D 30181 **(Pages : 4)** **Name.....**

Reg. No.....

FIFTH SEMESTER (CUCBCSS–UG) DEGREE EXAMINATION NOVEMBER 2022

Mathematics

MAT 5D 18—MATHEMATICS FOR NATURAL SCIENCES

(2017—2018 Admissions)

Time : 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.*

7. 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.
8. 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

9. If $Z_1 = X_1 + Y_1$, $Z_2 = X_2 + Y_2$,... $Z_N = X_N + Y_N$, 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 tubes have mean lifetimes of $\overline{X}_A = 1495$ hours and $\overline{X}_B = 1875$ hours, and standard deviations of $S_A = 280$ hours and $S_B = 310$ hours. Which tube has the greater ? (a) Absolute dispersion ; and (b) Relative dispersion.

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 marks)

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 128,137,146,155,164 and 182 pounds (lb), find : (a) The class-interval size ; (b) The class boundaries ; and (c) The class 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 Company.

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 costs of \$0.80, \$0.90, \$1.05, and \$1.25 per gallon (gal). What was the average cost of oil over the 4-year 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.

Turn over

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)

D 10235 **(Pages : 3)** **Name.....**

Reg. No.....

FIFTH SEMESTER U.G. DEGREE EXAMINATION, NOVEMBER 2021

(CUCBCSS—UG)

Mathematics

MAT 5D 18—MATHEMATICS FOR NATURAL SCIENCES

Time : Two Hours Maximum : 40 Marks

Section A

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

1. Define discrete data and continuous data with an example.
2. Find the log to the base 8 of 4096.
3. Define any two measures of central tendency.
4. Find the median of the set of numbers 5, 5, 7, 9, 11, 12, 15, and 18.
5. Find the quadratic mean of the numbers 3, 5, 6, 6, 7, 10, and 12.
6. Define skewness of a distribution.

(6 × 1 = 6 marks)

Section B

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

7. Solve the logarithmic equation $\ln(x)^2 - 1 = 0$.
8. Describe two graphic representations of frequency distributions.
9. Ten measurements of the diameter of a cylinder were recorded by a scientist as 3.88, 4.09, 3.92, 3.97, 4.02, 3.95, 4.03, 3.92, 3.98, and 4.06 centimeters (cm). Find the arithmetic mean of the measurements.
10. Find the mean and mode for the set of numbers 3, 5, 2, 6, 5, 9, 5, 2, 8, and 6.
11. Find the second and third moments of the set of numbers 2, 3, 7, 8, 10.
12. Find the standard deviation of the set of numbers 9, 3, 8, 8, 9, 8, 9, 18.
13. Prove that $m_2 = m_2' - m_1'^2$.

(5 × 2 = 10 marks)

Turn over

Section C

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

14. Solve the logarithmic equation $\log(6y - 7) + \log y = \log 5$.

15. The smallest of 150 measurements is 5.18 in, and the largest is 7.44 in. Determine a suitable set of : (a) class intervals ; (b) class boundaries ; and (c) class marks that might be used in forming a frequency distribution of these measurements.

16. Four groups of students, consisting of 15, 20, 10, and 18 individuals, reported mean weights of 162, 148, 153, and 140 pounds (lb), respectively. Find the mean weight of all the students.

17. Prove that the sum of the deviations of $X_1, X_2, \ldots, X_N$ from their mean $\bar{X}$ is equal to zero.

18. The bacterial count in a certain culture increased from 1000 to 4000 in 3 days. What was the average percentage increase per day ?

$(3 \times 4 = 12$ marks)

Section D

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

19. The final grades in mathematics of 80 students at State University are recorded in the accompanying table :

68	84	75	82	68	90	62	88	76	93
73	79	88	73	60	93	71	59	85	75
61	65	75	87	74	62	95	78	63	72
66	78	82	75	94	77	69	74	68	60
96	78	89	61	75	95	60	79	83	71
79	62	67	97	78	85	76	65	71	75
65	80	73	57	88	78	62	76	53	74
86	67	73	81	72	63	76	75	85	77

With reference to this table, find :

(a) The highest grade.

