

Seat No.
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**M. Sc. Re-Entrance Examination, 2026**  
**Statistics/Applied Statistics and Informatics**  
**Subject Code: 58715**

**Day and Date : Wednesday, 24-06-2026****Total Marks : 100****Time : 10:30 am to 12:00 pm****Instructions:**

- 1) All questions are compulsory.
- 2) Each question carries 1 mark.
- 3) Answers should be marked in the given OMR answer sheet by darkening the appropriate option.
- 4) Follow the instructions given on OMR sheet.
- 5) Rough work shall be done on the sheet provided at the end of question paper.

**Questions: Choose most correct alternatives**

1. Which average is least affected by extreme values?
 

A) Mean	C) Harmonic mean
B) Median	D) Geometric mean
  
2. If the third central moment of a distribution is zero, then the distribution is:
 

A) Positively skewed	C) Symmetrical
B) Negatively skewed	D) Leptokurtic
  
3. If events A and B are mutually exclusive then which of the following is true?
 

A) $P(A \cap B) = 0$	C) $P(A \cup B) = 0$
B) $P(A \cap B) = 1$	D) None of these
  
4. In a leap year, the probability that the month of February has 5 Sundays is:
 

A) $\frac{1}{7}$	C) $\frac{5}{7}$
B) $\frac{2}{7}$	D) $\frac{3}{7}$
  
5. Which of the following empirical relation is true?
 

A) Mean = Median = Mode	C) Mean = 3Median - 2Mode
B) Mode = 3Median - 2Mean	D) None of these
  
6. If the correlation coefficient ( $r$ ) =  $\pm 1$ , then the two regression lines are
 

A) Coincide	C) Parallel
B) Perpendicular	D) Intersect at origin

7. For two attributes, the fundamental set of class frequencies consists of:
- A) 2 classes  
B) 3 classes  
C) 4 classes  
D) 5 classes
8. Life tables are mainly used in insurance to:
- A) Predict profits  
B) Estimate mortality risk  
C) Increase premium randomly  
D) Reduce policies
9. If  $p = q = 0.5$ , then the binomial distribution is...
- A) Positively skewed  
B) Negatively skewed  
C) Symmetric  
D) Degenerate
10. Which distribution always has variance  $>$  mean?
- A) Poisson  
B) Binomial  
C) Negative binomial  
D) Uniform
11. If  $X \sim U(a, b)$  with mean = 5 and variance = 3, then the values of  $a$  and  $b$  are:
- A)  $a = 8, b = 2$   
B)  $a = 8, b = -2$   
C)  $a = 2, b = 8$   
D)  $a = 2, b = 10$
12. If  $X \sim \beta_1(m, n)$ , then the harmonic mean of the distribution is:
- A)  $\frac{m}{m+n}$   
B)  $\frac{m-1}{m+n-1}$   
C)  $\frac{m}{m+n-1}$   
D)  $\frac{m+1}{m+n-1}$
13. If  $X$  and  $Y$  are i.i.d. exponential random variables with parameter  $\alpha$ , then the distribution of  $X - Y$  is:
- A) Gamma  
B) Normal  
C) Exponential  
D) Laplace
14. The multiple correlation coefficient lies between:
- A)  $-1$  to  $1$   
B)  $-1$  to  $0$   
C)  $0$  to  $1$   
D) None of these
15. Time reversal test is satisfied by:
- A) Laspeyre's index number  
B) Paasche's index number  
C) Fisher's index number  
D) All of these

16. If  $X \sim N(10, 25)$ , then the mean and variance of  $X + 4$  are:
- A) Mean = 10, variance = 29  
 B) Mean = 14, variance = 25  
 C) Mean = 14, variance = 29  
 D) Mean = 14, variance = 41
17. Mean of t-distribution is:
- A) Exactly zero  
 B) Greater than zero  
 C) Less than zero  
 D) None of these
18. What is the term used for periodic change in the values of a time series?
- A) Seasonal variations  
 B) Cyclical variation  
 C) Both A and B  
 D) Irregular variations
19. Chance variation in the manufactured product is:
- A) Controllable  
 B) Uncontrollable  
 C) Both A and B  
 D) None of these
20. Critical region is a region of:
- A) Rejection of  $H_0$   
 B) Acceptance of  $H_0$   
 C) Rejection for both  $H_0$  and  $H_1$   
 D) None of these
21. The c.d.f. of a Rayleigh distribution with parameter  $\lambda$  is
- A)  $1 - e^{-\lambda x^2}$   
 B)  $e^{-\lambda x^2}$   
 C)  $1 - e^{-\lambda x}$   
 D)  $\lambda x e^{-\lambda x^2}$
22. The Weibull distribution reduces to exponential distribution when
- A)  $\alpha = 1$   
 B)  $\alpha = 2$   
 C)  $\lambda = 1$   
 D)  $\alpha = 0$
23. If  $X \sim \text{Lognormal}(\mu, \sigma^2)$ , then
- A)  $X \sim N(\mu, \sigma^2)$   
 B)  $\log X \sim N(\mu, \sigma^2)$   
 C)  $e^X \sim N(\mu, \sigma^2)$   
 D) None of these
24. Which distribution has no finite mean and variance?
- A) Normal  
 B) Logistic  
 C) Cauchy  
 D) Weibull







