TEACHING PLAN: BUSINESS STATISTICS

SCHOOL: (ASOM) ALABBAR SCHOOL OF MANAGEMENT		**ACADEMIC SESSION: 2022 – 2023**	**BBA: Semester-II FOR THE STUDENTS' BATCH: 2022-25**
1	**Course No.**	**COM -204**	
2	**Course Title**	**BUSINESS STATISTICS**	
3	**Credits**	**4**	
4	**Learning Hours**	**Contact Hours: 50** **Assessment: 20** **Guided Study: 30** **Total hours: 100**	
5	**Course Objective**	The focus of this course is to equip the students with the knowledge of various statistical tools and techniques used in business decision making. The course aims at providing fundamental knowledge and exposure to the students to use various statistical methods in order to understand, analyze and interpret data for managerial decision making.	
6	**Course Outcomes**	After completing the course, the students will be able to: CO1 Gaining Knowledge of basic concept / fundamentals of business statistics. CO2 To compute various measures of central tendency, Measures of Dispersion and apply the same for the business decisions. CO3 To understand and compute Correlation and Regression analysis and their implication on Business performance. CO4 To know the concept Index Number and Time Series Analysis and apply for the business decision making. CO5 Evaluating basic concepts of probability and perform probability theoretical distributions.	
7	**Outline syllabus:**		

7.01	**Unit**	**Sub-Unit**	**Introduction**	**Page Numbers***	**Lectures**
7.02	**Unit I: Statistical Data and Descriptive Statistics**	a)	Meaning and objectives of measures of central tendency, different measure viz. arithmetic mean, median, mode.	T1: 83-100	3
		b)	Geometric mean and harmonic mean, characteristics,	T1: 100-121	2
		c)	Applications and limitations of these measures.	T1: 107-108	1
		d)	measure of variation viz. range, quartile deviation mean deviation.	T1: 129-137	1
		d)	Standard deviation, co-efficient of variation and skewness.	T1: 138-174	2
		e)	Tutorial Classes		3
7.03	**Unit II: Simple**	a)	Meaning of correlation, types of correlation – positive and negative correlation, simple.	T1: 217-223	3

	Correlation and Regression Analysis	b)	Methods of studying correlation; scatter diagram, graphic and direct method; properties of correlation coefficient	T1: 223-232	3
		c)	Rank correlation, coefficient of determination	T1: 233-237	2
		d)	Lines of regression, co-efficient of regression, standard error of estimate.	T1: 263-300	3
		e)	Tutorial Classes		3
7.04	**Unit III: Index Numbers**	a)	Concept of Index number and their uses in business;	T1: 301-303	2
		b)	Construction of simple and weighed price, quantity and value index numbers;	T1: 307-316	3
		c)	Test for an ideal index number, components of time series viz. secular trend, cyclical, seasonal and irregular variations, methods of estimating secular trend and seasonal indices.	T1: 316-318	2
		d)	Use of time series in business forecasting and its limitations, calculating growth rate in time series.	T1: 353-403	2
		e)	Tutorial Classes		3
7.05	**Unit IV: Time Series Analysis**	a)	Time Series Data; Components of time series. Additive and multiplicative models	T1: 353-368	2
		b)	Trend analysis. Fitting of trend line using principle of least squares – linear, second-degree parabola and exponential.	T1:369-380	3
		c)	Conversion of annual linear trend equation to quarterly/monthly basis and vice-versa; Moving averages	T1:382-386	2
		d)	Seasonal variations- Calculation of Seasonal Indices using Simple averages, Ratio-to-trend, and Ratio-to-moving averages methods. Uses of Seasonal Indices	T1:387-412	2
		e)	Tutorial Classes		3
7.06	**Unit V: Probability**	a)	Basic concepts and approaches of probability, Concept of conditional probability.	T1: 421-430	
		b)	Addition Rule, multiplication Rule and	T1: 430-433	2
		c)	Bayes' theorem.	T1: 437-446	3
		d)	Probability distributions - meaning, types and applications	T1: 455-494	3
		e)	Tutorial Classes		3
8	**Course Evaluation**				