(b) The lowest grade.

(c) The range.

(d) The grades of the five highest-ranking students.

(e) The grades of the five lowest-ranking students.

(f) The grade of the student ranking tenth highest.

(g) The number of students who received grades of 75 or higher.

(h) The number of students who received grades below 85.

(i) The percentage of students who received grades higher than 65 but not higher than 85.

(j) The grades that did not appear at all.

20. Find : (a) the quartiles Q1, Q2, and Q3 and (b) the deciles D1, D2,...,D9 for the wages of the 65 employees at the P&R Company.

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

21. Find the moment co-efficient of skewness, a3 for the height distribution of 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

(2 × 6 = 12 marks)

D 90235 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CUCBCSS—UG)

Mathematics

MAT 5D 18—MATHEMATICS FOR NATURAL SCIENCES

Time : Two Hours Maximum : 40 Marks

Part A

All questions to be attended.
Each question carries 1 mark.

1. What is a finite set ?
2. What is a transitive relation ?
3. Give an example for a continuous characteristic ?
4. Find power set of A if $A = \{2, 3, 4\}$?
5. What is Pearsons measure of skewness ?
6. What is the empirical relation between Mean, Median, Mode ?

(6 × 1 = 6 marks)

Part B

All questions can be attended and overall ceiling.
Each question carries 2 marks.

7. What is a Questionaire ?
8. If $A = \{2, 4, 6\}$ and $B = \{1, 2, 5, 6\}$ find $A \cap B$ and $A \cup B$.
9. Define bijective function with example.
10. What is a raw moment ?
11. Find the arithmetic mean of first 100 natural numbers.
12. What is Sampling ?
13. Calculate the geometric, mean of the following observations :

    34, 56, 7, 65, 87.6, 43, 87.65, 67.20.30

(5 × 2 = 10 marks)

Turn over

Part C

All questions can be attended and overall ceiling.
Each question carries 4 marks.

14 Explain about a frequency distribution.

15 What is Venn diagram ? Represent set operations using venn diagrams.

16 Find the arithmetic mean for the following frequency distribution of marks of 150 students :

Marks	:	0–40	40–50	50–60	60–70	70–80	80–90	90–100
No. of students	:	10	45	25	30	20	15	5

17 What is Dispersion ? Briefly explain various measures of dispersion.

18 The mean and median of a frequency distribution are 23.2 and 25.5 respectively. Find the approximate value of its mode.

(3 × 4 = 12 marks)

Part D

All questions can be attended and overall ceiling.
Each question carries 6 marks.

19 Find the quartile deviation for the following data :

Class	:	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80
Frequency	:	1	8	10	15	12	8	5	1

20 What are different methods in classification of data ?

21 Draw histogram for the following data :

Income	:	0–50	50–100	100–200	200–300	300–400
No. of families	:	60	60	70	30	30

(2 × 6 = 12 marks)

D 70325 (Pages : 3)

Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2019

(CUCBCSS–UG)

Mathematics

MAT 5D 18—MATHEMATICS FOR NATURAL SCIENCES

Time : Two Hours Maximum : 40 Marks

Section A

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

1. If 5, 8, 6 and 2 occur with frequencies 3, 2, 4 and 1, respectively, then find its arithmetic mean ?
2. Find the median of the set of numbers 5, 5, 7, 9, 11, 12, 15, 18.
3. State the relation between the mean, median and mode.
4. What do you mean by geometric mean of positive numbers ?
5. Define skewness of a distribution.
6. Find the RMS of set of numbers 1, 3, 4, 5 and 7.

