S.Y. B.Sc. Semester -IV

PAPER – 401

Generating Functions & Discrete Probability Distributions

Unit-1: **Generating functions:** (10%)

- Moment generating function (m.g.f.) about origin and mean,
- Factorial moment generating function,
- Cumulant Generating Function (c.g.f.),
- Properties and relationship of above functions.
  - Problems of above topics.

Unit-2: **Bernoulli distribution and Binomial Distribution:** (30%)

- Bernoulli distribution: Definition, Mean, Variance and Additive property.
- Binomial Distribution: Definition, Uses, Mean, Variance, M.G.F. about origin and mean, Factorial moments, C.G.F., β_1, β_2, γ_1 and γ_2, Additive property, Limiting form, Recurrence relation: for (i) raw moments and (ii) central moments.
  - Problems of above topics.

Unit-3: **Poisson distribution and Discrete Uniform distributions:** (30%)

- Poisson distribution: Definition, Uses, Mean, Variance, M.G.F. about origin and mean, Factorial moments, C.G.F., β_1, β_2, γ_1 and γ_2, Additive property, Limiting form, Recurrence relation: for (i) raw moments and (ii) central moments.
  - Problems of above topics.
- Discrete Uniform distribution: Definition, Mean, Variance.
  - Problems of above topics.

Unit-4: **Hypergeometric, Geometric and Negative-Binomial distributions:** (30%)

- Hypergeometric distribution: Definition, Mean, Variance, Limiting form.
- Geometric distribution: Definition, Mean, Variance, M.G.F. about origin, Factorial moments.
  - Problems of above topics.
- Negative-Binomial distribution: Definition, Mean, Variance, M.G.F. about origin, Limiting form.
  - Problems of above topics.

References:

1. Mood, Graybill and Boes : Introduction to theory of Statistics.
2. Hogg and Craig : Introduction to mathematical Statistics.
3. Gupta and Kapoor : Fundamentals of mathematical statistics.
4. Bhatt, B.R. (1999): Modern probability theory; New Age International.

PAPER – 402
Continues Probability Distributions

Unit-1: **Normal distribution:** (45%)

- Definition, Applications and importance, Mean, Variance, M.G.F. about origin and mean, Additive properties, Median, Mode, Quartile deviation, Mean deviation, Relationship among Q.D.,M.D. and S.D., Odd and even order moments about mean, C.G.F., β_1, β_2, γ_1 and γ_2, Area Property of normal Curve, Recurrence relation for central moments,
  - Problems of above topics.

Unit-2: **Rectangular distribution, Exponential distribution:** (25%)

- Rectangular distribution: Definition, Mean, Variance, r^{th} moment about origin, M.G.F., C.G.F., Odd and even order moments about mean, Mean deviation,
  - Problems of above topics.
- Exponential distribution: Definition, Mean, Variance, M.G.F. about origin, C.G.F.
  - Problems of above topics.

Unit-3: **Gamma distribution, Beta distribution of First kind and Beta distribution of Second kind:** (30%)

- Gamma distribution: Definition, Mean, Variance, M.G.F. about origin, C.G.F., Mode.
  - Problems of above topics.
- Beta distribution of First kind: Definition, Mean, Variance, r^{th} raw moment and hence first four raw moments, Mode, Harmonic mean.
  - Problems of above topics.
- Beta distribution of Second kind: Definition, Mean, Variance, r^{th} raw moment and hence first four raw moments, Mode, Harmonic mean.
  - Problems of above topics.
- X and Y are independent Gamma variates then the distribution of:

  (i) X+Y (ii) $\frac{X}{X+Y}$ and (iii) $\frac{X}{Y}$.

References:

1 Mood, Graybill and Boes : Introduction to theory of Statistics.

2 Hogg and Craig : Introduction to mathematical Statistics.

3 Gupta and Kapoor : Fundamentals of mathematical statistics.

4 Johnston and Korz (1970): Distributions in Statistics

5 Stuart, G. and Ord, J.K. (1991): Advanced theory of Statistics, Vol. 2.

PAPER - 403
Testing of Hypothesis

Unit-1: **Terminology:** (15%)

- Define terms: Hypothesis, Statistical hypothesis, Simple and composite hypothesis, Null and alternative hypothesis, Test of a statistical hypothesis, Type I and Type II errors, Power of a test, Level of significance, Rejection region. Critical value, Test statistic, Two-tailed and One-tailed test, Degrees of freedom, Concept of p value,
- Procedure for testing of hypothesis.

Unit-2: **Tests of significance-I (Large sample tests):** (40%)

- Tests of significance for Large sample tests:

  1. Tests of attributes:

  (i) Test of significance for single proportion, (ii) Test of significance for the difference of proportions.

  2. Tests of variables:

  (i) Test of significance for single mean, (ii) Test of significance for the difference of means, (iii) Test of significance for the difference of standard devotions.
- Problems of above topics.

Unit-3: **Tests of significance-II (Small sample tests):** (45%)

- Chi square test:

Chi square variate, Assumptions of Chi square test

- Applications:

  (i) To test the 'goodness of fit', (ii) To test the independence of attributes (iii) To test a specified value of the variance of the population,

- Yate's Correction.
- Problems of above topics.
- t- Test:

  t- statistic, Assumptions of t - test,

- Applications:

  (i) Test for single mean, (ii) Test for difference of means: For independent samples and for dependent samples, (iii) Test the significance of an observed sample correlation coefficient and sample regression coefficient.

- Problems of above topics.
- F- Test:

  F- statistic, Assumptions of F - test,

- Application: Test for equality of two population variances.
- Problems of above topics.

References:

1. Mood, Graybill and Boes : Introduction to theory of Statistics.
2. Hogg and Craig : Introduction to mathematical Statistics.
3. Gupta and Kapoor : Fundamentals of mathematical statistics.
4. Stuart, G. and Ord, J.K. (1991): Advanced theory of Statistics, Vol. 2.

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[Effective from June-2015]

B.Sc. SEMESTER – III

STATISTICS PRACTICAL PAPER – V

Practical based on Statistics Paper 301

STATISTICS PRACTICAL PAPER – VI

Practical based on Statistics Paper 302

STATISTICS PRACTICAL PAPER – VII

Practical based on Statistics Paper 303

B.Sc. SEMESTER – IV

STATISTICS PRACTICAL PAPER – VII

Practical based on Statistics Paper 401

STATISTICS PRACTICAL PAPER – IX

Practical based on Statistics Paper 402

STATISTICS PRACTICAL PAPER – X

Practical based on Statistics Paper 403

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