8.1	**CA: 40%**	
8.1.1	**Attendance**	**5 marks**
8.1.2	**Homework**	4 Assignments, Project and Presentation - **20 marks**
8.1.3	**Quizzes**	4 Quizzes, Class tests- **15 marks**
8.1.4	**Any other**	--
8.2	**MTE**	20%
8.3	**End-term examination: 40%**	
9	**Text Books & References**	
9.1	**Text book**	1. Gupta, S.P. & M.P. Gupta, Business Statistics, Sultan Chand Publication. (Latest Edition) 2. *Levin*, Richard I. & *Rubin*, David S., Statistics for Management, Pearson Education. (Latest Edition)
9.2	**References**	1. Levine David M., Business Statistics, Pearson Education India. (Latest Edition) 2. Vohra, N.D., (2009) Quantitative Techniques in Management, 4th edition, McGraw Hill Education. 3. Vishwanathan, P.K., (2008) Business Statistics and Applied Orientation, 1st edition, Pearson Education. 4. Rajagopalan, S. and Sattanathan, R., (2009) Business Statistics & Operations Research, 2nd Edition, McGraw Hill Education. 5. Gupta, C.B., An Introduction to Statistical Methods. (Latest Edition) 6. Gupta, B.N., An Introduction to Modern Statistics. (Latest Edition)
9.3	**Video References**	https://www.youtube.com/watch?v=RALOqYe9JEI https://www.youtube.com/watch?v=-3TzyOuGEfk https://www.youtube.com/watch?v=1m1YuCIzpX0 https://www.youtube.com/watch?v=zYMSn48fy14 https://www.youtube.com/watch?v=8dPkvu4gAvc https://www.youtube.com/watch?v=dUe3U0BTb4k https://www.youtube.com/watch?v=R5NDVdXE22c https://www.youtube.com/watch?v=sbbYntt5CJk
10	**Methods of Teaching**	Class room Lecture, White board, PPT, Group Discussion and Practical Problem-solving Session.

Mapping of Outcomes v. Topics

Outcome no. → Syllabus topic↓	1	2	3	4	5
Paper Code.Unit I (a) to (e)	✓				
Paper Code.Unit II (a) to (f)		✓			
Paper Code.Unit III (a) to (e)			✓		
Paper Code.Unit IV (a) to (e)				✓	
Paper Code.Unit V (a) to (e)					✓

Question for Practice

Unit-I

Q. 1 What do you mean by statistics? What are the various uses of statistics in the management of an organization? (10)

Q. 2 Highlight the need and importance of statistics. (10)

Q. 3 Describe the scope of statistics. (5)

Q. 4 Through light on the limitations of statistics. (5)

Q. 5 Enlist the objectives of statistics. (5)

Q. 6 Highlight the need and importance of tabulation and also classify the tables. (5)

Q. 7 What is data? Categorise the data with suitable examples. (5)

Q. 8 Write the short notes on the followings: (4*5)

a) Population
b) Sample
c) Parameter
d) Statistics

Q. 9 What do you mean by central tendencies? Discuss each type of central tendencies pointing out their merits and demerits. (10)

Q. 10 What do you understand by Dispersion? Discuss the need and importance of studying dispersion. (10)

Q. 11 Write the short notes on the followings: (6*5)

a) Range
b) Inter-quartile range
c) Mean deviation
d) Variance
e) Standard deviation
f) Coefficient of variance

Q. 12 Define dispersion. (5)

Q. 13 What is the coefficient of dispersion? (5)

Q. 14 Average marks of 26 students of Section A of MBA are 73 and average marks of 24 students of Section B of MBA is 86. Find out the average marks of students of MBA. (5)

Q. 15 The mean of 10 items was 70. Later on, it was found out that one item 92 was misread as 29. What was the correct mean? (5)

Q. 16 The mean of marks in Statistics of 100 students of a class was 72. The mean of marks of boys was 75 while their number was 70. Find out the mean marks of girls. (5)

