Question Bank
Methods and Techniques for Business Data Analysis
II Semester B.Com

Number System

1. Define Integer
2. Define Prime number
3. Define Real number
4. Define rational number
5. Define irrational number
6. Find the HCF of the following by prime factors method
   a. 210, 55
   b. 21,35
   c. 81,237
   d. 325,481
   e. 32,54
7. Find the HCF of the following by division method
   a. 210,385,735
   b. 18,27,81
   c. 108,288,360
8. Find the LCM of the following
   a. 6,7,8,9,12
   b. 72,108,2100
   c. 25,30,45
   d. 12,15,20,27
   e. 26,56,104,182
9. The HCF of two number is 12 and their difference is 12. Find the numbers
10. The product of two numbers is 2028 and their HCF is 13. If the numbers are of two digits, find the numbers
11. Find the greatest number that divide 132 and 77 leaving remainder 2 in each case
12. Find the least integer which when divided by 18,24,56 leaves no remainder
13. Find the least number which when increased by 3 exactly divisible by the number 21,45,63, 81
14. Find the least integer which when divided by 6,10,15,30 leaves the remainder 2
15. Six bell commence tolling together and the toll intervals of 2,4,,6,8,10 and 12 seconds respectively. In 30 min how many times do they toll together.

Theory of Equations

1. Define polynomial equation
2. 7(x-3)-3(x+4)=7+2(3x-8)
3. (x/3)-(17/2)= (x/5-(13/2)
4. (4x+11)/3-(6(x-7)/7 = 13

5. $(1/x)-(1/x+1) = 2/(x+1) – (1/x)$
6. Divide 21 into two parts such that one part is greater than the other by 5
7. What are the two numbers whose sum is 30 and the difference is 4
8. A number exceeds another by 7. If 2 is added to the greater number, the sum is three times the difference if 5 is subtracted from the smaller. What are the numbers?
9. Mr A is 6 times as old as Mr. B. fifteen years hence Mr. A will be three times as old as Mr. B. Find the ages of Mr. a and Mr. B .
10. Ten year ago the age of a father was 4 times of his son. Ten years from now the age of the father will be double that of his son. What are the present ages of the father and son?
11. Solve the following equations by substitutions and elimination methods
    a. y=2x; 3x+2y=21
    b. y=3x-7; 5x-3y=1
    c. x-y=5; 4x-y=2x+13
12. One number is greater than by 6 than twice another number but 3 times the smaller number exceeds the greater by one. Find the number
13. There are two numbers such that if to 3 times the first, twice the other is added the sum is 72. Also, if from 5 times the first number, 3 times the other is subtracted the result is 44. What are the numbers?
14. Monthly incomes of two persons are in the ratio 4:5 and their monthly expenses are in the ratio is 7:9. If each takes Rs 500 per month, find the monthly incomes
15. The purchase manager of an automobile is analyzing bids for seat belts from two suppliers A and B. the difference in the cost per unit from each suppliers is one Re. If for Rs 36 the manger could buy three more belts from A than from B, how many belts could he buy from A for Rs 90
16. A bus is carrying 12 passengers some with Rs 3 tickets and the remainder with Rs 5 tickets. If the total receipt from there passengers are Rs 114, find the number of passengers with Rs 3 tickets.
17. A real estate business firm brought some land for Rs 7200. After having sold all but 20 sq.ft at a profit of Rs. 30 per sq ft. the entire cost of the land had been regained. How many square feet of area of land were sold?
18. A 700 gms dry fruit pack cost Rs 72. It contains some cashew nuts and the rest are dry grapes. If cashew nuts cost Rs. 96 and dry grapes cost Rs 112 per kg. What are the quantities of the two items put into the pack?
19. A man sells 7 horses and 8 cows at Rs. 29000 and 5 horses and 6 cows at Rs 21500. What is the selling price of each.
20. Mr. Vasanth bought a certain number of shirts for Rs. 750, each shirt costing the same. He sold each shirt at Rs 42 and with the total sales proceeds he could buy 10 more shirts than before. How many shirts did he buy originally?

Matrices and Determinant

1. Define matrices
2. Distinguish between null matrix and square matrix
3. Distinguish between column and row matrix

4. Distinguish between diagonal and scalar matrix
5. Define unit matrix
6. If $A = \begin{matrix} 0 & 2 & 4 \\ 2 & 1 & 3 \end{matrix}$ and $B= \begin{matrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{matrix}$ find 3A-B

7. If $A= \begin{matrix} 2 & 4 \\ 3 & 2 \end{matrix}$ $B= \begin{matrix} 1 & 3 \\ -2 & 5 \end{matrix}$ $C= \begin{matrix} -2 & 5 \\ 3 & 4 \end{matrix}$ Find 2A-B+2C