49. In a village survey, if 10 villages are selected first and then households are selected within those villages, the sampling method is:

- A) Two-stage sampling
- B) Quota sampling
- C) Systematic sampling
- D) Snowball sampling

50. If the cost per unit in stratum 1 is much higher than in stratum 2, optimum allocation will generally assign:

- A) More sample to expensive stratum
- B) Less sample to expensive stratum
- C) Equal sample to all strata always
- D) Zero sample to expensive stratum

51. What would be the output of the following R-code?

```
x=c(1:4,5,10:6)
y=c(5:1,10:6)
sum(x==y & x<y)
```

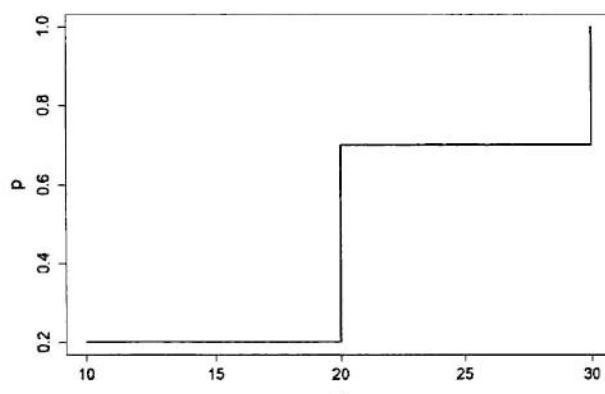
- A) 2
- B) 6
- C) 8
- D) 0

52. What would be the output of the following R-code?

```
x=seq(10,100,10)
x[2]+x[5:6]
```

- A) 70
- B) 70 60
- C) 70 80
- D) Error...

53. Which of the following command in R will generate following plot?



- A) `x=c(10,20,30); p=c(0.2,0.7,1); plot(x,p,type="s")`
- B) `x=c(10,20,30); p=c(0.2,0.7,1); plot(x,p,type="h")`
- C) `x=c(10,20,30); p=c(0.2,0.7,1); plot(p,x,type="s")`
- D) None of the above

54. The output of the following R program is...

```
t=0
for(i in c(45,12,19)){
  if(i%%3==0){
    t=t+1
  }else{
    t=t+2
  }
}
t
```

- A) 1
- B) 2
- C) 3
- D) 4

55. The output of the following R program is...

```
t=1
s=2
while(t>=1){
  t=t-1
  s=s+3
  t=t-s
}
print(c(t,s))
```

- A) 1 2
- B) 3 4
- C) 0 5
- D) -5 5

56. ....is not from the seven SPC tools

- A) Histogram
- B) Check sheet
- C) Pareto chart
- D) Single sampling plan

57. ....is helpful in searching the root-cause of a problem

- A) Flow chart
- B) Control chart
- C) Check sheet
- D) Fishbone diagram

58. Which of the following is a limitation of the Shewhart control chart?

- A) It gives excessive weight to past observations
- B) It uses only the most recent sample information and ignores past data
- C) It cannot detect large shifts in the process
- D) It is applicable only to attribute data

59. Let  $X_i$  denote the  $i^{\text{th}}$  observation from a process with in-control mean  $\mu_0$ . In CUSUM chart, let  $K$  be the reference value. The upper one-sided CUSUM statistic  $C_i^+$  is used to detect upward shifts in the process mean.

Which of the following correctly defines the upper one-sided CUSUM statistic?

