The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science & Commerce

(AUTONOMOUS)

College with Potential for Excellence

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Syllabus for Program S.Y.B.A. Open Elective Course offered by Department of Mathematics

Syllabus as per Choice Based Credit System (NEP-2020)

(June 2024 Onwards)

Submitted by

Department of Mathematics
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❖ Semester-wise Details of Mathematics Course

Semester – I									
Teaching Scheme (Hrs/Week)				**Continuous Internal Assessment (CIA) 40 marks**			**End Semester Examination Marks**		**Total**
Course	**L**	**P**	**Credit**	**CIA-1**	**CIA-2**	**CIA-3**	**Theory**	**Practical**	
OE	02	-	2	15	15	10	60	-	100
CIA- II : Assignment/Project , CIA-III : APICID&A Max. Time, End Semester Exam (Theory) : 2 .00 Hrs.									

Semester – II									
Teaching Scheme (Hrs/Week)				**Continuous Internal Assessment (CIA) 40 marks**			**End Semester Examination Marks**		**Total**
Course	**L**	**P**	**Credit**	**CIA-1**	**CIA-2**	**CIA-3**	**Theory**	**Practical**	
OE	02	-	2	15	15	10	60	-	100
CIA-II : Assignment/Project CIA-III : APICID&A Max. Time, End Semester Exam (Theory) : 2 .00 Hrs.									

- L - Lectures
- T - Tutorials
- P - Practical
- C - Credits

SEMESTER-I			
CODE	COURSE TYPE	COURSE TITLE	CREDITS
VMS230	Open Elective (OE)	MATHEMATICAL AND STATISTICAL TECHNIQUES-I	2

SEMESTER-II			
CODE	COURSE TYPE	COURSE TITLE	CREDITS
VMS280	Open Elective (OE)	MATHEMATICAL AND STATISTICAL TECHNIQUES-II	2

(OE-OPEN ELECTIVE) (For Arts Students)		
Title of the Course and Course Code: VMS230	**MATHEMATICAL AND STATISTICAL TECHNIQUE -I**	**No. of Credits: 02**

Unit No.	Content	No. of Hours
I	**Functions, Derivatives and Their Applications**	**10**
	Concept of real functions: Constant function, linear function x^n, e^x,,ogx,Demand, Supply, Total Revenue, Average Revenue, Total cost, Average cost and Profit function. Equilibrium Point, Break-even point. **Derivative of functions:** Derivative as rate of measure, Derivative of x^n,e^x,a^x,$logx$, Rules of derivatives: Scalar multiplication, sum, difference, product, quotient (Statements only), Simple problems. Second order derivatives. Applications: Marginal Cost, Marginal Revenue, Elasticity of Demand. Maxima and Minima for functions in Economics and Commerce.	
II	**Summarization Measures**	

	Measures of Central Tendencies: Definition of Average, Types of Averages: Arithmetic Mean, Median, and Mode for grouped as well as ungrouped data. Quartiles, Deciles and Percentiles. Combined and Weighted mean. **Measures of Dispersion:** Concept and idea of dispersion. Various measures: Range, Quartile Deviation, Mean Deviation, Standard Deviation, Variance, Combined Variance.	**10**
III	**Time series and Index Numbers**	
	Time Series: Concepts and components of a time series. Representation of trend by Freehand Curve Method, Estimation of Trend using Moving Average Method and Least Squares Method.	**10**

	Index Number: Concept and usage of Index numbers, Types of Index numbers, Aggregate and Relative Index Numbers, Lasperye's, Paasche's, Dorbish Bowley's, Marshall-Edgeworth and Fisher's ideal index numbers,Chain Base Index Nos. Shifting of Base year. Cost of Living Index Numbers, Concept of Real Income, Concept of Wholesale Price Index Number.	

Learning objective

- To define the derivative function of a given function and apply it to define several economics function.
- To judge the reliability of measures of central tendency and measures of dispersions.
- The main objective of this course is to introduce statistics to undergraduate students of commerce, so that they can use them in the field of commerce and Industry to solve the real life problems.
- To calculate the indices to measure price and quantity changes over period of time.
- To understand different tests an ideal Index Number satisfies.

Learning outcomes

- Understand and work with derivatives as rates of change in mathematical models.
- Understand what are Mean, Median and Mode and how to calculate it.
- Understand how all of alternative measures differ and why.
- Differentiate among simple index numbers, unweighted aggregate price index numbers, weighted aggregate price index numbers, Laspeyres price index numbers, and Paasche price index numbers by defining and calculating each.

Recommended Books:

1)Mathematical & Statistical Techniques by Manan Prakashan.

2)Mathematical & Statistical Techniques,Sheth Publication,

3) Statistical Methods - S.G. Gupta S. Chand & Company ltd.

4) Statistics - Theory, Method & Applications D.S.Sancheti & V. K. Kapoor.

(OE- OPEN ELECTIVE) (For Arts Students)		
Title of the Course and Course Code :VMS280	**MATHEMATICAL AND STATTISTICAL TECHNIQUE -II**	**No. of Credits: 02**

Unit No.	Content	No. of Hours
I	**Bivariate Linear Correlation and Regression**	**10**
	Correlation Analysis: Meaning, Types of Correlation, Determination of Correlation: Scatter diagram, Karl Pearson's method of Correlation Coefficient and Spearman's Rank Correlation Coefficient. **Regression Analysis:** Meaning, Concept of Regression equations, Slope of the Regression Line and its interpretation. Regression Coefficients, Relationship between Coefficient of Correlation and Regression Coefficients, Finding the equations of Regression lines by method of Least Squares	
II	**Elementary Probability Theory**	**10**
	Probability Theory: Concept of random experiment/trial and possible outcomes; Sample Space and Discrete Sample Space; Events their types, Algebra of Events, Mutually Exclusive and Exhaustive Events, Complimentary events. Classical definition of Probability, Addition theorem (without proof),conditional probability. Independence of Events: $P(A \cap B) = P(A)P(B)$.Simpleexamples. **Random Variable:** Probability distribution of a discrete random variable; Expectation and Variance of random variable, simple examples on probability distributions.	
III	**Decision Theory**	**10**
	Decision making situation, Decision maker, Courses of Action, States of Nature, Pay-off matrix; Decision making under uncertainty, Maximin, Maximax, Minimax regret and Laplace criteria; simple examples to find optimum decision .Formulation of Payoff Matrix. Decision making under Risk, Expected Monetary Value (EMV); Decision Tree; Simple Examples based on EMV. Expected Opportunity Loss(EOL),simple examples based on EOL.	

Learning objective

- To analyze the result by data handling.
- To judge the reliability of measures of central tendency and measures of dispersions.
- Explain the concept of probability; calculate the probability of simple events.
- To design the Decision Theory Model. To know the representation of Decision Theory.
- To understand and criteria for Decision Making.

Learning outcomes

- Calculate and interpret the correlation between two variables.
- Determine whether the correlation is significant. Calculate the simple linear regression equation for a set of data and know the basic assumptions behind regression analysis.
- Understand the concept of probability and its features.
- Understand the decision-making processes.

Recommended Books:

1) Mathematical & Statistical Techniques by Manan Prakashan.
2) Mathematical & Statistical Techniques, Sheth Publication, Dr.NeenaJoshi,Dr.N.N.Pandey.
3) Basic practice of statistics: Study guide,Flinger,Nortz
4) Statistics, Freedman, Pisani, Purves