COURSE: B.COM (P)

SEMESTER: II

PAPER: BUSINESS MATHEMATICS AND STATISTICS

QUESTION BANK

Ques 1 Solve the following equations using determinant method

$x + 2y - 2z = -7$

$2x - y + z = 6$

$x - y - 3z = -3$

Ques 2 Solve the following equations using inverse of a matrix

$5x – 6y + 4z = 15$

$7x + 4y – 3z = 19$

$2x + y + 6z = 46$

Ques 3 In an elocution contest, a participant can speak either of the fivelanguages, viz., Hindi, English, Punjabi, Gujarati and Tamil. A college (say,No.1) sent 30 students of which 10 offered to speak in Hindi, 9 in English, 6in Punjabi, 3 in Gujarati and rest in Tamil. Another college (say, No.2) sent25 students of which 7 spoke in Hindi, 8 in English, 10 in Punjabi. Out of 22students from third college (say, No.3), 12 offered to speak in Hindi, 5 inEnglish and 5 in Gujarati.Write the information given above in matrix form.

Ques 4The total cost of manufacturing three types of motor car is given by the

following table:

Type of motor Labour Materials Subcontracted
Car (hrs) (units) Work (units)
Car A 40 100 50
Car B 80 150 80

Car C 100 250 100

Labour cost Rs 2 per hour, units of material cost Rs 1 each and unit of

sub-contracted work cost Rs 3 per unit. Find the total cost of

manufacturing 3000, 2000 and 1000 vehicles of type A, type B and

type C respectively using matrices.

Ques 5 A large energy company produces electricity, natural gas, and oil.The production of a rupee's worth of electricity requires inputs of Rs.0.30 from electricity, Rs. 0.10 from natural gas and Rs. 0.20 from oil.The production of a rupee's worth of natural gas requires inputs of Rs.0.30 from electricity, Rs.0.10 from natural gas and Rs.0.20 from oil.Production of a rupee's worth of oil requires inputs of Rs. 0.10 fromeach sector. Find the output for each sector that is needed to satisfy afinal demand of Rs. 25 crore for electricity, Rs. 15 crore for natural gasand Rs. 20 crore for oil.

Ques 6 A trust fund has Rs 10000 that is to be invested into two types ofbonds. The first bond pays 5% interest per year and the second bondpays 6% interest per year. Using matrix algebra, determine how todivide Rs 10000 among theannual interest Rs 550.Rs. 50 more than the income from third, find the amount of eachinvestment by using matrix algebra.

Ques 7 Suppose there is demand of 60 units of a product when its price is Rs.18 per unit and 40 units when its price is Rs. 28 each. Find the demandfunction, assuming that it is linear.

Ques 8) When the unit price of an item is Rs. 5, the daily supply will be 100.When the price is increased to Rs. 10, the daily supply is found to be200. Find the supply function, assuming that it is linear.

Ques 9) A company decides to set up a small production plant formanufacturing electronic clocks. The total cost for initial set-up (fixedcost) is Rs. 9 lakhs. The additional cost (i.e., variable cost) forproducing each clock is Rs. 300. Each clock is sold at Rs. 750. During the first month, 1,500 clocks are produced and sold:

i) Determine the cost function C(x) for the total cost of producing xclocks.

ii) Determine the revenue function R(x) for the total revenue fromthe sale of x clocks.

iii) Determine the profit function P(x) for the profit from the saleclocks.

iv) What profit or loss the company incurs during the first monthwhen all the 1,500 clocks are sold?

v) Determine the break-even point.

Ques 10 A manufacturer earns Rs. 5500 in the first month and Rs. 7000 in thesecond month. On plotting these points, the manufacturer observes alinear function may fit the data.

i) Find the linear function that fits the data.

ii) Using your model make a prediction of the earning for the fourthmonth.

Ques 11) A salesman earns Rs. 380 in the first week, Rs. 660 in the second weekand Rs. 860 in the third week. On plotting the points (1, 380), (2, 660)and (3, 860), the salesman feels that a quadratic function may fit thedata.

i) Find the quadratic function that fits the data.

ii) Using the model make a prediction of the earning for the fourthweek.

