



NP – 106

II Semester B.Sc. Examination, Sept./Oct. 2022
(NEP) (2021-22 and Onwards)

STATISTICS

Paper – II : 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. State axioms of probability.
2. Define continuous random variable and probability density function (pdf).
3. Define mathematical expectation of a random variable.
4. Write any two properties of Poisson distribution.
5. Define rectangular distribution and write its mean and variance.
6. Write the output of the following R-programs.
 - 1)

```
> Y ← C (5, 8, 9, 10)
> S ← sum (Y)
> S
```
 - 2)

```
> Y ← C (2, 4, 6, 8)
> M ← mean (Y)
> M
```

P.T.O.



PART – B

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

(5×4=20)

7. State and prove addition theorem of probability.
8. Define moment generating function of a random variable. State its properties and prove one of them.
9. If X is continuous random variable with pdf $f(x) = 4x^3$, $0 < x < 1$ then find mean and variance.
10. Obtain mgf of exponential distribution and hence find its mean.
11. State and prove lack of memory property of geometric distribution.
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 Baye's theorem. (5+3)
b) Define conditional probability.
 14. a) Explain the methods of generating moments from MGF. (4+4)
b) State and prove addition theorem of Mathematical expectations.
 15. a) Show that $E(aX + b) = aE(X) + b$. (4+4)
b) Show that $M_{ax+b}(t) = e^{bt} \cdot M_x(at)$.
 16. a) State and prove additive property of the binomial distribution. (4+4)
b) Define Bernoulli distribution. Find its mean, variance and MGF.
 17. Define Normal distribution. Hence find its mean and variance. 8
 18. Explain the graphical environment of 'R'. 8
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