

# Statistics - 2010

## M.Sc. Statistics (Option-I : Statistics & Option-II : Mathematics)

### Option : I (Statistics)

- The probability of an event is:  
(a) a number (b) a ratio  
(c) neither a number nor a ratio (d) none of the above
- If  $f(x)$  has probability density  $cx^2, 0 < x < 1$ . The value of  $c$  is:  
(a) zero (b) one  
(c) two (d) three
- The probability of throwing a total of 11 with 2 dice is:  
(a)  $\frac{1}{18}$  (b)  $\frac{1}{9}$   
(c)  $\frac{1}{6}$  (d)  $\frac{1}{2}$
- If  $P(A)$  denotes the probability of an event  $A$ . Then which one of the following is true?  
(a)  $0 \geq P(A) \geq 1$  (b)  $0 \leq P(A) \leq 1$   
(c)  $0 < P(A) < 1$  (d) none of the above
- It is given that:  
 $f(x) = 2x, 0 \leq x \leq 1$   
 $= 0, \text{ otherwise}$   
The probability that  $1/4 \leq x \leq 1/2$  is  
(a)  $\frac{3}{4}$  (b)  $\frac{3}{8}$   
(c)  $\frac{3}{16}$  (d)  $\frac{1}{2}$
- The density function  
 $f(x) = \frac{1}{\beta - \alpha}, \alpha < x < \beta$   
 $= 0, \text{ elsewhere}$   
is known as:  
(a) Rectangular distribution (b) Pareto's distribution  
(c) Log-normal distribution (d) Beta distribution

7. For a normal distribution  $N(\mu, \sigma^2)$  the odd central moments are all :
- (a) one (b) zero  
(c) neither ones nor zeros (d) none of the above
8. Let  $X$  be a random variable with cumulative distribution function  $F(x) = 1 - e^{-\theta x}$ ,  $0 \leq x < \alpha$ . The mean of  $X$  is :
- (a)  $1/\theta$  (b)  $1 + 1/\theta$   
(c)  $1/\theta$  (d) None
9. If  $X_1$  and  $X_2$  be two independent Poisson variates with parameters  $\lambda_1$  and  $\lambda_2$ , respectively, then :
- (a)  $X_1 + X_2$  and  $X_1 - X_2$  also follow Poisson distribution  
(b)  $X_1 + X_2$  and  $X_1 - X_2$  do not follow Poisson distribution  
(c)  $X_1 + X_2$  and not  $X_1 - X_2$ , follow Poisson distribution  
(d)  $X_1 - X_2$  and not  $X_1 + X_2$ , follow Poisson distribution

10. Let  $X$  be random variable that follows a gamma distribution with parameter  $\beta$ , the pdf is given as :

$$f(x) = \frac{\exp(-x)x^{\beta-1}}{\Gamma(\beta)}, \beta > 0, x > 0$$

Then as  $\beta \rightarrow \infty$ , gamma distribution tends to

- (a) Normal distribution  
(b) Uniform distribution  
(c) Geometric distribution  
(d) Cauchy distribution
11. A random variable  $X$  is gamma distributed with  $\alpha = 3$  and  $\beta = 2$ . The value of  $P(X \leq 1)$  is :

- (a)  $\frac{13}{18e}$  (b)  $\frac{13}{8\sqrt{e}}$   
(c)  $1 - \frac{13}{8e}$  (d)  $1 - \frac{13}{8\sqrt{e}}$

12. The data collected by the investigator himself is called :
- (a) Primary (b) Secondary  
(c) List value (d) Collection

13. The quantitative facts in descriptive statistics are not :
- (a) interpreted (b) collective  
(c) summarized (d) classified
14. A given data has mean = 6.5, median = 6.3 and mode = 5.4. It represents :
- (a) leptokurtic distribution (b) symmetrical distribution  
(c) negatively skewed distribution (d) positively skewed distribution
15. The variance of following numbers 15, 25, 5, 10, 30 is equal to :
- (a) 50.20 (b) 9.27  
(c) 430 (d) 86
16. The second quartile position is also known as :
- (a) median (b) mode  
(c) standard deviation (d) variance
17. For a grouped data, which of the following is rarely used ?
- (a) quartile deviation (b) standard deviation  
(c) arithmetic mean (d) average deviation
18. If the coefficient correlation is equal to zero, then the standard error is equal to :
- (a) one (b) zero  
(c) greater than one (d) none of the above
19. Given the regression equations y on x :  $8x - 10y + 66 = 0$  and x on y :  $40x - 18y = 214$ . The correlation coefficient between x and y is :
- (a)  $\pm \frac{5}{3}$  (b)  $\pm \frac{3}{5}$   
(c)  $\pm 3$  (d)  $\pm 5$
20. When the coefficient of correlation is zero, the lines of regression are :
- (a) coincident (b) parallel  
(c) at right angles (d) none of the above
21. When the coefficient of correlation is  $\pm 1$ , the lines of regression are :
- (a) coincident (b) parallel  
(c) coincident or parallel (d) at right angles