- A)  $C_i^+ = \max(0, C_{i-1}^+ + X_i - (\mu_0 + K))$
- B)  $C_i^+ = \min(0, C_{i-1}^+ + X_i - (\mu_0 + K))$
- C)  $C_i^+ = C_{i-1}^+ + X_i - (\mu_0 + K)$
- D)  $C_i^+ = X_i - (\mu_0 + K)$

60. The primary objective of an acceptance sampling plan is .....

- A) to eliminate the bad part from the sample
- B) to determine if there is a need to test every part in the lot
- C) to estimate whether or not the quality of each part in the sample is acceptable
- D) to test whether or not the entire lot is of acceptable quality

61. Let  $X_1, X_2, \dots, X_n$  be a random sample of size  $n$  from  $U(0, 1)$ . The expected value of the first order statistic  $X_{(1)}$  is:

- A)  $\frac{1}{n+1}$
- B)  $\frac{n}{n+1}$
- C)  $\frac{1}{2}$
- D)  $\frac{1}{n}$

62. Let  $X_1, X_2, \dots, X_n$  be a random sample from  $U(0, 1)$ . The joint pdf of the order statistics  $X_{(i)}$  and  $X_{(j)}$  ( $i < j$ ) involves:

- A) Gamma distribution
- B) Beta distribution
- C) Normal distribution
- D) Poisson distribution

63. Which of the following implication is always true?

- A)  $X_n \xrightarrow{D} X \Rightarrow X_n \xrightarrow{P} X$
- B)  $X_n \xrightarrow{P} X \Rightarrow X_n \xrightarrow{D} X$
- C)  $X_n \xrightarrow{D} X \Rightarrow X_n \xrightarrow{L^2} X$
- D) None of these

64. The Weak Law of Large Numbers (WLLN) fails if:

- A) Variance is infinite
- B) Mean is finite
- C) Sample size is large
- D) Observations are IID

65. Let  $X_1, X_2, \dots, X_n$  be i.i.d. random variables. The Central Limit Theorem (CLT) requires:

- A) Finite mean and finite variance
- B) Only independence
- C) Only identical distribution
- D) None of these

66. Reliability of series system decreases with:

- A) Constant
- B) Decrease in components
- C) Increase in components
- D) Independent

67. The hazard rate function  $h(t)$  is related to the survival function  $S(t)$  as:

- A)  $h(t) = -\frac{d}{dt} \ln S(t)$
- B)  $h(t) = S(t)$
- C)  $h(t) = f(t)$
- D)  $h(t) = F(t)$

68. If the lifetimes of components are independent and exponentially distributed, then the lifetime of a series system is:

- A) Exponential
- B) Normal
- C) Uniform
- D) Poisson

69. The mean residual life function for an exponential distribution is:

- A) Decreasing
- B) Constant
- C) Increasing
- D) Zero

70. A coherent system must be:

- A) Non-monotone
- B) Random
- C) Constant
- D) Monotone increasing

71. Let  $X_1, X_2, \dots, X_n$  be a random sample from an exponential distribution with pdf

$$f(x; \theta) = \theta e^{-\theta x}, \quad x > 0$$

Which of the following is a pivotal quantity for  $\theta$ ?

- A)  $\bar{X}/\theta$
- B)  $2\theta \sum_{i=1}^n X_i$
- C)  $(\sum_{i=1}^n X_i)/\theta^2$
- D)  $\bar{X} - \theta$

72. If  $\bar{X}$  is the mean of a random sample of size  $n$  taken from a  $N(\mu, 3^2)$  distribution, the value of  $n$  such that  $P[\bar{X} - 1 < \mu < \bar{X} + 1] = 0.99$  is... (take  $z_{0.005} = 2.57$ )

- A) 42
- B) 50
- C) 55
- D) 59

73. Let  $X$  follow a normal distribution  $N(\mu, \sigma^2)$ . Consider the hypotheses for the test as  $H_0 : \mu = 2$  against  $H_1 : \mu = 3$ . Which one of the following statements is correct?