Q. 17 A person takes a trip which consists of travelling 900 miles by train at an average speed of 30 m.p.h, 3000 miles by plane at an average of 400 m.p.h., 400 miles by bus at 25 m.p.h. and finally 15 miles by taxi at 25 m.p.h. What is the average speed for the entire distance? (5)

Q. 18 Calculate arithmetic mean from the following data: (Using assume mean method) (5)

X	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50
f	5	15	55	75	100

Q. 19 Calculate mean, median, mode SD and CV of the following series: (10)

Class	10-19	20-29	30-39	40-49	50-59	60-69	70-79
Frequency	10	12	18	30	16	6	8

Q. 20 Calculate median SD and CV from the following data: (10)

Marks in Statistics	More than 0	More than 10	More than 20	More than 30	More than 40	More than 50
No. of Students	50	42	38	28	16	3

Q. 21 The following series to the daily income of employees in a firm. Compute(a) highest income of lowest 50% employees (b) minimum income earned by the top 25% employees and (c) maximum income earned by lowest 25% employees. (10)

Daily Income (in Hundred)	10-14	15-19	20-24	25-29	30-34	35-39
Number of Employees	5	10	15	20	10	5

Q. 22 From the following information evaluate Mean, Median and Mode also, calculate Variance, SD and CV: (10)

Weight (in lbs.)	**No. of persons**
100 and above but less than 110	4
Less than 120	10
Less than 130	30
Less than 140	62
Less than 150	95
Less than 160	112
Less than 170	120
Less than 180	122

Q. 23 Find the Coefficient of Variance from the following distribution: (10)

Age	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50
No. of persons	170	110	80	45	40	35

Q. 24 In the frequency distribution of 100 families given below the number of families corresponding to expenditure groups 20 - 30 and 60 - 80 are missing from the table. however the Median is known to be 50. Find the missing frequencies. (10)

Expenditure (Rs)	No. of Families
0 - 20	14
20 - 40	x
40 - 60	26
60 - 80	y
80 - 100	5

Unit-II

Q. 25 Write short notes on the followings: (5*5)

a) Student's coefficient of correlation
b) Rank correlation
c) Degree of coefficient of correlation
d) Regression analysis

Q. 26 Attempt the following questions: (5+5)

a) Give three points of distinctions between correlation and regression.
b) Calculate Pearson's coefficient of correlation between the indices of wages and cost of living from the following data:

Wages Indices	100	101	102	102	100	99	97	98	96	95
Cost of living	98	99	99	97	95	92	95	94	90	91

Q. 27 From the following data obtain the two-regression equation of X on Y & Y on X: (10)

X	6	2	10	4	8
Y	9	11	5	8	7

Q. 28 Calculate and interpret the correlation coefficient of the two variables below. (10)

Person	Hand	Height
A	17	150
B	15	154
C	19	169
D	17	172
E	21	175

Q. 29 Calculate the regression coefficient and obtain the lines of regression for the following data. (10)

X	1	2	3	4	5	6	7
Y	9	8	10	12	11	13	14

Q. 30 Calculate the two regression equations of *X* on *Y* and *Y* on *X* from the data given below, taking deviations from a actual means of *X* and *Y*. (10)

Price(Rs.)	10	12	13	12	16	15
Amount demanded	40	38	43	45	37	43

Estimate the likely demand when the price is Rs.20.

