Mathematics

Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with 'A+' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Examination – June / July 2021
II Semester

Class : I UG **Time : 3 Hours**
Major : Mathematics **Max. Marks : 100**

18BMAI02 DSE - II Mathematical Statistics – II

Part A **10 x 1 = 10**
Choose the Correct Answer

1. The skewness in a binomial distribution will be zero if CO2 K1
   a. $p<\frac{1}{2}$ b. $p=\frac{1}{2}$
   c. $p>\frac{1}{2}$ d. $p<q$

2. For the binomial distribution, variance is less than CO2 K1
   a. mean b. standard deviation
   c. median d. all of the above

3. The characteristic function of Poisson distribution is CO2 K2
   a. $e^{(it-1)}$ b. $e^{\lambda(e^{it}-1)}$
   c. e^{mit} d. e^{mt}

4. The coefficient of variation of Poisson distribution with mean 4 is CO2 K2
   a. $\frac{1}{4}$ b. $\frac{2}{4}$
   c. 4 d. 2

5. The standard normal distribution is represented by CO3 K1
   a. N(0,0) b. N(1,1)
   c. N(0,1) d. N(1,0)

6. For a normal distribution, Q.D, Mean deviation, S.D are in the ratio CO3 K1
   a. $\frac{1}{4}:\frac{4}{5}:1$ b. $\frac{2}{3}:\frac{4}{5}:1$
   c. $1:\frac{1}{4}:\frac{2}{3}$ d. $\frac{1}{2}:\frac{4}{5}:1$

7. F is the ratio of two independent CO2 K1
   a. Poisson variates b. Binomial variates
   c. Normal variates d. Chi square variaties

8. The limiting form of t-distribution is CO2 K1
   a. $\frac{2}{\sqrt{2\pi}}exp\left(\frac{-t^2}{2}\right)$ b. $\frac{1}{\sqrt{2\pi}}exp\left(\frac{t^2}{2}\right)$
   c. $\frac{1}{\sqrt{2\pi}}exp(-t^2)$ d. $\frac{2}{\sqrt{2\pi}}exp$

9. A finite subset of statistical individuals in a population is called CO5 K1
   a. sample b. static
   c. non sample d. census

10. The elements of a sample are known as CO5 K1
   a. sample points b. sampling units
   c. observations d. all of the above

Part B **5 x 6 = 30**

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. Derive moment generating function of Binomial distribution. CO2 K2

(or)

11.b. Derive cumulant generating function of Binomial distribution. CO2 K2

12.a Find the variance of X-2Y if P(X=1) = P(X=2) & P(Y=2) = P(Y=3) where X and Y are Poisson variates. CO4 K2

(or)

12.b. If X and Y are independent Poisson variates with λ_1 and $\lambda_2$respectively, find the probability that (i) X+Y=K (ii) X=Y. CO4 K2

13.a. X is normally variate with mean 30 and S.D 5.Find the probabilities that (i) 26≤X≤40 (ii) X≥5 and (iii) $|x-30|>5$. CO4 K2

(or)

13.b. X is normally distributed and the mean of Xis 12 and S.D is 4. Find out the probability that (i) X≥20 (ii) X≤20 and (iii) 0≤X≤12. CO4 K2

14.a. Write the statements of central limit theorem and Demoiver's Laplace theorem. CO2 K3

(or)

14.b. Derive the limiting form of t-distribution. CO2 K3

15.a. Define (i) sample (ii) Parameter and (iii) Statistic CO5 K2

(or)

15.b. (i) Define simple random sampling
(ii) List out the advantages of sampling over census CO5 K2

Part C **5 x 12 = 60**

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. (i) Determine the Binomial distribution for which the mean is 4 and variance 3 and find its mode.
(ii) Find the parameter p of the distribution if n=5, P(X=1)=0.4096, P(X=2)=0.2048. CO4 K2

(or)

16.b. (i) Find P(X≥1) if the mean and variance of Binomial distribution are 4 and $\frac{4}{3}$ respectively.
(ii) If X~B(n,p), Show that $E(\frac{X}{n}-p)^2=\frac{pq}{n}$,cov $(\frac{X}{n},\frac{n-X}{n})=-\frac{pq}{n}$. CO4 K2

17.a. (i) Derive moment generating function of Poisson distribution.
(ii) Derive the cumulant generating function of Poisson distribution. CO2 K5

(or)

17.b. (i) State and prove additive property of independent Poisson variates.
(ii) In a Poisson frequency distribution, frequency corresponding to 3 success is$\frac{2}{3}$ times frequency corresponding to 4 success. Find the mean and S.D of the distribution. CO2 K5

18.a. Show that in a Normal distribution, mean and median are equal. CO2 K3

(or)

18.b. (i) Derive MGF of Normal distribution.

(ii) Derive cumulant generating function of Normal distribution. CO2 K3

19.a. (i) Write the derivation of characteristic function of chi square distribution.

(ii) State and prove additive property of chi square variate. CO3 K5

(or)

19.b. Derive the probability density function of t-statistic. CO3 K5

20.a. State the advantages of Stratified Random Sampling. CO5 K2

(or)

20.b. Write about (i) the Simple Random Sampling procedure.

(ii) the Stratified Random Sampling procedure. CO5 K2

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