(6 × 1 = 6 marks)

Section B

Answer any **five** *questions.*
Each question carries 2 *marks.*

7. Solve the equations $3a - 2b = 11$; $5a + 7b = 39$ simultaneously.
8. A student's final grades in Mathematics, Physics, English and hygiene are, respectively, 82, 86, 90 and 70. If the respective credits received for these courses are 3, 5, 3 and 1, determine an appropriate average grade.
9. If N numbers, $X_1, X_2, \ldots, X_N$ have deviations from any number A given by $d_1 = X_1 - A$, $d_2 = X_2 - A, \ldots, d_N = X_N - A$ respectively, prove that $\overline{X} = A + \frac{\sum_{i=1}^{N} d_i}{N}$.
10. Find the mean deviation of the sets of numbers 9, 3, 8, 8, 9, 8, 9, 18.
11. Prove that $m_2 = m_2' - m_1'^2$.
12. Prove that the standard deviation $s = \sqrt{\frac{\Sigma X^2}{N} - \left(\frac{\Sigma X}{N}\right)^2}$.

Turn over

13. Ten measurments of the diameter of a cylinder were recorded by a scientist as 3.88, 4.09, 3.92, 3.97, 4.02, 3.95, 4.03, 3.92, 3.98 and 4.06 centimeters (cm). Find the arithmetic mean of the measurements.

(5 × 2 = 10 marks)

Section C

Answer any **three** *questions.*
Each question carries 4 *marks.*

14. Show that the product of the numbers 5.74 and 3.8, assumed to have three and two significant figures, respectively, cannot be accurate to more than two significant figures.

15. Solve the logarithmic equation $\log_{10}(a+4) - \log_{10}(a-2) = 1$.

16. If the mean annual incomes of agricultural and non-agricultural workers are \$25,000 and \$35,000 respectively, would the mean annual income of both groups together be \$30,000. Justify.

17. Find the semi-interquartile range for the wages of the 65 employees a the P & R Company :

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 – 391.99	...	2
	Total =	65

18. Find the (a) first, (b) second, (c) third, and (d) fourth moments about the origin 4 for the set of numbers 2, 3, 7, 8, 10.

(3 × 4 = 12 marks)

Section D

Answer any **two** *questions.*
Each question carries 6 *marks.*

19. Find the median weight of the 40 male college students at State University by using the frequency distribution table given below :

Weight (lb)		*Frequency*
118 – 126	...	3
127 – 135	...	5
136 – 144	...	9
145 – 153	...	12
154 – 162	...	5
163 – 171	...	4
172 – 180	...	2
	Total =	40

20. Table given below shows the IQ's of 480 school children at a certain elementary school. Using the coding method, find the statement deviation :

Mark (X) :	70	74	78	82	86	90	94	98	102	106	110	114	118	122	126
Frequency :	4	9	16	28	45	66	85	72	54	38	27	18	11	5	2

21. Find the moment coeffient of skewness, $\alpha 3$ for the height distribution of students at XYZ University :

Height (lb)		*Number of students*
60 – 62	...	5
63 – 65	...	18
66 – 68	...	42
69 – 71	...	27
72 – 74	...	8
	Total =	100

(2 × 6 = 12 marks)

D 50604 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS—UG)

Open Course

MAT 5D 18—MATHEMATICS FOR NATURAL SCIENCES

Time : Two Hours Maximum : 40 Marks

Section A

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

1. Define continuous and discrete variable with an example.
2. Find the arithmetic mean of the numbers 8, 3, 5, 12 and 10.
3. What do you mean by the mode of a set numbers.
4. Find the harmonic mean of the numbers 2, 4 and 8.
5. Define mean deviation of set of N numbers.
6. Convert the natural logarithm ln 13 = 2.56495 into equivalent natural exponential form.