Q. 31 Obtain regression equation of *Y* on *X* and estimate *Y* when *X*=55 from the following. (10)

X	40	50	38	60	65	50	35
Y	38	60	55	70	60	48	30

Q. 32 The following table shows the sales and advertisement expenditure of a form.

	Sales	Advertisement expenditure (Rs. Crores)
Mean	40	6
SD	10	1.5

Coefficient of correlation *r*= 0.9. Estimate the likely sales for a proposed advertisement expenditure of Rs. 10 crores. (10)

Q. 33 You are given the following information:

	Price (Rs.)	**Demand ('000Units)**
Arithmetic mean	10	35
Standard deviation	2	5
Correlation of Coefficient	R = +0.8	

Obtain two regression equations taking price as X and demand as Y. (10)

Unit-III

Q. 34 What do you mean by Index Number. Write the application of the same in a business.

Q. 35 Write notes on the followings: (3*5)

a) Time reversal test
b) Factor Reversal Test
c) CPI

Q. 36 Calculate price index number for 2005 by (a) Laspeyre's (b) Paasche's method. (10)

Commodity	1995		2005	
	Price	Quantity	Price	Quantity
A	5	60	15	70
B	4	20	8	35
C	3	15	6	20

Q. 37 From the following data given ahead, calculate price index number for 2021 with 2020 as base by: (10)

a. Laspeyres method,
b. Paasche method,
c. Bowley's method
d. Fisher's Ideal method, and
e. Marshall-Edgeworth method,

commodities	**2020**		**2021**	
	Price	**Quantity**	**Price**	**Quantity**
A	20	8	40	6
B	50	10	60	5
C	40	15	50	15
D	20	20	20	25

Q. 38 Calculate Fisher's index number to the following data. Also show that it satisfies Time Reversal Test. (10)

Commodity	2016		2017	
	Price (Rs.)	Quantity (Kg)	Price (Rs.)	Quantity (Kg)
Food	40	12	65	14
Fuel	72	14	78	20
Clothing	36	10	36	15
Wheat	20	6	42	4
Others	46	8	52	6

Q. 39 Using the following data, construct Fisher's Ideal index and show how it satisfies Factor Reversal Test and Time Reversal Test? (10)

Commodity	Price in Rupees per unit		Number of units	
	Base year	Current year	Base year	Current year
A	6	10	50	56
B	2	2	100	120
C	4	6	60	60
D	10	12	50	24
E	8	12	40	36

Q. 40 Construct the cost of living Index number for 2015 on the basis of 2012 from the following data using family budget method. (10)

Commodity	Price		Weights
	2012	2015	
Rice	250	280	10
Wheat	70	85	5
Corn	150	170	6
Oil	25	35	4
Dhal	85	90	3

Unit-IV

Q. 41 Define Time series. (5)

Q. 42 What is the need for studying time series? (5)

Q. 43 State the uses of time series. (5)

Q. 44 Mention the components of the time series. (5)

Q. 45 Define secular trend. (5)

Q. 46 Write a brief note on seasonal variations. (5)

Q. 47 Explain the method of fitting a straight line. (5)

Q. 48 State the two normal equations used in fitting a straight line. (5)

Q. 49 Compute the average seasonal movement for the following series. (10)

year	Quarterly Production			
	I	II	III	IV
2002	3.5	3.8	3.7	3.5
2003	3.6	4.2	3.4	4.1
2004	3.4	3.9	3.7	4.2
2005	4.2	4.5	3.8	4.4
2006	3.9	4.4	4.2	4.6

Q. 50 The following figures relates to the profits of a commercial concern for 8 years

Year	1986	1987	1988	1989	1990	1991	1992	1993
Profit (₹)	15,420	15,470	15,520	21,020	26,500	31,950	35,600	34,900

Find the trend of profits by the method of three yearly moving averages. (10)

Q. 51 Find the trend of production by the method of a five-yearly period of moving average for the following data: (10)

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Production('000)	126	123	117	128	125	124	130	114	122	129	118	123

Q. 52 The following table gives the number of small-scale units registered with the Directorate of Industries between 1985 and 1991. Show the growth on a trend line by the free hand method. (10)

Year	1985	1986	1987	1988	1989	1990	1991	1992
No. of units (in'000)	10	22	36	62	55	40	34	50

Q. 53 The annual production of a commodity is given as follows:

Year	1995	1996	1997	1998	1999	2000	2001
Production (in tones)	155	162	171	182	158	180	178

Fit a straight-line trend by the method of least squares. (10)

Q. 54 Determine the equation of a straight line which best fits the following data

Year	2000	2001	2002	2003	2004
Sales (₹ '000)	35	36	79	80	40

Compute the trend values for all years from 2000 to 2004. (10)

Q. 55 The sales of a commodity in tones varied from January 2010 to December 2010 as follows:

in year 2010	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sales (in tones)	280	240	270	300	280	290	210	200	230	200	230	210

Fit a trend line by the method of semi-average. (10)

Q. 56 Use the method of monthly averages to find the monthly indices for the following data of production of a commodity for the years 2002, 2003 and 2004.

