

Exam Date & Time: 30-Sep-2020 (10:00 AM - 01:45 PM)



PSG COLLEGE OF ARTS AND SCIENCE

Note: Writing 3hrs: Checking & Inserting Image : 30mins + Grace Time : 15mins

BSc DEGREE EXAMINATION MAY 2020
(Sixth Semester)

Branch - MATHEMATICS WITH COMPUTER APPLICATIONS
CORE ELECTIVE-II - MATHEMATICAL STATISTICS [14MCU27A]

Marks: 75

Duration: 225 mins.

SECTION A

Answer all the questions.

- 1) Define event. (2)
- 2) State multiplication law of probability. (2)
- 3) Define discrete random variable. (2)
- 4) What are the various measures of central tendency for a continuous probability distribution? (2)
- 5) State addition theorem on expectation. (2)
- 6) Define covariance. (2)
- 7) Define binomial distribution. (2)
- 8) Define normal distribution. (2)
- 9) Define Student's 't' distribution. (2)
- 10) What is null hypothesis? (2)

SECTION B

Answer all the questions.

- 11) If two dice are thrown, what is the probability that the sum is greater than 8? (5)
- a)
- [OR]
- b) A card is drawn from a well-shuffled pack of playing cards. What is the probability that it is either a spade or an ace? (5)
- 12) A continuous random variable x has a p.d.f $f(x)=3x^2$, $0 \leq x \leq 1$ find 'a' such that $p(x \leq a) = p(x > a)$? (5)
- a)
- [OR]
- b) A petrol pump is supplied with petrol once a day. If its daily volume x of sales in thousands of litres is distributed by $f(x)=5(1-x)^4$, $0 \leq x \leq 1$. What must be the capacity of its tank in order that the probability that its supply will be exhausted in a given day shall be 0.01? (5)
- 13) Let x be a random variable with the following probability distribution:
- | | | | |
|-----------|---------------|---------------|---------------|
| $x:$ | -3 | 6 | 9 |
| $P(X=x):$ | $\frac{1}{3}$ | $\frac{1}{2}$ | $\frac{1}{3}$ |
- a) Evaluate $E(2x+1)^2$. (5)
- [OR]
- b) Two random variables X and Y have the following joint probability density function.
 $f(x,y)=2-x-y$; $0 \leq x \leq 1$; $0 \leq y \leq 1$
 $= 0$; otherwise (5)
- Find marginal probability density functions of X and Y ?
- 14) The mean and variance of binomial distribution are 4 and $\frac{4}{3}$ respectively. Find $P(x \geq 1)$? (5)
- a)
- [OR]
- b) If X is a Poisson variate such that $P(x=2)=9P(x=4)+90P(x=6)$. Find λ , the mean of X ? (5)
- 15) A certain stimulus administered to each of the 12 patients resulted in the following increases of blood pressure:
 5, 2, 8, -1, 3, 0, -2, 1, 5, 0 and 6.
- a) Can it be concluded that the stimulus will, in general, be accompanied by an increase in blood pressure? (5)
- [OR]
- b) A random sample of 27 pairs of observations from a normal populations gave a correlation coefficient of 0.6. Is this significant of correlation in the population? (5)

SECTION C

Answer 3 out of 5 questions.

- 16) (10)

State and prove Baye's theorem.

17)

A random variable X has the following probability distribution:

x:	0	1	2	3	4	5	6	7
P(x):	0	6	2k	2k	3k	K ²	2k ²	7k ² +k

(i) Find k (ii) evaluate $p(x < 6)$, $p(x \geq 6)$ and $p(0 < x < 5)$ (10)

(iii) If $p(x \leq c) > \frac{1}{2}$, find the minimum value of c, and

(iv) Determine the distribution function of X.

18)

A box contains 'a' white and 'b' black balls. 'c' balls are drawn. Find the expected value of the number of white balls drawn? (10)

19)

X is normally distributed and the mean of X is 12 and S.D is 4. Find out the probability of the following: $x \geq 20$, $x \leq 20$ and $0 \leq x \leq 12$. (10)

20)

Two random samples gave the following results:

Sample	Size	Sample Mean	Sum of the squares of deviation from the mean
1	10	15	90
2	12	14	108

Test whether the sample come from the same normal population of 5% level of significance. [Given : $F_{0.05}(9,11)=2.90$, $F_{0.05}(11,9)=3.10$ (app) and $t_{0.05}(20)=2.086$, $t_{0.05}(22)=2.07$]. (10)

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