

22U265S

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Name.....

Reg. No.....

**SECOND SEMESTER B.Voc. DEGREE EXAMINATION, APRIL 2023**

(Information Technology)

**CC18U GEC2 ST06 - BASIC STATISTICS AND PROBABILITY**

(2018 to 2020 Admissions - Supplementary/Improvement)

Time: Three Hours

Maximum: 80 Marks

**Part A**

Answer *all* questions. Each question carries 1 mark

Fill up the blanks:

1. A study based on complete enumeration is known as .....
2. The relation between AM, GM and HM is .....
3. If  $F(x)$  denote the distribution function, then  $F(\infty)$  is .....
4. If A and B are two mutually exclusive and exhaustive events and  $P(B)=2P(A)$ , then  $P(A)=$  .....
5. The value of  $r^2$  for a particular situation is 0.81. What is coefficient of correlation?

Write true or false:

6. If mean is 10 and variance is 16, then coefficient of variation is 40
  7. The class is having maximum frequency is called Median class
  8. Sum of the deviations of the observations from arithmetic mean is always positive.
  9. Pair wise independence of three events implies their mutual independence
  10. If a and b are the regression coefficients of X and Y, then correlation coefficient  $r = ab$
- (10 × 1 = 10 Marks)**

**Part B**

Answer any *eight* questions. Each question carries 2 marks.

11. What is Harmonic mean?
12. Why arithmetic mean is considered to be the best average?
13. Distinguish between population and sample.
14. Define range and quartile deviation.
15. The mean age of 100 persons was found to be 32.02. Later it was discovered that age 57 was misread as 27. Find the corrected mean.
16. State classical definition of probability.
17. Define random experiment.
18. What are the different types of random variables? Illustrate with suitable examples.

19. Check whether the function  $f(x) = -\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}$ , when  $x=1, 2, 3, 4$  and  $= 0$  elsewhere, is a probability density function?
20. Let  $X$  be a r.v whose p.d.f is  $f(x) = c, a \leq x \leq b$  and zero elsewhere. Find the constant  $c$ .
21. Mention the important properties of correlation coefficient.
22. What are the properties of the regression coefficients?

(8 × 2 = 16 Marks)

**Part C**

Answer any *six* questions. Each question carries 4 marks.

23. Show that mean deviation about median is a minimum.
24. Why standard deviation is considered to be the best measure of dispersion?
25. The marks obtained by 25 students are given below.

Marks	11	12	13	14	15
Frequency	3	7	8	5	2

Find Geometric Mean and Harmonic Mean.

26. Define i) Sample space ii) Event iii) Mutually exclusive events
27. A can hit a target in 4 out of 5 shots and B can hit the target in 3 out of 4 shots. Find the probability that i) the target being hit when both try ii) the target being hit by exactly one person.
28. State and prove addition theorem of two events.
29. Define distribution function. What are its properties?
30. Fit a straight line by the method of least squares to the following data.

X	0	1	2	3	4
Y	1	1.8	3.3	4.5	6.3

31. Given the two equations for the regression lines:  $8x - 10y + 66 = 0$  and  $40x - 18y - 214 = 0$ . Identify the two regression lines and obtain the correlation coefficient.

(6 × 4 = 24 Marks)

**Part D**

Answer any *two* questions. Each question carries 15 marks.

32. (a) State and prove Baye's Theorem.
- (b) There are three Urns I, II and III. Urn I contains 3 red and 4 white balls. Urn II contains 4 red and 2 white balls. Urn III contains 5 red and 3 white balls. An Urn is chosen at random and a ball is thrown from the chosen Urn. It is found that the ball is a red one. What is the probability that it comes from Urn II?

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33. From the data given below, find which series is more consistent?

Variable	Series A	Series B
10-20	10	22
20-30	16	18
30-40	30	32
40-50	40	34
50-60	26	18
60-70	18	16

34. (a) A random variable  $X$  has pdf  $f(x) = e^{-x}, x \geq 0$ . Find the pdf of  $y = e^{-x}$ .

(b) If  $f(x) = \begin{cases} Ax, & 0 \leq x \leq 1 \\ 0, & elsewhere \end{cases}$

Determine (i) A (ii)  $P(\frac{1}{4} < x < \frac{1}{2})$

35. Calculate the coefficient of correlation and obtain the lines of regression for the following data:

X	1	2	3	4	5	6	7
Y	9	8	10	12	11	13	14

Obtain an estimate of Y which should correspond to the average  $X = 6.2$ .

(2 × 15 = 30 Marks)

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