee q) \rightarrow (p \wedge q)$.

19. Define and give one example for each :

    (a) Proposition.

    (b) Tautology.

    (c) Contradiction.

(5 × 5 = 25 marks)

Section C

Answer any **one** *question.*
The question carries 11 *marks.*

20. (a) Find the tangent and normal to the curve $x^3 + y^3 - 9xy = 0$ at the point (2, 4).

    (b) Find the derivative of $y = \sec(\tan x)$.

21. Find the interval on which the function $f(x) = 2x^3 - 18x$ is increasing and decreasing. Find the local and absolute extreme values of f, if any.

(1 × 11 = 11 marks)

D 13224 (Pages : 3) Name.....

Reg. No.....

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS—UG)

Applied Statistics with Data Science

ASD 1B 01—STATISTICS 1 : DESCRIPTIVE STATISTICS AND BASIC R PROGRAMMING

(2021 Admissions)

Time : Two Hours and a Half Maximum : 80 Marks

Use of calculator and Statistical table are permitted

Section A

Answer atleast **ten** *questions.*
Each question carries 3 *marks.*
All questions can be attended.
Overall ceiling 30.

1. Write a short note on MOSPI.
2. Explain the methods of data input in R .
3. What is the role of CSO in the development of India ?
4. Write a short note on UNFPA.
5. How do you retrieve work in R ?
6. Write a short note on getting help in R.
7. What are the advantages of using secondary data?
8. Briefly explain nominal scale.
9. Define frequency curve.
10. Write a short note on arithmetic mean.
11. Define standard deviation.
12. Describe ratio scale.
13. How will you find out mode and median using R ?

14. What is a schedule ?

15. What are the limitations of Statistics ?

(10 × 3 = 30 marks)

Section B

Answer atleast **five** *questions.*
Each question carries 6 *marks.*
All questions can be attended.
Overall ceiling 30.

16. Define the common measures of central tendencies.

17. Briefly explain the history of development of 'R'. What are the advantages of R over other statistical software ?

18. Distinguish between questionnaire and schedule.

19. Define stem and leaf chart with an example. Write R commands for creating a stem and leaf chart.

20. Explain the concept of population and sample. Give an example.

21. What are the functions of Directorate of Economics and Statistics and organization of large sample survey ?

22. Explain the functions of NSSO and MOSPI.

23. Derive the relationship between raw moments and central moments.

(5 × 6 = 30 marks)

Section C

Answer any **two** *questions.*
Each question carries 10 *marks.*

24. What is primary data and secondary data ? Describe the methods for collecting primary data and secondary data.

25. a) Define dispersion . What are the various measures of dispersion ? Briefly explain standard deviation, quartile deviation and mean deviation.

    b) For the following data find the standard deviation :

X	12. 5	13	13. 5	14	14.5	15	15.5	16
f	4	19	30	63	66	29	18	1

26. Explain co-efficient of variation. Write the R command for finding coefficient of variation. Find the co-efficient of variation for the following data :

Age Group	20–30	30–40	40–50	50–60	60–70	70–80	80–90
Frequency	25	35	45	55	65	75	85

27. Explain the following :

a) Lists in R programming.

b) Data frames in R programming.

c) Work space in R programming.

d) Scripts in R programming.

e) Scan function in R programming.

(2 × 10 = 20 marks)