2015

MCA

1st Semester Examination

PROBABILITY & STATISTICS

PAPER—MCA-105

Full Marks : 100

Time : 3 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Group—A

Answer any *one* out of two questions : 1×15

1. (a) What do you mean by Conditional Probability ? 3

(b) State and Prove theorem of total probability. 7

(c) State the limitation of Probability. 2

(d) Two unbiased die are thrown. What is the probability that the sum of top faces is 9. And product of top faces is 12. 3

2. (a) Define Cumulative Distribution function. 2

(b) State and prove different properties of distribution function. 10

(c) What do you mean by Indicator random variable ? 3

Group—B

Answer any *six* questions : 6×5

3. A point P is chosen at random on a line segment AB of length $2l$. Find the expected value of (i) $|AP - PB|$ and (ii) max {AP, PB}. 3+2

4. If X is uniformly distributed in the interval $(-1, 1)$, then find the distribution of $|x|$. 5

5. What do you mean by probability mass function and probability density function ? 5

6. Define 'Coefficient of Variation'. What are the special uses of this measures ? 5

7. Find Mean and Variance of Poisson distribution. 5

8. If X, Y are two random variables defined on S and $Z = X + Y$ then $E(Z) = E(X) + E(Y)$.

9. Show that $-1 \leq r_{xy} \leq 1$. 5

10. (a) Prove that sum of deviations of $x_1, x_2, \ldots, x_n$ from their mean $\bar{x}$ is equal to zero. 3

(b) Define Harmonic mean. 2

11. (a) What is moving average?

Obtain the 4-year moving average of the following tabulated data : 6

Year	1980	1981	1982	1983	1984	1985	1986
No. of students	129	131	106	91	95	84	93

(b) Fit a straight line Z on Y to the data given by the following table : 6

Y	1	3	4	6	7	9
Z	1	8	17	34	52	78

(c) Describe method of least square. 3

Group—C

Answer any *one* question : 1×15

12. (a) What do you mean by regression? 2

(b) Distinguish between simple regression and multiple regression. 2

(c) Establish the simple regression equation of Y on X from n pairs of observation. 7

(d) Prove that the correlation coefficient does not depend on the origin or scale of the observations. 4

Group—D

Answer any *one* question out of two : 1×10

13. A sample analysis of examination results of 200 MCA's was made. It was found that 46 students had failed, 68 secured a third division, 62 secured a second division and the rest were placed in first division. Are these figures commensurate with the general examination result which is in the ratio of 4:3:2:1 for the various categories respectively.

[*Given* : $\chi^2_{.05,\,3} = 7{\cdot}815$]

14. (a) If T is an unbiased estimate of a population parameter θ, then show that T^2 is an unbiased estimate of θ^2 and T^2 is also consistent estimate of θ^2. 3+2

(b) Find the Confidence interval of the sample mean by taking a sample of size n drawn from a normal (m, σ) population where σ is known. 5

Internal Assessment : 30