(6 × 1 = 6 marks)

Section B

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

7. Solve the equations $3a + 2b + 5c = 15$; $7a - 3b + 2c = 52$; $5a + b - 4c = 2$ simultaneously.
8. 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.
9. Prove that the sum of the deviations of $X_1, X_2, \ldots, X_N$ from their mean $\bar{X}$ is equal to zero.
10. If (a) 85 and (b) 150 numbers are arranged in an array, how would you find the median of the numbers.
11. Find the standard deviation s of each set of numbers 9, 3, 8, 8, 9, 8, 9, 18.
12. Prove that the standard deviation $s = \sqrt{\frac{\Sigma X^2}{N} - \left(\frac{\Sigma X}{N}\right)^2}$.
13. Find the second and third, moments of the set 2, 3, 7, 8, 10.

(5 × 2 = 10 marks)

Turn over

Section C

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

14. Solve the logarithmic equation $\log (6y - 7) + \log y = \log 5$.

15. The smallest of 150 measurements is 5.18 in, and the largest is 7.44 in. Determine a suitable set of (a) class intervals, (b) class boundaries, and (c) class marks that might be used in forming a frequency distribution of these measurements.

16. Using table given below, find the mean wage of the 70 employees at the P&R Company :

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. Find the 10 – 90 percentile range of the heights of the 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

18. The bacterial count in a certain culture increased from 1000 to 4000 in 3 days. What was the average percentage increase per day ?

(3 × 4 = 12 marks)

Section D

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

19. 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 ?

20. Find Pearson's (a) first ; and (b) second coefficients of skewness for the wage distribution of the 65 employees at the P&R Company :

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

21. A car travels 25 miles at 25 miles per hour (mi/h), 25 miles at 50 mph, and 25 miles at 75 mph. Find the arithmetic mean of the three velocities and the harmonic mean of the three velocities. Which is correct ?

(2 × 6 = 12 marks)

C 30310

(Pages : 3)

Name.....

Reg. No.....

FIFTH SEMESTER B.A./B.Sc./B.Com./B.B.A. DEGREE EXAMINATION
NOVEMBER 2017

(CUCBCSS—UG)

Open Course

MAT 5D 18—MATHEMATICS FOR NATURAL SCIENCES

Time : Two Hours

Maximum : 40 Marks

Section A

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

1. What you mean by the median of a set of numbers.
2. A distribution having only one mode is called ————.
3. Find the quadratic mean of the numbers 3, 5, 6, 6, 7, 10 and 12.
4. Define Kurtosis of a distribution.
5. Write the empirical relation between mean deviation and standard deviation.
6. Define the semi-interquartile range.

(6 × 1 = 6 marks)

Section B

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

7. (a) Arrange the numbers 17, 45, 38, 27, 6, 48, 11, 57, 34 and 22 in an array.

   (b) Determine the range of these numbers.

8. If $Z_1 = X_1 + Y_1, Z_2 = X_2 + Y_2$; .....; $Z_N = X_N + Y_N$, prove that $\bar{Z} = \bar{X} + \bar{Y}$.
9. Find the mean deviation of the set of numbers 12, 6, 7, 3, 15, 10, 18, 5.
10. The bacterial count in a certain culture increased from 1000 to 4000 in 3 days. What was the average percentage increase per day ?
11. Solve the following logarithmic equation. $\log(6y - 7) + \log y = \log 5$.

Turn over

12. Find the quartile co-efficient of skewness for the distribution having $Q_1 = 268.25$, $Q_2 = 279.06$ and $Q_3 = 290.75$.

13. A manufacturer of television tubes has two types of tubes, A and B. Respectively, the tubes have mean lifetimes of $X_A = 1495$ hours and $X_B = 1875$ hours, and standard deviations of $S_A = 280$ hours and

    (a) Absolute dispersion.

    (b) Relative dispersion ?