22. The following frequencies are of the positive order : (A) = 40, (B) = 60, (AB) = 30, N = 130. Then the value of  $(\alpha\beta)$  is :
- (a) 90 (b) 70  
(c) 30 (d) 60
23. The following frequencies are of the positive order : (A) = 50, (B) = 30, (AB) = 20, N = 170. Then  $A\beta$  is equal to :
- (a) 80 (b) 30  
(c) 120 (d) 140
24. The curve which is very highly peaked and has the value of  $\beta > 3$  are called :
- (a) mesokurtic (b) leptokurtic  
(c) platykurtic (d) all of these
25. When frequency distribution is not symmetrical about the mean it is said to be :
- (a) kurtosis (b) moment  
(c) skewed (d) none of these
26. For an infinite population, the factor  $\frac{N-n}{N}$  is approximately :
- (a) zero (b) one  
(c) greater than one (d) none
27. The standard deviation of a simple random sample mean  $\bar{x}$  taken from an infinite population is :
- (a)  $\sigma\sqrt{n}$  (b)  $\sigma n$   
(c)  $\frac{\sigma}{\sqrt{n}}$  (d)  $\frac{\sigma}{n}$
28. The standard error of sample mean  $\bar{x}$  is equal to :
- (a)  $\text{Var}(\bar{x})$  (b)  $\{\text{Var}(\bar{x})\}^2$   
(c)  $\{\text{Var}(\bar{x})\}^{1/2}$  (d)  $\{\text{Var}(\bar{x})\}^{1/3}$
29. In randomized block design, how many treatments can be adopted without any loss of efficiency ?
- (a) 10 (b) 15  
(c) 18 (d) 20

30. An infinite population has a variance of 36 and a mean of 96. A sample of 4 items is taken. The standard deviation of the sample distribution is :
- (a) 18 (b) 1.5  
(c) 3.0 (d) 9
31. Systematic sample :
- (a) gives more reliable results than a random sample  
(b) gives less reliable results than a random sample  
(c) cannot be said to give either more reliable or reliable results than a random sample  
(d) none of the above
32. The ANOVA is a tool by which total variation may be split up into several physically assignable component was defined by :
- (a) Karl Pearson (b) R.A. Fisher  
(c) Horace Secrist (d) A.L. Bowley
33. When the fertility gradient of the field is in one direction, which design is appropriate ?
- (a) CRD (b) LSD  
(c) RBD (d) SPD
34. When the fertility gradient of the field goes in two directions, which design is most appropriate ?
- (a) Augmented design (b) CRD  
(c) LSD (d) SPD
35. If there are 5 treatments with 4 replication to each, the error degree of freedom for CRD will be :
- (a) 15 (b) 20  
(c) 12 (d) 9
36. The non-parametric test used for two independent samples is :
- (a) t-test (b) z-test  
(c) F-test (d) Mann Whitney U-test
37. For the comparison of two correlated samples under non-parametric alternative to paired F-test is :
- (a) z-test (b) F-test  
(c) Wilcoxon Signed-ranked test (d) Kruskal-Wallis H-test

