Deccan Education Society's
FERGUSSON COLLEGE, PUNE
(AUTONOMOUS)

SYLLABUS UNDER AUTOMONY

SECOND YEAR B.A.
SEMESTER - III

SYLLABUS FOR S.Y.B.A. (APPLIED STATISTICS)

Academic Year 2017-18

SEMESTER – I
Applied Statistics (General)
S.Y.B.A
PAPER – I
STA2301: Probability theory and discrete probability distributions

1.		**Permutations and Combinations**	**(5L)**
	1.1	Definitions of permutation and combination	
	1.2	Relation between permutation and combination	
		(i) $^{n}C_{r} = {}^{n}C_{n-r}$	
		(ii) $^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$	
	1.3	Examples and Problems	
2.		**Probability**	**(20L)**
	2.1	Concept and definition of union, intersection of two sets, complement of a set	
	2.2	Concept of random experiment, sample space, event	
	2.3	Definition of event, complementary event, elementary event, certain event, impossible event, problems on sample space, events for a given random experiment	
	2.4	Classical definition of probability and its limitations	
	2.5	Probability model	
	2.6	Axioms of probability	
	2.7	Theorems of Probability (Explain through illustrations)	
		(i) $P(A) + P(A) = 1$	
		(ii) $0 \leq P(A) \leq 1$	
		(iii) $P(\Phi) = 0$	
		(iv) If $A \subset B$ then $P(A) \leq P(B)$	
		(v) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$	
		(vi) $P(A \cup B) \leq P(A) + P(B)$	
		(vii) Statement for 3 events for (v) and (vi)	
	2.8	Definition of conditional probability	
	2.9	Multiplication theorem on $P(A \cap B)$	
	2.10	Concept and definition of independence of two events	
	2.11	Pairwise independence and complete independence in case of three events	
3.		**Uni-variate Discrete Probability Distributions**	**(8L)**
	3.1	Definition of a discrete sample space and discrete r.v.	
	3.2	Definition of probability mass function (p.m.f.) of a discrete r.v.	
	3.3	Definition of expectation of a discrete r.v. and expectation of a linear combination of discrete r.v. X.	
	3.5	Definition of variance of discrete r.v. X.	

	3.6	Examples	
4.		**Special Discrete Distributions**	**(15L)**
	4.1	Discrete uniform distribution: p.m.f. mean and variance. Illustrations of real life situations where this distribution can be applied	
	4.2	Binomial distribution : Notation $X \sim B(n,p)$. p.m.f., mean and variance, additive property (derivations excluded).Illustrations of real life situations where the distribution can be applied. Computation of probabilities of events related to binomial r.v.	
	4.3	Poisson distribution : Notation $X \sim P(m)$ p.m.f. ,mean and variance, additive property (derivations excluded), Illustrations of real life situations where the distribution can be applied.Computation of probabilities of events related to a Poisson r.v.	
		Books Recommended	
	1.	Asthana B.N. and Srivastava S.S, Applied Statistics of India Srivastava	
	2.	Goon,Gupta, Das Gupta, Fundamental of Statistics,Vol.II Shripati Bhattachrjee for the World Press Pvt. Ltd,Calcutta World Press Pvt. Ltd,Calcutta	
	3.	Gupta S.C Kapoor, V.K., Fundamentals of Applied Statistics, Sultan Chand and Sons, New Delhi	
	4.	Lipschutz, Probability and Statistics, Schaum's Outline, Series, New York	
	5.	Walpole,Myres, Probability and Statistics, Mcmillan Publishing Co. New York	
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SYLLABUS UNDER AUTOMONY

SECOND YEAR B.A.
SEMESTER - IV

SYLLABUS FOR S.Y.B.A. (APPLIED STATISTICS)

Academic Year 2017-18

SEMESTER – II
Applied Statistics (General)
S.Y.B.A
PAPER – I
STA2401 : Continuous Univariate Distributions and Applications of Statistics

1.		**Continuous univariate distributions**	**(16L)**
	1.1	Definition of continuous sample space, definition of continuous type of r.v. through p.d.f., Definition of distribution function of continuous type r.v. Statement of properties of distribution function of continuous type r.v.s	
	1.2	Exponential Distribution: Probability density function (p. d. f.) $$f(x) = \begin{cases} \alpha\, e^{-\alpha x} & x > 0\,,\ \alpha > 0 \\ 0 & \text{otherwise} \end{cases}$$ Notation : $X \sim E(\alpha)$ Statement of mean and variance, Statement of lack of memory property	
	1.3	Normal distribution p.d.f. $$f(x) = \frac{1}{\sigma\sqrt{2\pi}}\exp\left(\frac{-1}{2\sigma^2}(x-\mu)^2\right)\,,\ -\infty < x < \infty\,,\ -\infty < \mu < \infty\,;\ \sigma > 0$$ Notation: $X \sim N(\mu, \sigma^2)$ Standard normal distribution ,statement of properties of normal distribution, the graph of p.d.f, nature of probability curve Statement of additive property , Computation of probabilities	
2.		**Multiple regression plane, multiple and partial correlation coefficient (using tri-variate data)**	**(10 L)**
	2.1	Notion of multiple regression plane	
	2.2	Given total coefficients of correlation and standard deviations, fitting of regression plane by the method of least squares (statement only) and finding estimated values	
	2.3	Given sums, sums of squares and sum of squares of deviations from respective mean etc. fitting of regression plane, and estimated values by the method of least squares and finding the estimated values	
	2.4	Notion of multiple correlation coefficient $R_{Y.X_1X_2}$ partial correlation coefficient $r_{YX_1.X_2}$ and its computations	

3.		**Time Series**	**(12L)**
	3.1	Meaning and usefulness of time series analysis	
	3.2	Components of a time series : trend , seasonal, cyclical and irregular variations	
	3.3	Additive and Multiplicative Models	
	3.4	Methods of estimating seasonal components	
		(i) Methods of averages	
		(ii) Ratio to trend obtained by moving averages	
		(iii) Link relative methods	
		(iv) Ratio to trend by least square method	
4.		**Elements of Demography**	**(10L)**
	4.1	Introduction, need of vital statistics. Methods of collecting vital statistics	
	4.2	Demographic Ratios	
	4.3	Mortality Rates: Crude Death Rate(CDR),Standardized Death Rate (STDR)	
	4.4	Fertility and Reproduction Rates: Crude Birth Rate (CBR), General Fertility Rate(GFR).,Age-specific Fertility Rate(ASFR).Total Fertility Rate(TFR), Gross Reproduction Rate(GRR), Net Reproduction Rate(NRR)	
	4.5	Examples and problems	
		Books Recommended	
		1. Asthana B.N. and Srivastava S.S, Applied Statistics of India Srivastava	
		2. Brockwell P.J.and Davis R.A. : Introduction to Time Series and Forecasting (Second Edition), Springer Texts in Statistics	
		3. Chatfield C.: The Analysis of Time Series An Introduction, Chapman and Hall / CRC, Texts in Statistical Science	
		4. Goon,Gupta, Das Gupta, Fundamental of Statistics,Vol.II Shripati Bhattachrjee for the World Press Pvt. Ltd,Calcutta World Press Pvt. Ltd,Calcutta	
		5. Gupta S.C Kapoor, V.K., Fundamentals of Applied Statistics, Sultan Chand and Sons, New Delhi	
		6. Lipschutz, Probability and Statistics, Schaum's Outline, Series, New York	
		7. Walpole,Myres, Probability and Statistics, Mcmillan Publishing Co. New York	

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