Reg. No. : ....

Code No. : 30548 E   Sub. Code : CMSS 11

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

First Semester

Statistics – Core

DESCRIPTIVE STATISTICS

(For those who joined in July 2021 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1.   Which of the following statement is true?

(a) Statistics is derived from the French word statistic'

(b) Statistics is derived from the Latin word "status"

(c) Statistics is derived from the Italian word "statita'

(d) None of these

2. Frequency distribution

   (a) Arranges observation in an increasing order

   (b) Arranges observations in terms of a number of groups

   (c) Relates to a measurable characteristic

   (d) all of these

3. Which of the following measures of central tendency tends to be most influenced by an extreme score?

   (a) Median

   (b) Mode

   (c) Mean

   (d) all of these

4. Measures used to study the shape of the curve of a given distribution are marked as

   (a) Raw moments

   (b) measures of skewness

   (c) central moments

   (d) mean

5.   Scatter diagram of the variate values (X,Y) give the idea about:

   (a) Functional relationship

   (b) Regression model

   (c) Distribution of errors

   (d) None of the above

6.   Regression coefficient is independent of:

   (a) Origin

   (b) Scale

   (c) Both origin and scale

   (d) Neither origin nor scale

7.   Regression equation is also named as

   (a) predication equation

   (b) estimating equation

   (c) line of average relationship

   (d) all the above

8.   In the regression line $Y = \alpha + \beta \times, \beta$ is called the:

   (a) Slope of the line

   (b) Intercept of the line

   (c) Both (a) and (b)

   (d) Neither (a) and (b)

9. Level of significance is the probability of:

   (a) type II error

   (b) type I error

   (c) Not committing error

   (d) None of the above

10. Equality of several normal population means can be tested by:

   (a) Bartlett's test

   (b) F-test

   (c) t-test

   (d) χ^2-test

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the uses of statistics in business.

Or

   (b) What are the characteristics and limitations of statistics?

12. (a) Define the following (i) Quartile Deviation.
    (ii) Standard Deviation

                    Or

    (b) Explain the difference between geometric
        mean and harmonic mean.

13. (a) Distinguish between Pearsons and Bowley's
        measures of skewness.

                    Or

    (b) Explain difference between skewness and
        dispersion.

14. (a) Explain the concept of 2nd degree parabola.

                    Or

    (b) Explain the regression equations with
        example.

15. (a) What are the types of hypothesis with
        examples?

                    Or

    (b) Write a short note on critical region.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) What do you understand by classification of data? Discuss different methods.

Or

(b) Explain the following

(i) Line diagram

(ii) Frequency curve

(iii) Histogram

17. (a) Explain co-efficient of variation with example.

Or

(b) Describe the different measures of central tendency mentioning their merits and demerits.

18. (a) Explain kurtosis with example.

Or

(b) Calculate Pearson's coefficient of skewness.

x	12.5	17.5	22.5	27.5	32.5	37.5	42.5	47.5
f	28	42	54	108	129	61	45	33

19. (a) Explain principle of least squares with illustration.

Or

(b) Fit a curve of the form $y = a + bx$ to the following data.

$$
\begin{array}{ccccc}
\text{X} & -4 & 1 & 3 & 2 \\
\text{Y} & 4 & 6 & 8 & 10
\end{array}
$$

20. (a) Explain the procedure for hypothesis testing.

Or

(b) Discuss about students' t test with example.

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Code No. : 30549 E   Sub. Code : CMSS 21

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

Second Semester

Statistics — Core

TIME SERIES AND OFFICIAL STATISTICS

(For those who joined in July 2021 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The component of a time series attached to long-term variations is termed as

