Section—D

19. A bag contains 6 white balls and 9 black balls 4 balls are drawn at random. Find the probability that two are white and two are black.

20. A continours random variable X has a p. d. f. $f(x) = 3x^2, 0 \le x \le 1$. Find a and b s. t.

    (i) $P[X \le a] = P[X > a]$

    (ii) $P[X > b] = 0.05$

21. Show that for triangular distribution with density function :

$$f(x) = \begin{cases} x & 0 \le x \le 1 \\ 2 - x & 1 \le x \le 2 \end{cases}$$

$\mu_1 = 1, \mu_2 = \dfrac{1}{6}$.

22. Fit a straight line of the following data treating y as the dependent variable :

x	y
1	5
2	7
3	9
4	10
5	11

H–2207

M. A./M. Sc. (Final)

Term End Examination, June-July, 2017

MATHEMATICS

Paper Third

(Mathematical Statistics)

Time : Three Hours] [*Maximum Marks : 70*

[*Minimum Pass Marks : 28*

Instructions for Candidate :

Section–A : Question Nos. **01** to **08** are very short answer type questions. Attempt all questions. Each question carries 01 mark. Answer each of these questions in **1** or **2** words/**1** sentence.

Section–B : Question Nos. **09** to **14** are very short answer type questions. Attempt any *four* questions. Each question carries $2\frac{1}{2}$ marks. Answer each of these questions in about **75** words.

Section–C : Question Nos. **15** to **18** are short answer type questions. Attempt any *three* questions. Each question carries 05 marks. Answer each of these questions in about **150** words.

Section–D : Question Nos. 19 to 22 are half long answer type questions. Attempt any *two* questions. Each question carries 10 marks. Answer each of these questions in about 300 words.

Section–E : Question Nos. 23 and 24 are long answer type questions. Attempt any *one* question. Each question carries 17 marks. Answer each of these questions in about 700 words.

Section—A

1. Write the Geometric mean of 1, 2, 4.
2. Write the formulae of coefficient of variation.
3. State addition theorem of probability.
4. Write the conditions of probability density function $f(x)$ for a continuous random variable.
5. If the range of the probability density function is from $-\infty$ to ∞ then, write rth moment about origin.
6. If $b_{yx} = .99$ and $b_{xy} = .85$, then what is value of coefficient of correlation ?
7. What is value of $P(A) + P(\bar{A})$?
8. Define null hypothesis.

Section—B

9. For two variables x and y with same mean, the two regression equations are $y = ax + b$ and $x = \alpha y + \beta$ show that $\frac{b}{\beta} = \frac{1-a}{1-\alpha}$.
10. Prove that :
$$\text{Cov}(x_2, x_{1.23}) = \text{Cov}(x_3, x_{1.23}) = 0$$

11. Prove that :
$$\Delta \equiv E - 1$$
12. Write a short note on "Sampling in statistics".
13. Out of 200 individuals 40% show a certain trait, and that the number expected on a certain theory in 50%. Find whether the number observed differs significantly from expectation.
14. A normal population has mean of 0.1 and a S. D. of 2.1. Find the probability that the mean of simple of 900 members will be negative.

Section—C

15. Write a short note on the choice of base period in the construction of an index number.
16. What is trend ? How is it eliminated from a time series ?
17. Calculate the Geometric mean of the following frequency distribution :

x	f
0—10	5
10—20	8
20—30	3
30—40	4

18. The first four moments about the points 4 are – 1.5, 17, – 30 and 108. Then find the first four moments about the mean.

Section—E

23. (a) Calculate the coefficient of correlation between the values of x and y :

x	y
78	125
89	137
97	156
69	112
59	107
79	136
68	123
61	108

(b) Interpolate the missing term in the following table of rice cultivation :

Year	Acres (in millions)
1911	76.6
1912	78.7
1913	?
1914	77.7
1915	78.7
1916	?
1917	80.6
1918	77.6
1919	78.6

24. Show that in a discrete series if the deviations x from the mean M are so small that the third and higher powers of $\frac{x}{M}$ and $\frac{\sigma}{M}$ can be neglected the following relative are found to hold approximately :

(i) $G = M\left[1 - \frac{1}{2}\frac{\sigma^2}{M^2}\right]$

(ii) $M^2 - G^2 = \sigma^2$

(iii) $H = M\left[1 - \frac{\sigma^2}{M^2}\right]$

(iv) $M + H = 2\,G$

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