- A)  $H_0$  is simple but  $H_1$  is composite
- B) Both  $H_0$  and  $H_1$  are simple
- C)  $H_0$  is composite but  $H_1$  is simple
- D) Both  $H_0$  and  $H_1$  are composite

74. One observation is drawn from a population with pdf as

$$f(x, \theta) = \begin{cases} \frac{1}{\theta}, & 0 < x < \theta \\ 0, & \text{otherwise} \end{cases}$$

For testing  $H_0 : \theta = 1$  against  $H_1 : \theta = 2$ , the critical region is  $X > \frac{1}{2}$ . Then, probability of type I error is

- A) 0.25
- B) 0.50
- C) 0.75
- D) 0.95

75. If a random sample of size  $n$  is drawn from  $N(\mu, \sigma^2)$ , with  $\mu$  known, the Neyman–Pearson lemma for testing  $H_0 : \sigma^2 = \sigma_0^2$  against  $H_1 : \sigma^2 = \sigma_1^2 (> \sigma_0^2)$ , leads to a test statistic whose distribution is

- A) Chi-square distribution
- B) Normal distribution
- C)  $t$ -distribution
- D)  $F$ -distribution

76. Which of the following statement is correct?

- A) SPRT controls type II error for fixed level of significance and fixed average sample number
- B) The sample size for a SPRT is random variable
- C) The main advantage of a SPRT is that larger sample size is required for a fixed  $(\alpha, \beta)$
- D) None of these

77. The paired differences are  $d_i : 5, -3, 2, -1, 5, -4$ . What will be the value of Wilcoxon signed-rank statistic  $W = \min(W^+, W^-)$ ?

- A) 6
- B) 7
- C) 8
- D) 9

78. Which one of the following nonparametric tests is analogous to the one-sample  $t$ -test?

- A) Kolmogorov-Smirnov test
- B) Sign test
- C) Median test
- D) Mann–Whitney test

79. The Wilcoxon signed-rank test may give misleading results when:

- A) The data are normally distributed
- B) The distribution is highly skewed
- C) The sample size is large
- D) There are no ties



87. In Yates' algorithm for a  $2^k$  factorial experiment, the process of pairwise addition and subtraction is carried out over as many columns as the number of:

- A) Replicates
- B) Treatment combinations
- C) Factors
- D) Levels of factors

88. Confounding is a technique used for:

- A) Reducing the block size
- B) Increasing the block size
- C) Reducing the number of factors
- D) Reducing the number of blocks

89. Missing observation in a CRD is to be .....

- A) estimated
- B) deleted
- C) guessed
- D) None of these

90. In  $2^3$  factorial experiment, the total number of interaction effects are ..... in number respectively.

- A) 4
- B) 3
- C) 12
- D) 7

91. The standard form of an LPP requires all constraints to be:

- A) Equalities with non-negative variables
- B) Inequalities only
- C) Greater than type
- D) Free from restrictions

92. Degeneracy in LPP occurs when:

- A) More than one optimal solution exists
- B) A basic variable takes zero value
- C) Objective function is unbounded
- D) Constraints are inconsistent

93. Maximize  $Z = 3x + 2y$  subject to:

$$x + y \leq 4, \quad x \leq 2, \quad y \leq 3, \quad x, y \geq 0$$

The optimal value of  $Z$  is:

- A) 11
- B) 10
- C) 12
- D) 9

94. If a transportation problem is unbalanced, it is balanced by:
- |                                 |                          |
|---------------------------------|--------------------------|
| A) Removing a constraint        | C) Changing cost matrix  |
| B) Adding a dummy row or column | D) Ignoring extra supply |
95. The MODI method is used to:
- Find IBFS
  - Balance the problem
  - Test optimality of transportation solution
  - Solve assignment problem
96. In assignment problem, if number of jobs  $\neq$  number of machines, then:
- |                            |                              |
|----------------------------|------------------------------|
| A) Problem has no solution | C) Add dummy rows or columns |
| B) It is ignored           | D) Use simplex method        |
97. In a queuing system, the term “queue discipline” refers to:
- The number of customers in the system
  - The rule by which customers are selected for service
  - The rate at which customers arrive
  - The number of service channels
98. In an M/M/1 queuing model, the traffic intensity  $\rho$  is defined as:
- Ratio of service rate to arrival rate
  - Sum of arrival and service rates
  - Difference between service and arrival rates
  - Ratio of arrival rate to service rate
99. Pseudo random numbers are generated using:
- |                             |                     |
|-----------------------------|---------------------|
| A) Deterministic algorithms | C) Manual selection |
| B) Natural randomness       | D) Sampling methods |
100. The pessimistic criterion in decision theory is also called:
- |            |                   |
|------------|-------------------|
| A) Laplace | C) Minimax regret |
| B) Maximax | D) Maximin        |

**- Rough Work -**