(5 × 2 = 10 marks)

Section C

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

14. Table shows the IQs of 480 school children at a certain elementary school. Using the coding method, find (a) the mean ; (b) The standard deviation ; (c) Determine the percentage of the students IQs that fall within the ranges $\bar{X} \pm s$, and $\bar{X} \pm 2s$

Class mark (X) ...	70	74	78	82	86	90	94	98	102	106	110	114	118	122
Frequency (f) ...	4	9	16	28	45	66	85	72	54	38	27	18	11	5

15. In a company having 80 employees, 60 earn 10.00 rupees per hour and 20 earn 13.00 rupees per hour.

    (a) Determine the mean earnings per hour.

    (b) Would the answer in part (a) be the same if the 60 employees earn a mean hourly wage of 10.00 rupees per hour ? Prove your answer.

    (c) Do you believe the mean hourly wage to be typical ?

16. Find the mean, median and mode for the sets.

    (a) 3, 5, 2, 6, 5, 9, 5, 2, 8, 6.

    (b) 51.6, 48.7, 50.3, 49.5, 48.9.

17. Prove that the quadratic mean of two positive unequal numbers, a and b, is greater than their geometric mean.

18. Find the (a) first, (b) second, (c) third, and (d) fourth moments about the mean for the set of numbers 2, 3, 7, 8, 10.

(3 × 4 = 12 marks)

Section D

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

19. Two variables X and Y, assume the values $X_1 = 2, X_2 = -5, X_3 = 4, X_4 = -8$ and $Y_1 = -3, Y_2 = -8, Y_3 = 10, Y_4 = 6$, respectively. Calculate (a) $\sum X$, (b) $\sum Y$, (c) $\sum XY$, (d) $\sum X^2$, (e) $\sum Y^2$, (f) $(\sum X)(\sum Y)$, (g) $\sum(X+Y)\sum(X-Y)$.

20. Table shows a frequency distribution of the weekly wages of 65 employees at the PR Company. With reference to the table given, determine the standard deviation.

Wages Employees (in rupees)	Number of employees
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

21. Find Pearsons (a) first and (b) second coefficients of skewness for the wage distribution of the 65 employees at the PR Company given in the above problem.

(2 × 6 = 12 marks)

D 90910

(Pages : 3)

Name.....

Reg. No.....

FIFTH SEMESTER B.A./B.Sc./B.Com. DEGREE EXAMINATION
NOVEMBER 2015

(U.G.—CCSS)

Open Course—Mathematics

MM 5D 02—MATHEMATICS FOR NATURAL SCIENCES

Time : Three Hours

Maximum : 30 Weightage

Part A

Answer **all** *questions.*
Each question carries ¼ weightage.

1. $A \cap \bar{A} =$

   (a) A.
   (b) ϕ.
   (c) U.
   (d) $\bar{A}$.

2. If set A contains 3 elements, number of proper subsets of A is :

   (a) 2.
   (b) 7.
   (c) 8.
   (d) 9.

3. The average of the upper and lower limit of a class is known as :

   (a) Class mark.
   (b) Class boundary.
   (c) Class limit.
   (d) Class interval.

4. The AM of two numbers is 18. If one of them is 12, the other number is :

   (a) 36.
   (b) 24.
   (c) 15.
   (d) 21.

5. The relation between AM, GM and HM is :

   (a) AM ≥ HM ≥ GM.
   (b) GM ≥ HM ≥ AM.
   (c) HM ≥ AM ≥ GM.
   (d) AM ≥ GM ≥ HM.

6. If Q_1, Q_2 and Q_3 denote the quartiles, then QD is :

   (a) $\frac{Q_3 + Q_1}{2}$.
   (b) $\frac{Q_3 - Q_1}{Q_2}$.
   (c) $\frac{Q_3 - Q_1}{2}$.
   (d) $\frac{Q_1 - Q_3}{2}$.

Turn over

7. The AM of a series is 25 and its coefficient of variation is 32 %. The SD of the series is :

   (a) 64. (b) $\frac{\sqrt{32}}{5}$.

   (c) 16. (d) 8.

8. For a lepto Kurtic distribution, β_2 is :

   (a) Less than 3. (b) Greater than 3.

   (c) Equal to 3. (d) Equal to zero.

