

**U.G. 5th Semester Examination 2021**

**MATHEMATICS (General)**

**Paper : SEC-3**

**[Mathematical Statistics & Its Applications]**

**(CBCS)**

Full Marks : 32

Time : 2 Hours

*The figures in the margin indicate full marks.  
Notations and symbols have their usual meanings.*

**Group - A**

**(4 Marks)**

1. Answer any *four* questions : 4×1=4
- (a) What are the uses of bar graph?
  - (b) State the relationships among A.M., G.M., and H.M.
  - (c) Let's consider the data : 56, 67, 54, 34, 78, 43, 23. Find out the median.
  - (d) Let's consider the data : 76, 102, 44, 42, 80, 30. Find out the second moment.
  - (e) State the central limit theorem.
  - (f) State the relationship between level of significance and null hypothesis.
  - (g) If two variables are uncorrelated then the value of correlation coefficient will be?

**Group - B**

**(10 Marks)**

Answer any *two* questions :

2×5=10

2. Calculate the Quartile deviation and Mean deviation from mean for the following data :
- |                 |   |      |       |       |       |       |       |       |   |
|-----------------|---|------|-------|-------|-------|-------|-------|-------|---|
| marks           | : | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |   |
| no. of students | : | 6    | 5     | 8     | 15    | 7     | 6     | 3     | 5 |
3. If  $X$  is a chi-square variate with  $n$  d.f., then prove that for large  $n$ ,  $\sqrt{2X} \sim N(\sqrt{2n}, 1)$  5
4. In a large city  $A$ , 20 percent of a random sample of 900 school children had defective eye-sight. In other large city  $B$ , 15 percent had the same defect. Is the difference between the two proportions significant? Obtain 95% confidence limits for the difference in the population proportions. 5
5. If the lines  $4x + y = 52$  and  $x + y = 32$  be the regression lines of  $x$  on  $y$  and  $y$  on  $x$  respectively. Obtain the correlation coefficient. 5

**Group - C**

**(18 Marks)**

Answer any *two* questions :

2×9=18

6. (a) Determine the least square approximation of the form  $ax^2 + bx + c$  to the function  $2^x$  at the points  $x = 0, 1, 2, 3, 4$ . 5
- (b) Given  $f(x, y) = xe^{-x(y+1)}$ ,  $x \geq 0, y \geq 0$   
find the regression curve of  $Y$  on  $X$ . 4
7. In one sample of 8 observations, the sum of squares of the deviations of the sample values from the sample mean was 84.4 and in the other sample of 10 observations it was 102.6. Test whether this difference is significant at 5 percent level, given that the 5 percent point of  $F$  for  $n_1 = 7$  and  $n_2 = 9$  degrees of freedom is 3.29. 9
8. Show that the sample mean is an unbiased estimate of the population mean but the sample variance is not an unbiased estimate of population variance. 9