Ques 12. A stereo manufacturer determines that in order to sell x units ofa new stereo, the price per unit, in rupees, must be $p(x)= 1000 - x$. Themanufacturer also determines that the total cost of producing x units is givenby $C(x) = 3000 + 20x$.

a) Find the total revenue R(x).

b) Find the total profit P(x).

c) How many units must the manufacturer produce and sell in order tomaximize profit?

d) What is the maximum profit?

e) What price per unit must be charged in order to make this maximumprofit?

Ques 13. The demand function for a commodity is given by $p= 20 - 2x$. Findtotal revenue. Compute average revenue and marginal revenue atx=3 and interpret the results. Find the output level at which totalrevenue is maximum and the maximum revenue. Is marginalrevenue rising at x=3?

Ques 14) A manufacturer finds her yearly uniform demand for her product tobe 40,000 units. The cost of setting up a production run is Rs. 200and the cost of carrying one unit in inventory is Re.1 per annum.Find the economic lot size that should yield a minimum total cost

Ques 15)The corn flakes industry decides to reduce the price of its product, fromRs.100 to Rs. 75. The company expects that the sales of corn flakeswill increase from 10,000 units a month to 20,000 units a month.Calculate and comment on the price elasticity of demand.

Ques 16. Mehak deposited Rs. 50,000 in a finance account that pays 8%interest, compounded annually. How much amount will be in her financeaccount after 10 years?

Ques 17. If an amount of Rs. 86,400 is invested at 8% p.a. compounded Interest Ratesquarterly, how long will it take to accumulate Rs. 2,06,500.60?

Ques 18. If invested for three years, which investment yields the largest compoundamount? (a) Rs. 5,000 at 6% per annum compounded annually (b) Rs.5,125 at 5% per annum compounded continuously or (c) Rs.4,950 at6.5% per annum compounded annually?

Ques 19) How long would it take for a principal P to double if rate of interest is14% per annum compounded monthly?

Ques 20) A bank pays 5% per annum compounded continuously. Rs. 4,000 hasbeen deposited for 6 years. Find the amount at the end of 6 years.

Business Statistics

Question 1 For a Group of 50 male workers, the mean and standard deviation of their dailywages are Rs. 72 and Rs. 9 respectively. For another group of 40 female workers these are Rs.54 and Rs. 6 respectively. Find the standard deviation for the combined group of 90 workers.

Question 2 You are given the following incomplete frequencydistribution. It is known that total frequency is 1,000 and that the median is413.11. Estimate the missing frequencies.

Values Frequency
300-325 5
325-350 17
350-375 80
375-400 -
400-425 326
425-450 -
450-475 88
475-500 9

The following table gives the distribution of monthly incomeof 600 families in Ahmedabad city.

Question 3 Finding the missing frequency

The following table gives the age (in years) of employees of a firm. The

modal age is 32 years. Find the missing frequency.

Age in Years 20-25 25-30 30-35 35-40 40-45

No. of Employees 5 - 18 9 6

Question 4 Calculate: i) median from the following data and ii) obtain the range

of marks obtained by middle 80%of the students.

Marks No. of Students
Less than 10 4
Less than 20 10
Less than 30 30
Less than 40 40
Less than 50 47
Less than 60 50

Question 5 What is coefficient of variation? What is its role as a measure ofvariation? How does it differ from variance?

Question 6) Define various measures of dispersion and explain their relative merits

and limitations.

Ques 7 Calculate the mean deviation about Median and coefficient of meandeviation from the following data :

Sales (Rs. ' 00) No. of Companies
Less than 20 3

Less than 30 9
Less than 40 20
Less than 50 23
Less than 60 25

Question 8 The students of the B.Com. class of a college have obtained thefollowing marks in statistics out of 100 marks. Calculate the standarddeviation of marks obtained

Student :X B C D E F G HI J
Marks :5 10 20 25 40 42 45 48 70 80

Question 9 In a small town, a survey was conducted in respect of profits made by retail shops. The following results were obtained :

Profit (+)/Loss (-) No. of Shops
–4 to –3 4
–3 to –2 10
–2 to –1 22
–1 to 0 28
0 to 1 38
1 to 2 56
2 to 3 40
3 to 4 24
4 to 5 18
5 to 6 10

Calculate i) the average profit made by a retail shop, ii) total profitmade by all shops, and iii) the coefficient of variation of earnings.