9. If A and B are mutually exclusive events, then $P(A \cup B) =$

   (a) $P(A) \cdot P(B)$. (b) $P(A) + P(B) - P(A) \cdot P(B)$.

   (c) $P(A) + P(B)$. (d) $1 - P(A \cap B)$.

10. The relation between second central moment and raw moments is :

    (a) $M_2 = M_2^1 + M_1^1$. (b) $M_2 = M_2^1 - M_1^1$.

    (c) $M_2 = M_2^1 + (M_1^1)^2$. (d) $M_2 = M_2^1 - (M_1^1)^2$.

11. The distribution for which mean = variance is :

    (a) Binomial. (b) Poisson.

    (c) Normal. (d) None of the above.

12. The number of elements in the sample space of the experiment of tossing three coins is :

    (a) 3. (b) 6.

    (c) 8. (d) 9.

(12 × ¼ = 3 weightage)

Part B

Answer **all** *questions.*
Each question carries 1 *weightage.*

13. State De Morgan's law on set theory.
14. Define Mode.
15. Define a continuous variable.
16. What are the various graphs used to represent a data ?
17. Define Range.
18. What is the GM of the numbers 2, 4 and 8 ?
19. Write the sample space in the experiment of tossing a coin and a die.
20. Define mutually exclusive events.
21. Define the probability distribution of a discrete random variable.

(9 × 1 = 9 weightage)

Part C

Answer any **five** *questions.*
Each question carries 2 weightage.

22. If S = {1, 2, 3, 4, 5, 6, 7} ; A = {1, 3, 5, 6} ; B = {2, 3, 5, 7} find find $A^1 \cap B$ and $A \cup B^1$.

23. What are Ogives ? Explain.

24. Find the median of the following data :—

x :	15	18	20	21	22	24
f :	4	7	10	8	6	4

25. Find the mean deviation about mean of :

9, 4, 8, 7, 10, 12, 9, 13.

26. Given $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$. Find P (A *or* B) when (i) A and B are independent ; (b) A and B are mutually exclusive.

27. For a Binomial distribution mean = 18 and variance = 6. Find P (X = 0).

28. A bag contains 4 white and 2 back balls. Another bag contains 3 white and 5 black balls. If one ball is drawn from each bag find the probability that (i) both are white ; (ii) one is white and one is black.

(5 × 2 = 10 weightage)

Part D

Answer any **two** *questions.*
Each question carries 4 weightage.

29. Find Karl Pearson's coefficient of skewness of the following data :—

Class :	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Freq. :	3	12	21	28	19	12	5

30. The following table gives the height of students. Find the quartile deviation :

Height (cms) :	150 – 153	153 – 156	156 – 159	159 – 162	162 – 165	165 – 168
No. of students :	2	7	24	27	13	3

31. The scores obtained by 500 students in an examination is assumed to follow normal distribution with mean 60 and SD 10, find the number of students scoring (i) above 75 ; (ii) between 65 and 75.

(2 × 4 = 8 weightage)

D 70945 (Pages : 4) Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

(UG—CCSS)

Open Course—Mathematics

MM 5D 02—MATHEMATICS FOR NATURAL SCIENCES

Time : Three Hours Maximum : 30 Weightage

Part A

Answer **all** *questions.*

Each question carries ¼ weightage.

1. For a set A, $A \cup \bar{A}$ =

   (a) A. (b) U.

   (c) ϕ. (d) $\bar{A}$.

2. If $A \subset B$, then $A \cap B$ =

   (a) A. (b) B.

   (c) $A \cup B$ (d) $\bar{A}$

3. The class interval of the continuous grouped data 30—33 34—37 38—41 is :

   (a) 3.5. (b) 3.

   (c) 4. (d) 4.5.

4. Sum of algebraic deviations of a data from its A.M. is :

   (a) Mean deviation. (b) $\bar{x}$.

   (c) 1. (d) Zero.

