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II Semester B.Sc. Examination, August/September 2023
(NEP)
STATISTICS
Paper – II : DSC – 2 : Probability and Distributions

Time : 2½ Hours

Max. Marks : 60

Instructions : 1) Scientific calculators are **permitted**.
2) Statistical tables and graph sheets are provided on request.

PART – A

Answer **any four** questions (**2 marks each**).

(2×4=8)

1. Define subjective probability.

2. Define discrete random variable and probability mass function (pmf).

3. Define Mathematical expectation of a random variable.

4. Write any two properties of Binomial distribution.

5. Define standard normal distribution and write its mean and variance.

6. Write the output of the following R-programs.

   i) > Y ← C (6, 9, 10, 12)
   > S ← Sum (Y)
   > S

   ii) > Y ← C (3, 5, 7, 9)
   > M ← Mean (Y)
   > M

PART – B

Answer **any four** questions (**5 marks each**).

(5×4=20)

7. State and prove Baye's theorem.

8. Define moment generating function of a random variable. State its properties and prove one of them.

9. If X is a continuous random variable with pdf $f(x) = \frac{1}{4}x^3$, $0 < x < 1$ then find mean and variance.

10. State and prove lack of memory property of geometric distribution.

11. Obtain mgf of Exponential distribution and hence find its mean.

12. Explain the arithmetic operators used in 'R'.

PART – C

Answer **any four** questions (**8** marks **each**). (8×4=32)

13. a) State and prove addition theorem of probability.
    b) Define dependent event and conditional probability. (5+3)

14. a) State and prove multiplication theorem of Mathematical expectations.
    b) Explain the methods of generating moments from MGF. (4+4)

15. a) Show that $E(aX^2 + b) = a\,E(X^2) + b$.
    b) Show that $M_{aX+b}^{(t)} = e^{bt}\,M_X(at)$. (4+4)

16. a) Define Bernoulli distribution. Find its mean, variance and MGF.
    b) State and prove additive property of the binomial distribution. (4+4)

17. a) Define Normal distribution. State any four properties of Normal distribution (N.D.).
    b) Derive MGF of normal distribution and hence find mean and variance. (4+4)

18. Explain the graphical environment of 'R'. 8

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