

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2021
THIRD SEMESTER
MATHEMATICS - CORE
RESEARCH METHODOLOGY
(for those who joined in July 2017 onwards)

Time : Three hours

Maximum: 75 marks

Part - A (10 X 1 = 10 marks)

Answer all question, choose the correct answer:

1. _____ research aims at finding a solution for an immediate problem facing a society (or) business organization.
(a) Applied (b) Analytical (c) Quantitative (d) Conceptual
2. _____ methodology is a way to systematically solve the research problem.
(a) Research (b) Proposal (c) Thesis (d) Planning
3. The _____ page of a research report should not be numbered.
(a) Abstract (b) Introduction (c) conclusion (d) title
4. _____ includes questionnaires, documents, tables and so on.
(a) Bibliography (b) contents (c) Appendices (d) abstract
5. The value of μ in Gamma Distribution is _____.
(a) 0 (b) $\alpha\beta^2$ (c) β (d) $\alpha\beta$
6. The variance of Chi - Square distribution is _____.
(a) 0 (b) r (c) 2r (d) 1
7. If X has a Binomial distribution $b(n, p)$ where p is _____.
(a) Known (b) zero (c) one (d) unknown
8. If T is an unbiased estimator of θ if $E(T) =$ _____.
(a) 0 (b) θ (c) 1 (d) -1
9. A variable whose value is determined by the outcome of a random experiment is called a _____.
(a) Variable (b) random variable (c) event (d) experiment
10. If A and B are independent events, then $P(A \text{ and } B) =$ _____.
(a) 0 (b) $P(A)$ (c) $P(B)$ (d) $P(A). P(B)$

Part - B (5 X 5 = 25 MARKS)

Answer ALL Questions, Choosing either (a) or (b).

- 11(a). What is meant by the context of the project?

(OR)

- (b). Outline the objectives while writing a proposal.

- 12(a). List the sections in the order while writing a Thesis.

(OR)

- (b). What are the things present in a list of contents?

- 13(a). Let X be $N(2, 25)$. Find $P(-8 < X < 1)$.

(OR)

(b). Let X_1, \dots, X_n be independent random variables. Suppose, for

$i = 1, 2, \dots, n$, that X_i has a $\Gamma(\alpha_i, \beta)$ distribution. Let $Y = \sum_{i=1}^n X_i$. Then prove that Y has a $\Gamma(\sum_{i=1}^n \alpha_i, \beta)$ distribution.

14(a). Let $Y_1 < Y_2 < Y_3 < Y_4$ denote the order Statistic of a random sample of size 4 from a distribution having pdf

$$f(x) = \begin{cases} 2x & 0 < x < 1 \\ 0 & \text{elsewhere.} \end{cases}$$

Then find $P\left(\frac{1}{2} < Y_3\right)$.

(OR)

(b). If $\bar{X} = 53, \mu = 56, n = 16, S = 3$, then find the value of *Statistic t*.

15(a). A dealer in refrigerators estimates from his past experience the probabilities of his selling refrigerators in a day. These are as follows:

No. of refrigerators sold in a day	0	1	2	3	4	5	6
Probability	0.03	0.20	0.23	0.25	0.12	0.10	0.07

Find the ~~man~~ number of refrigerators sold in a day.

mean

(OR)

(b). The probability that a man fishing at a particular place will catch 1, 2, 3, 4 fish are 0.5, 0.4, 0.3 and 0.2 respectively. What is the expected number of fish caught?

*Part - C (5*8 = 40 MARKS)*

Answer ALL Questions, Choosing either (a) or (b).

16(a). How ~~to~~ *do you* eradicate the ethical problems in Research project ?.

(OR)

(b). What are the basic requirements of a Research project ?.

17(a). Explain the component called Introduction of a Research project.

(OR)

(b). Describe ~~about~~ the Results of a Research project.

18(a). Derive the m.g.f. of the Normal distribution.

(OR)

(b). Let X have a Gamma distribution with $\alpha = \frac{r}{2}$ where r is a positive integer, and $\beta > 0$. Define $Y = \frac{2X}{\beta}$ and find the pdf of Y .

19(a). The life time of electric bulbs for a random sample of 10 from a large consignment gave the following data:

Item	1	2	3	4	5	6	7	8	9	10
Life in Hrs.	4.2	4.6	3.9	4.1	5.2	3.8	3.9	4.3	4.4	5.6

Can we accept the hypothesis that the average life time of bulbs is 4,000 hours.

(OR)

(b). Is a Correlation Coefficient of 0.5 significant if obtained from a random sample of 11 pairs of values from a normal distribution?. Use t - test.

20(a). A firm plans to bid Rs.300 per tonne for a contract to supply 1,000 tonnes of a metal. It has two competitors A and B and it assumes that the probability that A will bid less than Rs.300 per tonne is 0.3 and that B will bid less than Rs.300 per tonne is 0.7. If the lowest bidder gets all the business and the firms bid independently, what is the expected value of the contract to the firm?

(OR)

(b). State and prove Central Limit theorem.