    (a) Cyclic variation

    (b) Secular trend

    (c) Irregular variation

    (d) All the above

2.   Time series is a set of data recorded

    (a)   Periodically

    (b)   At time or space intervals

    (c)   At successive points of time

    (d)   All the above

3.   A pattern of variation of a time series that repeats every year is called

    (a)   Trend   (b)   Seasonal variation

    (c)   Cyclical variation   (d)   Secular Variation

4.   The moving averages in a time series are free from the influences of :

    (a)   Seasonal and cyclic variations

    (b)   Seasonal and irregular variations

    (c)   Trend and cyclical variations

    (d)   Trend and random variations

5.   Most commonly used index number is :

    (a)   Diffusion index number

    (b)   Price index number

    (c)   Value index number

    (d)   None of the above

6. The unweighted price index formula based on n items is :

   (a) $\sum_{i=1}^{n} p_{1i} / p_{0i}$

   (b) $\sum_{i=1}^{n} \frac{p_{1i}}{p_{01}} \times 100$

   (c) $\frac{\sum_{i=1}^{n} p_{1i}}{\sum_{i=1}^{n} p_{0i}} \times 100$

   (d) none of the above

7. An ordinal scale is :

   (a) The simplest form of measurement

   (b) A scale with an absolute zero point

   (c) A rank-order scale of measurement

   (d) A scale with equal intervals between ranks

8. Which of the following is true?

   (a) Shorter scales tend to have lower internal reliability but higher reliability over lime

   (b) Shorter scales tend to have greater internal reliability but lower reliability over time

   (c) Longer scales tend to have lower internal reliability and lower reliability over time

   (d) Longer scales tend to have higher internal reliability and lower reliability over time

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9. All of the following are sources of secondary data EXCEPT :

    (a) Official statistics

    (b) A television documentary

    (c) The researcher's research diary

    (d) A company's annual report

10. National sample survey organisation was established in?

    (a) 1959   (b) 1957

    (c) 1956   (d) 1950

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe the nature of the components of a time series.

Or

    (b) What is meant by a time series? Indicate it's important in business and economics.

12. (a) What do you understand by the seasonal variations in a time series?

Or

(b) Explain the concepts moving average method and give their example.

13. (a) What are the errors in the measurement of price and quantity index numbers?

Or

(b) Construct the cost-of-living index number and write down their uses.

14. (a) Distinguish between T-score and standard score.

Or

(b) Explain test-retest method of determining test reliability.

15. (a) Discuss about the Agricultural Statistics in India.

Or

(b) Write a short note on Registration of vital events.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the additive and multiplicative models of a time series stating clearly the assumptions and discuss their relative merits.

Or

(b) Below are given the figures of production (in thousands) of a sugar factory :

Year :   1999 2000 2001 2002

Production :   77   88   94   85

Year :   2003 2004 2005

Production :   91   98   90

    (i) Fit a straight line by the method of least squares and obtain the trend values.

    (ii) What is the monthly increase in production?

17. (a) Compute seasonal indices from the following data by using ratio-moving average method

Quarter   Year

              1985   1986   1987   1988

    I quarter   75   86   90   100

    II quarter   60   65   72   78

    III quarter 54   63   66   72

    IV quarter   59   80   85   93

                    Or

(b) Explain the link relative method of computing the indices.

18. (a) Explain briefly about the simple aggregative method and weighted aggregative method. Give an example for each method.

                    Or

(b) Explain the following :

    (i)   Laspevre's Method

    (ii) Fisher's Method.

19. (a) Explain about percentile curve and their uses in time series analysis.

Or

(b) Explain in detail about special correlation methods.

20. (a) Discuss about the functions of NSSO.

Or

(b) Discuss about the Labour statistics in India.

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Reg. No. : ....

Code No. : 30550 E   Sub. Code : CMSS 31

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Third Semester

Statistics — Core

PROBABILITY THEORY

(For those who joined in July 2021 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Each outcome of random, experiment is called _____

    (a) Primary event   (b) Compound event

    (c) Derived event   (d) All the above

2. Probability can takes values —————

    (a) $-\infty$ to ∞ (b) $-\infty$ to 1

    (c) -1 to $+1$ (d) 0 to -1

3.   If X is a random variable $E(e^{tx})$ is known as —————

   (a) characteristic function

   (b) moment generating function

   (c) probability generating function

   (d) all the above

4.   If X is a random variable $E(t^x)$ is known as —————

   (a) characteristic function

   (b) moment generating function

   (c) probability generating function

   (d) the xth moment k

5.   If X is a random variable which can take only non negative values then —————

   (a) $E(X^2) = [E(X)]^2$ (b) $E(X^2) \geq [E(X)]^2$

   (c) $E(X^2) \leq [E(X)]^2$ (d) None of the above

6.   If X is a random variable having its p.d.f f(x) then E(X) is called —————

   (a) arithmetic mean   (b) geometric mean

   (c) harmonic mean   (d) first quartile

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7. The characteristic function of the binomial distribution for binomial variate $X \sim b(n, p)$ is _____