8. If $A = \begin{matrix} 2 & 3 \\ 1 & 5 \end{matrix}$ find X such that A-2X= $\begin{matrix} 1 & 4 \\ 7 & -6 \end{matrix}$

9. If $A = \begin{matrix} 1 & -3 \\ 2 & -1 \\ 2 & 0 \end{matrix}$ $B= \begin{matrix} 1 & 2 \\ 0 & 1 \\ 1 & 3 \end{matrix}$ find c if A+B+C=0

10. If $A = \begin{matrix} 1 & -1 \\ -2 & 1 \end{matrix}$ and $B= \begin{matrix} 4 & 1 \\ 3 & -2 \end{matrix}$ find A-B and B-A

11. If $A = \begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix}$ show that A^2-5A=2I

12. If $A= \begin{matrix} 1 & 3 & 0 \\ 1 & 1 & 0 \\ 4 & 1 & 0 \end{matrix}$ $B = \begin{matrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 5 & 1 \end{matrix}$ show that AB not equal to BA

13. If $A= \begin{matrix} -1 & 1 & 0 \\ 3 & -3 & 3 \\ 5 & -5 & 5 \end{matrix}$ $B= \begin{matrix} 0 & 4 & 3 \\ 1 & -3 & -3 \\ -1 & 4 & 4 \end{matrix}$ show that $A^2-B^2 =A^2$

14. If $A = \begin{matrix} 1 & -1 \\ -1 & 1 \end{matrix}$ Show that A^2=2A

15. If $A= \begin{matrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ -1 & -2 & -3 \end{matrix}$ Find A^2

16. Evaluate the following determinants

a. $\begin{matrix} 1 & 6 & 7 \\ 2 & 3 & 0 \\ 0 & 1 & 4 \end{matrix}$ b. $\begin{matrix} 12 & 0 & 0 \\ 2 & 3 & 0 \\ 0 & 1 & 4 \end{matrix}$ c. $\begin{matrix} 12 & 0 & 0 \\ 14 & 3 & 0 \\ 2 & 2 & -3 \end{matrix}$

17. Show that the determinant
$\begin{matrix} x & y & p \\ p & x & q \\ p & q & x \end{matrix}$ = (x+p+q)(x-p)(x-q)

18. $\begin{vmatrix} 43 & 1 & 6 \\ 35 & 7 & 4 \\ 17 & 3 & 2 \end{vmatrix} = 0$

19. $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$

20. If $\begin{vmatrix} 1 & 2 & 3 \\ 2 & x & 3 \\ 3 & 4 & 3 \end{vmatrix} = 0$ find x

21. Define adjoint of a matrix
22. Define inverse of A
23. Define minor of a matrix
24. Find the adjoint of the following matrices

a. $\begin{bmatrix} 3 & -2 \\ 2 & 3 \end{bmatrix}$ b $\begin{bmatrix} 1 & 3 & -2 \\ 2 & 1 & 3 \\ 4 & 1 & 2 \end{bmatrix}$

25. Find the inverse of the following matrices

a. $\begin{bmatrix} 1 & 4 & -2 \\ -2 & -5 & 4 \\ 1 & -2 & 1 \end{bmatrix}$ b $\begin{bmatrix} 3 & -1 & 2 \\ 2 & 1 & -1 \\ 1 & 3 & -5 \end{bmatrix}$

26. Solve by using cramer's rule
    a. 2x-3y+1=0;3x+y-1=0
    b. 4x+2y=3; 3x-4y=5
    c. 5x-7y=2; 7x-5y=3

27. A manufacturing company produces four products A, B, C and D. Each product is made from raw materials P,Q and R. one unit of A requires 2 units of p and 1 unit of Q and 4 units of R one unit of B requires 5 units of P and 3 units of R. One unit of C requires 4,3,2 units of P,Q,R respectively and one unit of D requires 4,1 and 2 units of P,Q,R respectively. Find in matrix form
    a. The total cost of material consumed
    b. The total production cost
    c. Total sales
    d. Total contribution and contribution per unit of each product

28. There are two families A and B. There are two men, three women and one child in family A and husband wife and 2 children in family B. The daily intake of calories as recommended by WHO is men: 2400 women: 1900 and children:1800. For protein intake men 55 gms, women 45 gms and children 33 gms. Using matrices, calculate the daily total requirement of calories and protein for each of the two families.

29. A man buys 6 dozens of pencils, 5 dozens of pens and 10 dozens of note books. Pencil cost Rs 36 per dozen pen Rs 60 per dozens and note books Rs. 48. Represent the quantity bought by row matrix and price by column matrix and obtain the total cost.

30. Food I has one unit of vitamin A 2 units of vitamin B and 4 units of vitamin C. Food II has 1, 3, and 9 units respectively. Food III has 1, 2 and 1 units respectively. 7

units of vitamin A 17 units of vitamin B and 37 units of vitamin C are required. Find all possible amount of 3 food that will provide exactly their amount of vitamins.

