

(6 Pages)

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M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

Third Semester

Mathematics — Core

RESEARCH METHODOLOGY

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answers :

1. Plagiarism means
 - (a) Copying from others research work
 - (b) Conclusion
 - (c) Introduction
 - (d) A summary of the main problem

2. The _____ for research explains why you decided to embark on your research project.
- (a) guide (b) motivation
(c) problem (d) talk
3. The role written requirement for the Ph.D degree is a _____
- (a) synopsis (b) dissertation
(c) thesis (d) guide
4. List of abbreviations is given
- (a) at the end of a research project
(b) at the references base
(c) at the starting of project
(d) none
5. If the mgf of X is $M(t) = (1 - 2t)^{-6}$, then the distribution of X is
- (a) $N(2,6)$ (b) $N(6,2)$
(c) $X^2(2)$ (d) $X^2(12)$
6. If e^{5t+7t^2} is the mgf of a random variable X then the variance of X is
- (a) 7 (b) 14
(c) 5 (d) 9

7. If a t distribution has 10 degrees of freedom $P(|T| > 2.228) =$
- (a) 0.01 (b) 0.03
- (c) 0.04 (d) 0.05
8. If \bar{X} is the mean of a random sample and 25 from the distribution $n(3, 100)$ then $P(0 < \bar{X} < 6) =$
- (a) 0.786 (b) 0.866
- (c) 0.833 (d) 0.723
9. If X, Y are random variables with $\mu_1 = 1, \mu_2 = 4, \sigma_1^2 = 4, \sigma_2^2 = 6, \rho = \frac{1}{2}$ what is the mean of $Z = 3X - 2Y$
- (a) 4 (b) -4
- (c) -5 (d) 5
10. If X is $b(72, 1/3)$ then $P(22 < X < 28)$
- (a) 0.5205 (b) 0.6035
- (c) 0.8305 (d) 0.1905

PART B — ($5 \times 5 = 25$ marks)

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

Each answer should not exceed 250 words.

11. (a) How will you chose your title for your project?

Or

- (b) Why is methodology important?

12. (a) Explain the language critiquing.

Or

- (b) What do you mean by literature review?

13. (a) Find the mean and variance of chi-square distribution.

Or

- (b) Find the mgf of normal distribution.

14. (a) Show that the t distribution with $r=1$ degree of freedom and the Cauchy distribution are the same.

Or

- (b) If X_1, X_2 denote a random sample of size two from a distribution that is $n(0, 1)$. Find the pdf of $Y = X_1^2 + X_2^2$.

15. (a) If $X_i (1 \leq i \leq n)$ are stochastically independent random variables with distributions $n(\mu_i, \sigma_i^2)$ show that $Y = \sum k_i X_i$ where k_i are constants, is normally distributed using mfg technique.

Or

- (b) If X_1, X_2 are stochastically independent normal distributions $n(\mu_1, \sigma_1^2)$ and $n(\mu_2, \sigma_2^2)$ respectively, find the pdf of $Y = X_1 - X_2$.

PART C — ($5 \times 8 = 40$ marks)

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

16. (a) Briefly explain the elements of introduction.

Or

- (b) Write an essay on selection of topic and choosing your supervisor.

17. (a) How will you format your references?

Or

- (b) To sum up the thesis what were various points to be considered before writing the conclusion?

18. (a) Let X be $n(\mu, \sigma^2)$
- (i) If $P(X < 89) = 0.90$ and $P(X < 94) = 0.95$
find μ and σ^2 .
- (ii) If $\left(\left|\frac{X - \mu}{\sigma}\right| < b\right) = 0.90$ find b .

Or

- (b) Find the mean and variance of gamma distribution.
19. (a) Derive the pdf of Fisher's distribution.

Or

- (b) If X_1, X_2 are independent chisquare variables with two degrees of freedom, find the pdf of $Y_1 = \frac{X_1 - X_2}{2}$.
20. (a) Explain, in detail, the mgf techniques, Give illustrations also.

Or

- (b) State and prove the central limit theorem.