    (a) $(q + pe^{it})$

    (b) $(p + qe^{it})^n$

    (c) $(p + qe^t)^n$

    (d) $(q + pe^{it})^n$

8. The moment generating function for geometric distribution with parameter p is

    (a) $p(1 - qe^t)$

    (b) $p(1 - qe^{it})$

    (c) $p/(1 - qe^{it})$

    (d) $p/(1 - qe^t)$

9. For Bernoulli distribution with probability p of a success and q of a failure the relation between mean and variance that holds is _____

    (a) mean < variance

    (b) mean > variance

    (c) mean = variance

    (d) mean $\leq$ variance

10. A number x is selected from first 100 natural numbers. Find the probability that x satisfies the condition $x + \dfrac{100}{x} > 50$ _____

    (a) 0.55

    (b) 0.66

    (c) 0.77

    (d) 0.88

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PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Describe about independent events.

Or

(b) What is meant by probability? Also give some examples.

12. (a) What is meant by distribution function? And state its properties.

Or

(b) Write short notes on probability density function for continuous random variables.

13. (a) Describe about marginal density functions.

Or

(b) Discuss about independence of random variables.

14. (a) State the Cauchy - Schwartz inequality and also give its uses.

Or

(b) Write short notes on characteristic function.

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[P.T.O.]

15. (a) State the importance of Bernoulli's theorem.

Or

(b) What is the role of convergence in probability? Explain in detail.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) State and prove addition theorem of probability.

Or

(b) State and prove Bayes theorem.

17. (a) Distinguish discrete and continuous random variables.

Or

(b) Describe the discrete and continuous probability distributions.

18. (a) Write short notes on the independence of random variables.

Or

(b) Explain the transformation of random variables.

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19. (a) Write in detail about probability generating function and its properties.

Or

(b) Distinguish conditional expectation and conditional variance.

20. (a) State and prove central limit theorem.

Or

(b) State and prove weak law of large numbers.

———————

Code No. : 30551 E   **Sub. Code : CASS 11**

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

First Semester

Statistics – Allied

MATHEMATICS FOR STATISTICS – I

(For those who joined in July 2021 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1.   The equation of the tangent

(a) $y + y_1 = \tan \theta (x + x_1)$

(b) $y - y_1 = \tan(x - x_1)$

(c) $y - y_1 = \sec \theta (x + x_1)$

(d)   None of these

2. What is the subtangent of the curve $y^2 = ax^3$

(a) $\dfrac{2}{3}x$

(b) $\dfrac{5}{6}y$

(c) $\dfrac{3ax^2}{2}$

(d) $\dfrac{5}{6}x^2$

3. Formula for the radius of curvature

(a) $\rho = \left[1 + \left(\dfrac{dy}{dx}\right)^2\right]^{3/2}$

(b) $\rho = \dfrac{\left[1 - \left(\dfrac{dy}{dx}\right)^2\right]^{3/2}}{dy/dx}$

(c) $\rho = \dfrac{\left[1 + \left(\dfrac{dy}{dx}\right)^2\right]^{3/2}}{d^2y/dx^2}$