Progression

1. Define A.P
2. Find the 20th term of an AP 2,6,10..
3. Find the 10th term of an AP   7,10,13…
4. Which term of AP 3,7,11 is 43
5. Which term of AP 5,13,21, is 181
6. The first term of an AP is 6 and common difference is 2 find the 15th term
7. The 10th term of an AP is 2 and 16th term is -10 find the 11th term
8. If 7 times 7th term of an AP is equal 11 times its 11th term show that 18th term of AP is 0
9. The sum of three numbers of AP is 24 and their product is 440 find them
10. Find the sum of AP 1,3,5,7, to 30th term
11. How many terms of the AP 2,8,14 amounts to 352
12. Find the sum of all natural numbers between 100 and 1000 which are multiples of 5
13. Find the sum of n terms of an AP whose 7th term is 30 and 13th term is 54
14. A man borrows Rs. 1000 and agrees to repay with a total of Rs 140 in 12 installments each installments being less than the immediate preceding one by Rs 10. What should be his first installment.
15. A person pays Rs 975 in monthly installment each installment being less than the former by Rs 5. The amount of the first installment is Rs 100. In what time will the entire amount be paid?
16. Define GP
17. Write the fifth element GP 4,12,36..
18. The second and fifth element are respectively 3 and 81/8 write down the common ratio and first element
19. The fourth element of GP is 27 and 7th element is729 find the GP
20. If x-2,x,x+3 are in GP find the value of x
21. The seventh element of GP is 8 times the fourth element. Find the GP when its 5th element is 48
22. The ratio of 9th element of a GP to the 6th element is-8 and 5th element is 16 find the GP
23. Find the three numbers which are in GP if their sum is 28 and their product is 572
24. The product of three numbers of GP is 27 and the sum of their product in pairs is 39. Find the numbers.
25. Find the sum of 27,9,3,1 to 8 element
26. How many elements of the GP 1,2,4,8… must be taken amount to 255
27. Determine the third element of the GP whose common ratio is 3 and the sum of first 7 element is 2186
28. The sum of the first two element of GP is 36 and the product of the first and the third element is 9 times the second element find the sum of the first 8 elements.
29. Insert 5 AM between 5 and 15

30. Insert 5 GM between 16 and ¼
31. A parent places in the savings bank Rs 25 on his son's first birthday. Rs 50 on his second birthday Rs 75 on his third birthday and so on increasing the amount by Rs 25 on each birthday. How much will be saved up when the boy reaches his sixteenth birthday, the latter inclusive?
32. A money lender lent Rs. 15000 at 18% p.a. for 10 years. He applies SI and has allowed interest to accumulate. How much will he get back as interest at the end of 10th year. If he borrower would want to repay the loan along with interest at the end of 5th year. How much interest should he repay?
33. Anirudh opens a recurring deposit with a bank for a duration of 36 months. Bank allows 9% p.a as interest reckoned monthly. If his monthly deposit is Rs 500. How much he get at the end of 36 months.
34. A machine purchased at a cost of 100000 has been depreciated under WDV method. Its book value at the end of 12th year was Rs 6872. What is the rate of depreciation charged by user?
35. The yearly output of a silver mine is found to be decreasing by 25% of its previous year's output. If in 5th year its output was Rs 25000, what could be reckoned as its total future output? Assume that the mine can be worked for 10 years.

Simple Interest and Compound Interest, Bill Discount, annuities, ratios and proportions

1. Find the simple interest on Rs. 1000 at 4.5 % p.a for 1 year
2. At what rate of SI will Rs.4000 amounts to 4220 in one year?
3. In what time will Rs. 6000 amount to 6375 at 5 % simple interest
4. What amount is required to repay a loan of Rs 300 for 7 months at 12.5%p.a?
5. A man deposited Rs 5000 in a savings bank which pays a simple interest at a rate of 4.5% for the first two years and then at the rate of 5 % for the next three years. Find the amount due at the end of 5 years.
6. Ajay and Vijay borrowed Rs 3000 and Rs 4000 respectively from a money lender on the same day and at the same rate of interest. Ajay repaid the loan after two years and Vijay after 4 years.   Vijay paid Rs 1500 more as interest. Find the rate of interest paid by each.
7. Calculate the CI on Rs 7500 at 14% for 4 years.
8. Find the amount of Rs 5500 in 8 years at 12 % p.a interest compounded
9. A sum of money Rs 5000 was lent at compound interest of 15 %p.a for 42 months. What is the amount due?
10. Find in how many years Rs 300 will become Rs 3000 at 9% CI
11. Find the difference between SI and CI on Rs. 2500 for 3 years at 10% p.a
12. A certain sum of money invested today amounts Rs 376.3 in 2 years and to Rs 472 in 4 years. Find the principal and the compound rate of interest allowed?
13. A Pvt banker offer to give 8000 after 12 years in return of 1000 deposited today. Find the interest rate offered?
14. A certain sum of money is lent at 8 % p.a compounded annually. If the interest for the first year is less than Rs 32 than the interest for the second year. What is the original principal amount lent?