(10)

2002	15	18	17	19	16	20	21	18	17	15	14	18
2003	20	18	16	13	12	15	22	16	18	20	17	15
2004	18	25	21	11	14	16	19	20	17	16	18	20

Q. 57 Calculate the seasonal indices from the following data using the average from the following data using the average method: (10)

	I Quarterly	II Quarterly	III Quarterly	IV Quarterly
2008	72	68	62	76
2009	78	74	78	72
2010	74	70	72	76
2011	76	74	74	72
2012	72	72	76	68

Q. 58 The following table shows the number of salesmen working for a certain concern:

Year	1992	1993	1994	1995	1996
No. of salesmen	46	48	42	56	52

Use the method of least squares to fit a straight line and estimate the number of salesmen in 1997. (10)

Unit-V

Q. 59 Write short notes on the followings: (10*5)

a) Sample Space
b) Simple Events
c) Mutually Exclusive Events
d) Exhaustive Events
e) Independent Events
f) Conditional Probability
g) Multiplication Rule of Probability
h) Addition Rule of Probability
i) Bayes Theorem
j) Probability Distribution

Q. 60 A teacher gave her students of the class two tests namely maths and science. 25% of the students passed both the tests and 40% of the students passed the maths test. What percent of those who passed the maths test also passed the science test? **(10)**

Q. 61 A bag contains green and yellow balls. Two balls are drawn without replacement. The probability of selecting a green ball and then a yellow ball is 0.28. The probability of selecting a green ball on the first draw is 0.5. Find the probability of selecting a yellow ball on the second draw, given that the first ball drawn was green. **(10)**

Q. 62 A bag I contains 4 white and 6 black balls while another Bag II contains 4 white and 3 black balls. One ball is drawn at random from one of the bags, and it is found to be black. Find the probability that it was drawn from Bag I. (10)

Q. 63 A man is known to speak the truth 2 out of 3 times. He throws a die and reports that the number obtained is a four. Find the probability that the number obtained is actually a four. (10)

Q. 64 A bag contains 5 red and 5 black balls. A ball is drawn at random, its colour is noted, and again the ball is returned to the bag. Also, 2 additional balls of the colour drawn are put in the bag. After that, the ball is drawn at random from the bag. What is the probability that the second ball drawn from the bag is red? (10)

Q. 65 Of the students in the college, 60% of the students reside in the hostel and 40% of the students are day scholars. Previous year results report that 30% of all students who stay in the hostel scored A Grade and 20% of day scholars scored A grade. At the end of the year, one student is chosen at random and found that he/she has an A grade. What is the probability that the student is a hosteler? (10)

Q. 66 From the pack of 52 cards, one card is lost. From the remaining cards of a pack, two cards are drawn and both are found to be diamond cards. What is the probability that the lost card is a diamond? (10)

Q. 67 **Question: If P (A) = 0.8, P (B) = 0.5 and P (B|A) = 0.4, find:** (10)

(i) P (A ∩ B)

(ii) P (A|B)

(iii) P (A ∪ B)

Q. 68 **It** is known that 10% of certain articles manufactured are defective. What is the probability that in a random sample of 12 such articles, 9 are defective? (10)

Q. 69 Two dice are thrown simultaneously. If X denotes the number of sixes, find the expectation of X. (10)

Q. 70 A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability of two successes. (10)

Q. 71 A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both diamonds. Find the probability of the lost card being a diamond. (10)