(d) none of these

4. The locus of the centre of curvature for a curve is called

(a) circle

(b) diameter

(c) envelop

(d) evolute

5. Evaluate $\displaystyle\int_{0}^{2}\int_{1}^{e^x}\dfrac{x}{y}\,dy\,dx$

(a) $\dfrac{8}{3}$

(b) $\dfrac{7}{6}$

(c) $\dfrac{3}{8}$

(d) $\dfrac{6}{7}$

6. The double integral in Cartesian from

$$\iint_R f(x, y)dxdy \text{ transform into}$$

(a) $\iint_R f(\cos\theta, r\sin\theta)rdrd\theta$

(b) $\iint_R f(r\cos\theta, \sin\theta)rdrd\theta$

(c) $\iint_R f(r\cos\theta, r\sin\theta)rdrd\theta$

(d) $\iint_R f(\cos\theta, \sin\theta)rdrd\theta$

7. $\overline{\left|\left(\dfrac{1}{2}\right)\right|} =$

(a) $\dfrac{1}{2}$ (b) $\dfrac{1}{\sqrt{2}}$

(c) $\dfrac{1}{\sqrt{\pi}}$ (d) $\sqrt{\pi}$

8. $\int_{0}^{\pi/2} \sin^7 \theta \cos^5 \theta d\theta =$

   (a) $\dfrac{1}{210}$ (b) $\dfrac{1}{120}$

   (c) $\dfrac{1}{326}$ (d) $\dfrac{\pi}{124}$

9.   Which is the Clairaut's equation.

   (a) $y = p(x) - f(p)$

   (b) $x = p(y) + f(p)$

   (c) $y = p(x) + f(p)$

   (d) $x = p(y) - f(p)$

10. What is the general form of first order linear equation?

   (a) $\dfrac{dx}{dy} + py = Q$

   (b) $\dfrac{dy}{dx} + py = Q$

   (c) $\dfrac{dy}{dx} + px = Q$

   (d) none of these

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Find the equation of tangent and normal to the curves $y = x^3$ at $(1/2, 1/8)$.

Or

(b) Find the slope of the tangent to the curve $r = a(1 - \cos\theta)$ at $\theta = \dfrac{\pi}{2}$.

12. (a) Find the co-ordinates of the centre of curvature of the curve $y = x^2$ at $(1/2, 1/4)$.

Or

(b) Find the envelope of family of Curve $\dfrac{x^2}{a^2} + \dfrac{y^2}{k^2 - a^2} = 1$, where a is parameter.

13. (a) Evaluate $\displaystyle\int_0^\pi \int_0^{\pi/2} k \int_0^r r^2 \sin\theta \, dr \, d\theta \, dQ$.

Or

(b) Change the order of $\displaystyle\int_0^\infty \int_0^\infty \dfrac{e^{-y}}{y} dx \, dy$.

14. (a) Prove that

$$\int_0^{\pi/2} \sin^m \theta \cos^n \theta \, d\theta = \frac{\left| \overline{\dfrac{m+1}{2}} \right| \left| \overline{\dfrac{n+1}{2}} \right|}{2 \left| \overline{\dfrac{m+n+2}{2}} \right|}$$

Or

(b) Evaluate $\displaystyle\int_0^{\pi/2} \sqrt{\tan \theta} \, d\theta$.

15. (a) Solve $\dfrac{dy}{dx} - \dfrac{dx}{dy} = \dfrac{x}{y} - \dfrac{y}{x}$.

Or

(b) Solve $y + px = x^4 p^2$.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

16. (a) For the curves $x^2 = 4y$ and $y^2 = 4x$. Find the angle of intersection.

Or

(b) Find $\dfrac{ds}{d\theta}$ and $\dfrac{ds}{dr}$ for the cardiyoids $r = a(1 + \cos \theta)$.

17. (a) Find the envelope of the straight lines $\dfrac{x}{a} + \dfrac{y}{b} = 1$, where the parameters are related by the equation $a^2 + b^2 = c^2$, where c is a constant.

Or

(b) Show that the radius of curvature at any point of the catenary $y = c \cosh \dfrac{x}{c}$ is equal to the length of the portion of the normal intercepted between the curve and the axis of x.

18. (a) Evaluate $\iiint xyz \, dxdydx$ taken through the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$.

Or

(b) By changing into polar co-ordinates evaluate the integral $\displaystyle\int_{0}^{2a} \int_{0}^{\sqrt{2ax-x^2}} \left(x^2 + y^2\right) \, dxdy$.

19. (a) Prove that $\beta(m,n) = \dfrac{\lfloor m \lfloor n}{\lfloor m + n}$.

Or

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(b) Express $\int_0^1 x^m (1 - x^n)^p \, dx$ in terms of Gamma function and evaluate the integral $\int_0^1 x^5 (1 - x^3)^{10} \, dx$.

20. (a) Solve $xp^2 - 2yp + x = 0$.

Or

(b) Solve $y^2 + x^2 \dfrac{dy}{dx} = xy \dfrac{dy}{dx}$.