5. The empirical relation between mean, median and mode is :

   (a) Mean – Mode = Mean – Median.

   (b) 3 Mean – 2 Median = Mode.

   (c) Mean – Mode = 3 (Mean–Median).

   (d) Median – Mode = 2 (Mean–Median).

6. The most repeated value in a data is called :

   (a) Mode. (b) Median.

   (c) H.M. (d) G.M.

Turn over

7. Sum of squares of the deviations is minimum when deviations are taken from :

(a) Mode. (b) Mean.

(c) Median. (d) H.M.

8. If the minimum value in a set of values is 12 and its range is 46, then the maximum value of the set is :

(a) 34. (b) 58.

(c) 52. (d) 40.

9. The probability of getting a white ball from a box containing 6 white and 4 black balls is :

(a) $\frac{6}{4}$. (b) $\frac{2}{3}$.

(c) $\frac{6}{10}$. (d) $\frac{2}{5}$.

10. For a Poisson distribution :

(a) Mean = Variance. (b) Mean = 2 Variance.

(c) Mean < Variance. (d) Mean > Variance.

11. For two events A and B, $P(A/B)$ =

(a) $\frac{P(A \cap B)}{P(A)}$. (b) $\frac{P(A \cap B)}{P(B)}$.

(c) $\frac{P(A \cup B)}{P(A)}$. (d) $\frac{P(A \cup B)}{P(B)}$.

12. The first central moment of a distribution is :

(a) One. (b) AM.

(c) Zero. (d) Median.

(12 × ¼ = 3 weightage)

Part B

Answer **all** *questions.*

Each question carries 1 *weightage.*

13. Define null set. Give an example.

14. Define a discrete variable.

15. Define Median.

16. What are Percentiles ?

17. If $S = \{1, 2, 3, 4, 5, 6, 7, 8\}$, $A = \{1, 3, 4, 5, 6\}$, $B = \{4, 6, 7, 8\}$ find $A \cup B$ and $A \cap B$.

18. State the classification of probability.

19. Define mutually exclusive events.

20. Define Kurtosis.

21. Define probability distribution of a discrete random variable.

(9 × 1 = 9 weightage)

Part C

Answer any **five** *questions.*

Each question carries 2 *weightage.*

22. Sketch the graph of $Y = 3X - 4$.

23. A variable takes values 8, 10, 15, 18, 20 with frequencies 2, 5, 8, 4, 1 respectively. Find its AM.

24. Find the SD of 5, 8, 10, 12, 15.

25. Distinguish between raw moments and central moments.

26. Define independent events.

If $P(A) = \frac{1}{3}$ and $P(B) = \frac{2}{5}$ find $P(A \cup B)$ if A and B are independent.

27. From a box containing 5 white and 3 black balls, 2 balls are drawn at random. What is the probability that :

(i) Both are white. (ii) One is White.

28. State the properties of Normal distribution.

(5 × 2 = 10 weightage)

Part D

Answer any **two** *questions.*

Each question carries 4 *weightage.*

29. Find the 10–90 percentile range of the following data :

Class	:	5–9	10–14	15–19	20–24	25–29	30–34	35–39
Frequency	:	10	30	80	50	40	20	20

30. A random sample of 100 items has the following distribution :

Class	:	30–35	35–40	40–45	45–50	50–55	55–60	60–65
Frequency	:	3	12	21	28	19	12	5

Compute the mean and standard deviation.

31. (a) A discrete random variable X has the following probability distribution :

X	:	1	2	3	4	5
P (x)	:	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{12}$

Find E (x).

(b) If 20 % of the bolts produced by a machine are defective, determine the probability that in a sample of 4 chosen at random at least one is defective.

($2 \times 4 = 8$ weightage)

D 50727 (Pages : 3) Name..............................

Reg. No..............................