38. Which test is applied for the test of significance between the two variances ?  
 (a) t-test (b) z-test  
 (c) Chi-square test (d) F-test
39. The regression coefficient is independent of change of:  
 (a) origin (b) scale  
 (c) both A and B (d) none of these
40. The hypothesis of no difference is known as :  
 (a) Simple hypothesis (b) Null hypothesis  
 (c) Composite hypothesis (d) Alternative hypothesis
41. If  $t$  is a consistent estimator of  $\theta$ , then :  
 (a)  $t^2$  is also a consistent estimator of  $\theta$   
 (b)  $t$  is also a consistent estimator of  $\theta^2$   
 (c)  $t^2$  may or may not be a consistent estimator of  $\theta^2$   
 (d)  $t^2$  is also a consistent estimator of  $\theta^2$
42. If  $a = (a_1 + a_2)/2$ , where  $a_1$  and  $a_2$  are both most efficient with variance  $S^2$ , and  $\rho$ , is the correlation coefficient between  $a_1$  and  $a_2$ , then variance of  $a$  is :  
 (a)  $(1 + \rho) S^2$  (b)  $(1 + \rho) S^2/2$   
 (c)  $\rho S^2/2$  (d) none
43. For given observed random samples 2, 1, 4, 5. The point estimates of the parameters of  $\mu$  and  $\sigma^2$  is a  $N(\mu, \sigma^2)$  are :  
 (a)  $\frac{10}{3}, 3$  (b)  $3, \frac{10}{3}$   
 (c)  $4, \frac{10}{3}$  (d)  $3, \frac{10}{4}$
44. An unbiased estimator :  
 (a) will always be consistent (b) will not be consistent  
 (c) may or may not be consistent (d) none of the above
45. For the Poisson parameter :  
 (a)  $\frac{1}{\bar{x}}$  is a consistent estimator of  $\frac{1}{\theta}$  (b)  $\frac{1}{x}$  is a consistent estimator of  $\frac{1}{\theta}$   
 (c)  $x$  is a consistent estimator of  $\frac{1}{\theta}$  (d) none of the above

46. A large population has a mean of 3.25 cm and standard deviation of 2.61 cm. A sample of 900 items has a mean of 3.45 cm. The value of Z is equal to :
- (a) 1.7 (b) 1.8  
(c) 2.3 (d) 2.8
47. The probability of type-I error is known as :
- (a) test of significance (b) level of significance  
(c) composite hypothesis (d) none of these
48. For test of goodness of fit, which test is used ?
- (a) t-test (b) F-test  
(c) z-test (d) Chi-square test
49. For comparison of two means from independent samples which test is applicable ?
- (a) t-test (b) F-test  
(c) z-test (d) Chi-square test
50. When we want average of rates of change or ratio or index number, which measure of central tendency is suitable ?
- (a) geometric mean (b) mode  
(c) arithmetic mean (d) median
51. If two attributes A and B such that  $(AB) > \frac{(A)(B)}{N}$ , they are said to be :
- (a) negatively associated (b) positively associated  
(c) not associated (d) none
52. If A and B attributes are independent, the value of  $\gamma$  the coefficient of colligation is :
- (a) +1 (b) -1  
(c) zero (d) none
53. For the following linear programming problem (LPP)
- $$\begin{aligned} \text{Max } Z &= 2x_1 + 3x_2 \\ \text{subject to } &x_1 + x_2 \leq 1 \\ &3x_1 + x_2 \leq 4 \\ &x_1, x_2 \geq 0 \end{aligned}$$
- The basic feasible solution is
- (a)  $x_1 = 1, x_2 = 1$  (b)  $x_1 = 0, x_2 = 1$   
(c)  $x_1 = 0, x_2 = 0$  (d) none of the above

54. The best average for constructing an index number is :
- (a) harmonic mean
  - (b) arithmetic mean
  - (c) geometric mean
  - (d) none of these
55. Fisher's ideal index number is :
- (a) the arithmetic mean of Laspeyre's and Paasche's index numbers
  - (b) the median of Laspeyre's and Paasche's index numbers
  - (c) the geometric mean of Laspeyre's and Paasche's index numbers
  - (d) none of the above
56. Laspeyre's formula does not obey :
- (a) Circular test
  - (b) Time reversal test
  - (c) Factor reversal test
  - (d) None of these
57. The factor reversal test is satisfied by :
- (a) Simple aggregative index number
  - (b) Laspeyre's index number
  - (c) Paasche's index number
  - (d) None
58. Crude death rate, expressed simply as a ratio, provided :
- (a) the probability of babies born and died during the year under reference
  - (b) the probability of a foetal death during the year under reference
  - (c) the probability of dying of a person during the year under reference
  - (d) all the above
59. The death rate obtained for a segment of a population is known as :
- (a) specific death rate
  - (b) crude death rate
  - (c) standardized rate
  - (d) vital index
60. Fertility rates mainly depend on :
- (a) total female population
  - (b) total population
  - (c) female population of child bearing age
  - (d) number of newly born babies