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Reg. No. : ....

Code No. : 30552 E   Sub. Code : CASS 21

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

Second Semester

Statistics — Allied

PROGRAMMING WITH C

(For those who joined in July 2021 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answers :

1. For 'C' programming language —————

    (a) Constant expressions are evaluated at compile

    (b) String constants can be concatenated at compile time

    (c) Size of array should be known at compile time

    (d) All of these

2. Who is father of C language?

   (a) Bjarne stroustrup

   (b) Dennis Ritchie

   (c) James A. Gosling

   (d) Dr. E.F. Codd

3. Which of the following is branching statement of C language?

   (a) if statement   (b) if…else statement

   (c) switch statement   (d) all of these

4. ————— is the built in multiway decision statement in C.

   (a) for   (b) switch

   (c) if   (d) while

5. Elements in an array are accessed —————

   (a) randomly   (b) sequentially

   (c) exponentially   (d) logarithmically

6. Which function will you choose to join two words?

   (a) strcpy( )   (b) strcat( )

   (c) strncon( )   (d) memcon( )

7. Which of the following are themselves a collection of different data types?

   (a) string   (b) structure

   (c) both (a) and (b)   (d) all of the mentioned

8. What is the size of C structure?

   (a) C structure is always 128 bytes

   (b) Size of C structure is the total bytes of all elements of structure

   (c) Size of C structure is the size of largest element

   (d) None of the above

9. The reason for using pointers in a C program is _____

   (a) Pointers allow different functions to share and modify their local variables

   (b) To pass large structures so that complete copy of the structure can be avoided

   (c) Pointers enable complex "linked" data structures like linked lists and binary trees

   (d) All of the above

10. FILE reserved word is?

   (a) A structure tag declared in stdio.h

   (b) One of the basic datatypes in C

   (c) Pointer to the structure defined in stdio.h

   (d) It is a type name defined in stdio.h

   PART B — (5 × 5 = 25 marks)

   Answer ALL questions, choosing either (a) or (b).
   Each answer should not exceed 250 words.

11. (a) Explain about the types of variable in C.

   Or

   (b) What are the basic data types in C? Write how much memory is occupied by the types?

12. (a) What is decision making and branching in C language?

   Or

   (b) How do you write an IF ELSE statement in C?

13. (a) Write a C program to search an element in an array.

   Or

   (b) What is initialization? Why is it important in C programming?

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   [P.T.O]

14. (a) What is meant by user defined function?

Or

(b) Differentiate structure and union.

15. (a) Write a short note on pointer data type in C language.

Or

(b) Explain random file in C language.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) What are the symbolic constants in C? How you declare them and examples?

Or

(b) Briefly explain about the character set in C language.

17. (a) What is the difference between nested IF ELSE and ELSE IF ladder?

Or

(b) Explain it briefly about the goto statement.

18. (a) What is one dimensional array? Write any one program in one dimensional array.

Or

(b) What are the string handling functions in C? Write the types.

19. (a) Discuss the data type structure.

Or

(b) Explain the following terms :

   (i) Defining functions

   (ii) Invoking user defined function.

20. (a) Discuss file handling in C language.

Or

(b) Write a C program to sort a set of numbers using pointers.

————————

Reg. No. : ....

Code No. : 30553 E   **Sub. Code : CASS 31**

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

Third Semester

Statistics – Allied

MATHEMATICS FOR STATISTICS – II

(For those who joined in July 2021 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Without solving, comment upon the nature of roots of the following equation $7x^2 - 9x + 2 = 0$

    (a) Rational and unequal

    (b) Irrational and unequal

    (c) Rational (real) and equal

    (d) Irrational and unequal

2. The equation $3x^2 - 12x + z - 5 = 0$ has equal roots. Find the value of z

(a) 16   (b) 17

(c) 18   (d) 19

3. If u and v two functions of x have derivatives of nth order then $(uv)_n = nC_0 u_n v + nC_1 u_{n-1} v + \cdots$ $nC_r u_{n-r} v + \cdots nC_n u_n v$ This theorem is known as _____.