15. A sum of Rs 1000 will amount to Rs 1180 in 3 years reckoning SI. What sum of money invested at CI at the same rate of interest as above for 3 years will amount to Rs 1500.
16. Find the present value of Rs 750 due 4 months hence at 15% p.a
17. What is the true discount Rs 900 due 5 months hence at 16% p.a
18. At what rate was the discounted calculated when Rs 825 is accepted in lieu of Rs 900 due 3 months hence?
19. Banker's and true discount on a sum of money due 3 months hence respectively Rs 154.5 and Rs 150. Find the sum of money and the rate of interest?
20. The difference between True discount and banker's discount on a bill due after 6 months discounted at 6% p.a is Rs 27. Find the true discount banker's discount and the face value of the bill.
21. The banker's gain on a certain bill due after 6 months from now is Rs 40. The rate of interest is 20% p.a. What is the face value of the bill.
22. What is the future value of Rs 1000 deposited annually for 12 years gathering CI 10% p.a
23. A father wants to send his child for higher studies after 15 years. He expects the cost of higher studies then to be Rs. 100000. How much should he save annually to have Rs 100000 after 15 years, if the interest rate is 12% p.a.
24. Four equal quarterly payment of Rs 2000 are made into a deposit account that pays 10% interest p.a What is the future value of this annuity after 4 deposits?
25. Calculate the amount of annuity of Rs 5000 for 15 years, if the rate of interest is 122% p.a.
26. Calculate the present value of an annuity of Rs 3000 for 6 years at 14% p.a
27. A machine costs Rs 25000. It will yield cash profit of Rs 7500 p.a for the next 5 years. If the interest rate is 18% p.a, would you consider investing in the machine.
28. Calculate the present value Rs 250 per month for 100 months of the discount rate is 18%p.a
29. What is the present value of an income stream which provides Rs. 2000 a year for the five years and Rs. 3000 a year , forever thereafter if the discount rate is 10% p.a
30. An asset was purchased on installment basis, such that Rs 5000 is to be paid on signing the agreement and four annual installment of Rs 5000 each payable at the end of the second, third, fourth and fifth years. If interest charged is 15%p.a what would be the cash price of the asset?
31. Find the ratio compounded of 2:3= 6:7
32. Write the duplicate and triplicate ratio of 3:5
33. Find the sub-duplicate and sub-triplicate ratio of 64:729
34. Two numbers are in the ratio3:4 if 6 is added to each form of the ratio, the new ratio will be 4:5 find the numbers
35. Find the rent of 84 acres of land at Rs 30000 for 16 acres
36. Given that a:b=2:4; b:c=3:5 and c:d= 12:10 find the ratio a:b:c
37. If the railway fare is 60 paise per k.m I can travel 400 km for a certain sum of money, but if the fares are revised to 80 paise per km. what distance can I travel for the same amount of money?
38. If 12 horses or 16 cows can consume 60 kgs of fodder in 20 days, how much fodder will be required for 24 hours and 24 cows to last 30 days.
39. If 2,x and 8 are in continued proportion find the value of x
40. The last three terms of a proportion are 2,3 and 6 What is the first term?

41. Divide 200 in to 4 parts in continued proportion so that the ratio of the first to the second term is 1:3

42. What number must be subtracted from each of 9,11,15 and 19 such that the difference will be proportional?

43. Find the third proportional to 153,207 and 34

44. Find the mean proportional to 21 and 84

45. A sum of Rs. 2415 was to be divided among three persons A,B and C in such proportion that A's share is to B's share as 4:5 and B's share to C'S Share as 9:16 How much does each gets?

46. Three persons A,B and C completed a job a worked 5 days, B for 7 days and C for 9 days. Their daily wages were in the ratio 4:3:2 and their total earnings amounted to Rs, 1180. What were their daily wages

47. If 15 chairs cost Rs 750 what will be the cost of 120 chairs at the same price?

48. If 20 men can do a job in 18 days how will 60 men take to do the same job?

49. The annual incomes of A,B and C taken together is 39000 A spend 80% of his income, B spend 87.5% and C spend 90% . If their savings are in the ratio 16:17:12 find their annual savings in Rs.

50. A sum of money is divided between A and B in the following manner one sixth is paid to A and an eight to B; the 5/9 of the remainder again to A and the rest to B. If A received Rs. 2420. What does B receive?