Question 10) The mean of two samples of size 50 and 100 are 54.1 and 50.3 and thestandard deviations are 8 and 7 respectively. Find the mean andstandard deviation of the sample of size 150 obtained by combining thetwo samples.

Ques 11 What do you understand by the term correlation? Distinguish betweendifferent types of correlation with the help of scatter diagrams?

Ques 12 Explain the difference between Karl Pearson's correlation co-effiecientand spearsman's rank correlations co-efficient. Under what situations,in the latter preferred to the former?

Ques 13 Determine the correlation coefficient between x and y

x 5 79 11 13 15
y 1.7 2.4 2.8 3.4 3.7 4.4

Ques 13) Ten competitors in a musical contest were ranked by 3 judges, A, B and

C in the following order:

Competitors: 1 2 3 4 5 6 7 8 9 10
Rank by A 1 6 5 10 3 2 4 9 7 8
Rank by B 3 5 8 4 7 10 2 1 6 9
Rank by C 6 4 9 8 1 2 3 10 5 7

Using rank correlation method, discuss which pair of judges has the nearestapproach to common liking in music.

Ques 14) Ten students obtained the following marks in the mathematics and

statistics. Calculate the rank correlation coefficient:

Student 1 2 34 5 6 7 8 9 10

Marks in Mathematics78 36 98 25 75 82 90 62 65 39
Marks in Statistics84 51 91 60 68 62 86 58 53 47

Ques 15) A sales manager of a soft drink company is studying the effect of itslatest advertising campaign. People chosen at random were called andasked how many bottles they had bought in the past week and howmany advertisements of this product they had seen in the past week.

No. of ads (X) 4 0 2 7 3 4 2 6
BottlesPurchased (Y) 6 5 4 16 10 9 6 14

Ques 16). Develop the regression equations that best fits the data through

the method of least squares.

b). Predict Y value when X = 78.

c). Predict X value when Y = 20.

Ques 17 Obtain the lines of regression from the following data.

X 25 22 28 26 35 20 22 40 20 18
Y 18 15 20 17 22 14 16 21 15 14

i) Estimate the value of Y if the value of X is 25, and

ii) Estimate the value of X if the value of Y is 45

Ques 18 A personal manager of a firm is interested in studying as to how thenumber of worker absent on a given day is related to the averagetemperature on that day. A random sample of 12 days was used forthe study. The data is given below:

No. of Workersabsent64 89 3 8 5 2 4 10 7 6
Average temperature (C) 12 30 15 18 40 30 45 35 23 15 25 35

a). State the independent variable and dependent variable.

b). Draw a scatter diagram.

c). Determine the regression lines (i) X on Y and (ii) Y on X

Ques 19 What do you mean by an index number? Explain the uses of indexnumbers for analysing the data.

Ques 20) Discuss various issues that arise in connection with the construction ofan index number.

Ques 21) Briefly explain different methods for construction of indices and theirlimitations.

Ques 22 A survey of the budget of working class families in an industrial areagave the following information.

Expression :Food Rent Clothing Fuel Others
Price in 2015 (Rs.) : 100 20 70 20 40
Price in 2016 (Rs.) : 90 20 60 15 55

What is the change in the cost of living in 2016, as compared with2015?

Ques 23 Foodgrain production (in lakh tones) is given below (figures are Time Series Analysisimaginary). Find the Trend by using

a) 3 yearly and 4 yearly movingaverage method

b) Straight Line Method. Tabulate the trend values.

C)Predict the production for the year 2022.

Years Production
2008 40
2009 60
2010 45
2011 83
2012 130
2013 135
2014 150
2015 120

2016 200

Ques 24 What do you mean by moving average? Explain the procedure forcalculation of moving average when the data is given in odd and evenperiods.

Ques 25 The production (in thousand tons) in a sugar factory during 2010 to

2017 has been as follows:

Years 2010 2011 2012 2013 2014 2015 2016 2017
Production 3538 4941 56 58 76 75

i) Find the trend values by applying the method of least square.

ii) What is the monthly increase in production?

iii) Estimate the production of sugar for the year 2020.