(a) Cauchy's theorem (b) Lagrange's theorem

(c) Leibnitz's theorem (d) Lipchitz's theorem

4. If $x^5 y^6 = (x+y)^{11}$ then $y_2 =$

(a) -1 (b) 1

(c) $x^5(x+y)^6$ (d) 0

5. If $x \varepsilon R$, the minimum and maximum limit of $\dfrac{x^2 - 2x + 9}{x^2 + 2x + 9}$

(a) 1/4, 2   (b) 1, 2

(c) 1/2, 2   (d) 3/2, 2

6. The minimum value $(x-2)(x-9)$ is _____.

(a) $-49/4$ (b) 0

(c) 11/4   (d) 49/2

7. Find the order and degree of the differential equation $\left(\dfrac{d^2y}{dx^3}\right)^2 = \sqrt{\dfrac{dy}{dx}+1}$

   (a) 2, 1   (b) 3, 4

   (c) 4, 3   (d) 1, 2

8. What is the solution of the differential equation $xdy - y\,dx = 0$?

   (a) $xy = c$ (b) $x + y = c$

   (c) $x - y = c$ (d) $y = cx$

9. Integrate $3x^2(\cos x^3 + 8)$. Which one of the following is true?

   (a) $\sin x^3 - 8x^3 + c$ (b) $\sin x^3 + 8x^3 + c$

   (c) $-\sin x^3 + 8x^3 + c$ (d) $\sin x^3 - x^3 + c$

10. Find $\displaystyle\int \dfrac{e^{-\cot^{-1}x}}{1+x^2}$

   (a) $e^{-\cot^{-1}x} + c$ (b) $e^{-2\cot^{-1}x} + c$

   (c) $e^{-\tan^{-1}x} + c$ (d) $e^{-\cot^1 2x} + c$

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PART B — (5 × 5 = 25 marks)

Answer ALL questions by choosing (a) or (b).

Each answer should not exceed 250 words.

11. (a) If $f(x) = q(x) g(x) + r(x)$ where degree of $r(x) <$ degree of $g(x)$ then prove that the H.C.F of $f(x)$ and $g(x)$ is the same as the H.C.F of $g(x)$ and $r(x)$.

Or

(b) If one root of the equations $2x^3 - 11x^2 + 38x - 39 = 0$ is 2–3 i, solve the equations.

12. (a) Find the nth differential coefficient of $\cos x . \cos 2x . \cos 3x$ using trigonometrical transformation.

Or

(b) If $y = \sin(m \sin^{-1} x)$ prove that $(1 - x^2)y_2 - xy_1 + m^2 y = 0$ and $(1 - x^2)y_{n+2} - (2n+1)xy_{n+1} + (m^2 - n^2)y_{n=0}$.

13. (a) For what values of x is the curve $y = 3x^2 - 2x^3$ concave upward and when is it convex upwards?

Or

(b) Find the point of inflexion on the curve $y = (x - a) (x - b) (x - c)$.

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[P.T.O]

14. (a) Solve $(D^2 + 5D + 6)y = e^x$.

Or

(b) Let X be of the form $\cos \alpha x$ or $\sin \alpha x$ where α is a constant, solve $D \sin \alpha x = \cos \alpha x$.

15. (a) State the properties of definite integrals.

Or

(b) Find $\int x \sin 2x \, dx$ through the integration by parts.

PART C — (5 × 8 = 40 marks)

Answer ALL questions by choosing (a) or (b).

Each answer should not exceed 600 words.

16. (a) Find the nature of the roots of $x^4 + 4x^3 - 20x^2 + 10 = 0$

Or

(b) Find the Horner's method, the root of the equation $x^3 - 4x^2 + 5 = 0$ which lies between 1 and 2 correct to two places to decimals.

17. (a) Find the nth differential coefficient of $\cos^5 \theta \sin^7 \theta$.

Or

(b) Find the nth differential coefficient of $x^2 \log x$ using Leibnitz formula.

18. (a) Find the maxima and minima of the function $2x^3 - 3x^2 - 36x + 10$.

Or

(b) The cost of fuel in running an engine is proportional to the square of the speed and is Rs. 48 per hour for a speed of 16 m.p.h. Other costs amount to Rs. 300 per hour. What is the most economical speed?