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2013

(UG—CCSS)

Mathematics—Open Course

MM 5D 02—MATHEMATICS FOR NATURAL SCIENCES

Time : Three Hours Maximum : 30 Weightage

Objective type Questions.
Answer all **twelve** *questions.*

1. For any set A, $A \cup \bar{A}$ is :

   (a) A. (b) U.

   (c) ϕ. (d) $\bar{A}$.

2. When 10 is subtracted from all values of a data, its S.D. is :

   (a) Decreased by 10. (b) Increased by 10.

   (c) Not affected. (d) Multiplied by 10.

3. If 25 % items of a data are less than 10 and 25 % are more than 40, then Quartile deviation is :

   (a) 15. (b) 30.

   (c) 25. (d) 50.

4. In a discrete series having 2 K + 1 observations, median is :

   (a) K^{th} value. (b) $(K+1)^{th}$ value.

   (c) $\left(\frac{2K+1}{2}\right)^{th}$ value. (d) $\left(\frac{K+2}{2}\right)^{th}$ value.

5. For a binomial distribution :

   (a) Mean < variance. (b) Mean = Variance.

   (c) Mean > variance. (d) Mean = S.D.

6. If $f(x) = \frac{x+3}{x-3}$, then $f(3) =$

   (a) 6. (b) 0.

   (c) 3. (d) Not defined.

Turn over

7. Mean deviation is minimum when deviations are taken about ———.

8. For a mesokurtic distribution, Co-efficient of kurtosis β_2 = ———.

9. If A and B are independent events then P (A ∩ B) = ———.

10. A normal distribution with mean = 0 and SD = 1 is called ———.

11. A fair coin is tossed twice. The probability of getting two heads is ———.

12. If first two raw moments of a distribution are 2 and 12 respectively then the second central moment is ———.

(12 × ¼ = 3 weightage)

Short Answer Questions.
Answer **all** *nine questions.*

13. State any *two* limitations of AM.

14. Find two numbers whose AM = 10 and GM = $\sqrt{96}$.

15. For a moderately skewed data, mean = 28 and Median = 30. Find Mode.

16. State the addition theorem on probability for two events.

17. For a binomial distribution mean = 12 and variance = 9, find *p*.

18. State any *four* properties of Normal distribution.

19. What is the relation between binomial and Poisson distribution.

20. A discrete random variable X has the following probability distribution :

X	0	1	2	3	4
Prob.	0.1	0.2	0.3	0.3	0.1

find E (X).

21. Sketch the graph of $Y = 2x - 3$.

(9 × 1 = 9 weightage)

Short Essay Questions.
Answer any **five** *questions.*

22. Draw a histogram to the following data :

Class	:	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency	:	12	15	20	18	14	10

23. Calculate the quartile deviation of the following data :

Class	:	20 - 39	40 - 59	60 - 79	80 - 99	100 - 119
Frequency	:	8	19	28	18	7

24. First three moments of a data about 5 are – 2, 10 and – 25 respectively. Calculate first three central moments.

25. The mean grade points obtained by 25, 30 and 35 students in three classes are 32, 27 and 26 respectively. What is mean grade point of all classes taken together.

26. Find mean deviation about median :

x_i	:	3	6	9	12	13	15
f_i	:	3	4	5	2	4	5

27. A fair die is thrown twice. Find the probability of getting

(a) A sum 7.

(b) A sum greater than 10.

28. A problem is given to two students whose chances of solving it are $\frac{2}{5}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved ?

(5 × 2 = 10 weightage)

Essay Questions.
Answer any **two** *questions.*

29. Calculate Karl Pearson's coefficient of skewness.

Marks	:	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of Students	:	3	5	12	15	26	20	12	7

30. Draw Ogives to the following data and locate median :

Class	:	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55
Frequency	:	5	6	12	14	26	12	16	9

31. A fair die is tossed 5 times. Let X denote the number of times '3' appears. Find the probabilities for X = 0, 1, 2, 3, 4 and 5.

(2 × 4 = 8 weightage)