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Name.....

Reg. No.....

FIFTH SEMESTER (CUCBCSS-UG) DEGREE EXAMINATION NOVEMBER 2022

Mathematics

MAT 5D 18—MATHEMATICS FOR NATURAL SCIENCES

(2017—2018 Admissions)

me : Two Hours

Maximum : 40 Marks

Section-A

Answer **all** *the six questions.*
Each question carries 1 mark.

1. Add the numbers 4.35, 8.65, 2.95, 12.45, 6.65, 7.55 and 9.75 by rounding to the nearest tenth according to the even integer convention
2. A rectangle has width x and length $x + 10$. Write a function $A(x)$, that expresses the area as a function of x.
3. What do you mean by frequency distribution ?
4. Find the arithmetic mean of the numbers 8, 3, 5, 12, and 10.
5. What do you mean by the median of a set of numbers ?
6. State empirical relations between measures of dispersion.

(6 × 1 = 6 marks)

Section B

Answer any **five** *out of seven questions.*
Each question carries 2 marks.

. State which of the following represent discrete data and which represent continuous data :

a) Numbers of shares sold each day in the stock market.

b) Temperatures recorded every half hour at a weather bureau.

c) Lifetimes of television tubes produced by a company.

d) Yearly incomes of college professors.

. Out of 100 numbers, 20 were 4's, 40 were 5's, 30 were 6's and the remainder were 7's. Find the arithmetic mean of the numbers.

Turn over

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9. If $Z_1 = X_1 + Y_1, Z_2 = X_2 + Y_2, \ldots Z_N = X_N + Y_N$, prove that $\overline{Z} = \overline{X} + \overline{Y}$.

10. Find the mean deviation of the set of numbers 9, 3, 8, 8, 9, 8, 9, 18.

11. A manufacturer of television tubes has two types of tubes, A and B. Respectively, the tube... mean lifetimes of $\overline{X}_A = 1495$ hours and $\overline{X}_B = 1875$ hours, and standard deviations of S_A = ... hours
$S_B = 310$ hours. Which tube has the greater ? (a) Absolute dispersion ; and (b) Relative dis...

12. Find the second and third moments about the mean for the set of numbers 2, 3, 7, 8, 10.

13. Prove that $m_3 = m'_3 - 3m'_1m'_2 + 2m'^3_1$.

(5 × 2 = 10)

Section-C

Answer any **three** *out of five questions.*
Each question carries 4 marks.

14. Solve the logarithmic equation $2 \log (x+1) - 3 \log (x+1) = 2$.

15. If the class marks in a frequency distribution of the weights of students are 128,137,146,... and 182 pounds (lb), find : (a) The class-interval size ; (b) The class boundaries ; and (c) Th... limits, assuming that the weights were measured to the nearest pound.

16. Using table given below, find the mean wage of the 70 employees at the P and R Compa...

Wages	*Frequency*
250.00- 259.99	8
260.00- 269.99	10
270.00- 279.99	16
280.00- 289.99	15
290.00- 299.99	10
300.00- 319.99	8
320.00- 379.99	3
	Total = 70

17. During four successive years, a home owner purchased oil for her furnace at respective... $0.80, $0.90, $1.05, and $1.25 per gallon (gal). What was the average cost of oil over th... period ?

18. Find the standard deviation of the heights of the 100 male students at XYZ University :

Height (in)	Number of Students
60-62	5
63-65	18
66-68	42
69-71	27
72-74	8
	Total = 100

(3 × 4 = 12 marks)

Section-D

Answer any **two** *out of three questions.*
Each question carries 6 marks.

19. Table given below shows a frequency distribution of the weekly wages of 65 employees at the P & R Company. With reference to the table, determine :

(a) The lower limit of the sixth class.

(b) The upper limit of the fourth class.

(c) The class mark of the third class.

(d) The class boundaries of the fifth class.

(e) The size of the fifth-class interval.

(f) The frequency of the third class.

(g) The relative frequency of the third class.

(h) The class interval having the largest frequency

(i) The percentage of employees earning less than $280.00 per week.

(j) The percentage of employees earning less than $300.00 per week but at least $260.00per week.

Wages	Frequency
250.00- 259.99	8
260.00- 269.99	10
270.00- 279.99	16
280.00- 289.99	14
290.00- 299.99	10
300.00- 309.99	5
310.00- 319.99	2
	Total= 65

20. During one year the ratio of milk prices per quart to bread prices per loaf was 3.00, whereas during the next year the ratio was 2.00 :

    (a) Find the arithmetic mean of these ratios for the 2-year period.

    (b) Find the arithmetic mean of the ratios of bread prices to milk prices for the 2-year period.

    (c) Discuss the advisability of using the arithmetic mean for averaging ratios.

    (d) Discuss the suitability of the geometric mean for averaging ratios.

21. The numbers $X_1, X_2, ..., X_K$ occur with frequencies $f_1, f_2, ..., f_K$ where $f_1 + f_2 + ... + f_K = N$ is the total frequency :

    (1) Find the geometric mean G of the numbers.

    (2) Derive an expression for log G.

    (3) How can the results be used to find the geometric mean for data grouped into a frequency distribution ?

(2 × 6 = 12 marks)