19. (a) Solve the equation by using method of homogeneous linear differential :

$$(5 + 2x)^2 \frac{d^2y}{dx^2} - 6(5 + 2x)\frac{dy}{dx} + 8y = 6x.$$

Or

(b) Find (i) $L\left(\dfrac{1-e^t}{t}\right)$ (ii) Find $L\left(\dfrac{\sin at}{t}\right)$.

20.   (a)   Evaluate $I = \int\limits_{0}^{\frac{\pi}{2}} \log \sin x \, dx$.

Or

(b)   Show that $\int\limits_{0}^{\frac{\pi}{4}} \dfrac{\sin 2\theta}{\sin^{4} \theta + \cos^{4} \theta} \, d\theta = \dfrac{\pi}{4}$.

_____

(6 pages)

Code No. : 30554 E   Sub. Code : CSSS 31

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

Third Semester

Statistics — Skill Based Core

MATHEMATICAL COMPUTATIONS USING R

(For those who joined in July 2021 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1.   R software is a ————

    (a) Operating system

    (b) Graphical user interface

    (c) Programming   language   and   software
         environment

    (d) Linux Kernel source

2. Command lines entered at the console are limited to about ———————— bytes.

   (a) 4090 (b) 4095

   (c) 4120 (d) 4225

3. For the population $y < -c(1,2,3,4,5)$, write the R command to find the median?

   (a) median(y) (b) medians(y)

   (c) median{y} (d) median [y]

4. The syntax of "stem and leaf" plot

   (a) Stem(data) (b) Stem leaf(data)

   (c) Stem and leaf(data) (d) Stemplot (data)

5. Name of the operator "<-"

   (a) Less than operator

   (b) Minus operator

   (c) Assignment operator

   (d) Equal operator

6. What is meant by "trim" in following statement mean (x, trim = 0, na.rm = FALSE,..)

   (a) Nearest endopoint (b) Nearest beginpoint

   (c) Endpoint (d) Beginpoint

7. Write the R commands for generating 700 random variables from normal distribution by using the following information : mean = 14, SD = 3, n = 5, k = 2000.

   (a) dnorm(n, mean, sd) (b) pnorm(n, mean, sd)

   (c) rnorm(n, mean, sd) (d) rnorm(n, mean, var)

8. The syntax of binomial distribution is

   (a) binom(size, prob)   (b) binom(prob, size)

   (c) bino(size, prob)   (d) bino(prob, size)

9. Regression coefficient is independent of

   (a) Origin

   (b) Scale

   (c) Both origin and scale

   (d) Neither origin nor scale

10. The range of simple correlation coefficient is

   (a) 0 to ∞ (b) $-\infty$ to ∞

   (c) 0 to 1   (d) -1 to 1

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11.   (a)   Explain the history of R programming.

Or

(b)   Explain the various data types in R programming.

12.   (a)   What purpose is served by measuring skewness and kurtosis?

Or

(b)   How will you create scatter plot matrices in R language?

13.   (a)   What is the difference between data frame and a matrix in R?

Or

(b)   Write the properties of binomial and Poisson distributions.

14.   (a)   How to check the frequency distribution of a categorical variable?

Or

(b)   Explain the procedure to make a distribution chart in R.

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[P.T.O.]

15. (a) Explain correlation co-efficient and bivariate correlation with example.

Or

(b) Write the merits and demerits of correlation coefficient.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Explain about data input procedures.

Or

(b) Write a note on :

(i) Tables

(ii) Graphics

(iii) Data frames.

17. (a) Explain data visualization using bar chart in R programming.

Or

(b) Explain range, mean deviation, standard deviation and their functions in R programming.

18. (a) How will you measure the probability of a binary response variable in R language?

Or

(b) Write a fitting procedure for binomial distribution in R.

19. (a) Explain the computational procedure for normal distribution in R.

Or

(b) How do you sketching graphs for distributions in R? Explain it.

20. (a) Explain the step by step inference procedure for correlation coefficient.

Or

(b) Write down the procedure for liner regression and its inference in R.

———————

Reg. No. : ....

Code No. : 30555 E   Sub. Code : CNSS 31

U.G. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

Third Semester

Statistics

Non Major Elective - ELEMENTS OF STATISTICS-I

(For those who joined in July 2021 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1.   Statistical methods does not include ——————.

   (a)   Collection

   (b)   Classification

   (c)   Reasoning

   (d)   Presentation

2. ————— is the unit of interpretation.

    (a) Coefficient   (b) Variance

    (c) Deviation   (d) None of the above

3. ————— are used to show the net magnitude of the phenomenon.

    (a) Deviation bar diagrams

    (b) Bilateral bar diagrams

    (c) Multiple bar diagram

    (d) None of the above

4. Choose the odd one out

    (a) Normal Curve

    (b) Skewed Curve

    (c) U-shaped Curve

    (d) J-shaped Curve

5. "An average is a figure that represents the whole group." said by

    (a) Clark

    (b) A.E. Wagh

    (c) Lawrence

    (d) Crum and Smith

6. Range =

   (a) L–S   (b) L+S

   (c) L±S   (d) L*S

7. If the change in the variables is not proportionate then the correlation is said to be ——————.

   (a) Simpler Correlation

   (b) Partial Correlation

   (c) Curvilinear Correlation

   (d) None of the above

8. If $r = 0$ then two regression lines are —————— to each other.

   (a) Parallel

   (b) Adjacent

   (c) Perpendicular

   (d) Corresponding to each other

9. For a moderately skew distribution what relation between mean mode and median exist?

   (a) Mean – Mode = 3(Mean – Median)

   (b) Mean + Mode = 3(Mean – Median)

   (c) 3(Mean – Mode) = Mean + Median

   (d) 3(Mean – Mode) = Mean – Median

10. If the frequency distribution curve is more peaked or flat than a normally peaked curve then it is called a ————.

   (a) Normal Curve

   (b) Kurtic Curve

   (c) Platykurtic Curve

   (d) Mesokurtic Curve

   PART B — (5 × 5 = 25 marks)

   Answer ALL questions, choosing either (a) or (b).

   Each answer should not exceed 250 words.

11. (a) Explain statistical investigation in brief.

   Or

   (b) Explain data and its types with example.

12. (a) Explain presentation of data in brief.

   Or

   (b) Explain the graphical presentation of statistical data in brief.

13. (a) In a factory, there are 100 skilled, 250 semi-skilled and 150 unskilled workers. It has been observed that on an average a unit length of a particular fabric is woven by a skilled worker in 3 hours, by a semi-skilled worker in 4 hours and by an unskilled worker in 5 hours. After a training of 2 years, the semi-skilled workers are expected to become skilled and the unskilled workers to become semi-skilled. How much less time will be required after two years of training for weaving unit length of fabric by an average worker?

Or

(b) Define

(i) Range

(ii) Inter Quartile range

(iii) Standard Deviation

14. (a) Explain the properties of coefficient of correlation.

Or

(b) From the following information on values of two variables x and y. Find the two regression lines and the correlation of coefficient.

$n=10$, $\Sigma x=20$, $\Sigma y=40$, $\Sigma x^2=240$, $\Sigma y^2=410$, $\Sigma xy=200$.

15. (a) Explain the concept of skewness in brief.

Or

(b) Explain brief on moments with example.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss the characteristics of statistics.

Or

(b) Explain brief on collection of data with a real life example.

17. (a) Explain classification of data with example.

Or

(b) Explain brief on the following:

(i)   Bar diagrams

(ii) Pie diagrams

(iii) Pictograms

18. (a) (i) The first and third quartiles of the following data are given to be 25 and 50 marks respectively. From the data given below find the missing frequencies when total frequency $N = 72$

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	4	8	?	19	?	10	5	?

   (ii) "Every average has its own particular characteristics. It is difficult to say which average is best." Command briefly.

Or

(b) (i) Define measure of a dispersion.

   (ii) Give the characteristic of a good measure of a dispersion.

   (iii) Merits and Demerits of a measure of dispersion.

19. (a) Explain brief Partial and Multiple correlation coefficients.

Or

(b) Explain the following
   (i) Regression with example.
   (ii) Regression coefficients and their properties.
   (iii) Regression equations.

20. (a) Explain brief on Bowley's coefficient of skewness.

Or

(b) Explain brief on coefficient of skewness and kurtosis.

———————