PRACTICE SET
End Semester Examination, December, 2025

Program: BBA
Semester: III
Subject: Business Mathematics
Subject code: 11.104

Course Objectives:

CLO 1: To understand the basics of Matrix and Determinant.
CLO 2: Describe about various permutation and combinations and explain about Probability.
CLO 3: To be able to appreciate uses of Mathematical models in real life situations
CLO 4: To understand commercial arithmetic and calculus and its applications

Section –A

I. Multiple Choice Question

1. Determinant can be calculated only for:

a) Any matrix b) Square matrix

c) Row matrix d) Column matrix (CO1) **Remember [LOT]**

2. If two rows of a determinant are interchanged, the value of the determinant:

a) Doubles b) Remains the same

c) Changes sign d) becomes zero (CO1) **Remember [LOT]**

3. The determinant of an identity matrix is:

a) 0 b) 1

c) –1 d) Undefined (CO1) **Remember [LOT]**

4. If (|A| = 0), then A is called:

a) Non-singular matrix b) Singular matrix

c) Identity matrix d) Diagonal matrix (CO1) **Remember [LOT]**

5. The order of the product of matrices A (2×3) and B (3×4) is:

a) 3×3 b) 2×4

c) 4×2 d) 2×3 (CO1) **Understand [LOT]**

6. Matrix multiplication is:

a) Always commutative b) Sometimes commutative

c) Not commutative d) commutative (CO1) **Remember [LOT]**

7. The cofactor of an element is obtained by multiplying its minor by:

a) ((-1)^{i+j}) b) ((-1)^{i-j})

c) ((i+j)) d) None of these (CO1) **Understand[LOT]**

8. The inverse of a matrix exists only when:

a) (|A| = 0) b) (|A| \neq 0)

c) (|A| = 1) d) None of these (CO1) **Understand[LOT]**

9. The adjoint of a matrix is:

a) Transpose of the cofactor matrix b) Transpose of the minor matrix

c) Inverse of the matrix d) None of these (CO1) **Remember [LOT]**

10. The rank of a matrix is equal to:

a) The order of the matrix b) Number of zero rows

c) Number of non-zero rows in echelon form d) Number of columns (CO1) **Understand [LOT]**

11. If (A = A'), the matrix A is:

a) Skew-symmetric b) Symmetric (CO1) **Remember [LOT]**

c) Singular d) Diagonal

12. The number of ways of arranging 4 objects taken all at a time is:

a) 4 b) (4^2)

c) (4!) d) (2^4) (CO2) **Understand[LOT]**

13. The number of permutations of 6 objects taken 3 at a time is:

a) (6!) b) ({6!}/{3!})

c) ({6!}/{(6 - 3)!}) d) (3!) (CO2) **Understand [LOT**

14. The number of combinations of 5 different things taken 2 at a time is:

a) 10 b) 15

c) 20 d) 25 (CO2) **Remember [LOT]**

15. The number of circular permutations of 7 people around a round table is:

a) 7! b) ((7 - 1)!)

c) (7!/2!) d) (7^2) (CO2) **Remember [LOT]**

16. The number of ways to select 3 students from a class of 10 is:

a) 120 b) 720

c) 60 d) 30 (CO2) **Understand [LOT**

17. The number of permutations of the letters of the word *BOOK* is:

a) 12 b) 24

c) 6 d) 10 (CO2) **Understand [LOT**

18. If order is not important, we use:

a) Permutation b) Combination

c) Circular permutation d) Probability (CO2) **Remember [LOT]**

19. If 5 boys are to be seated around a circular table, the number of possible arrangements is:

a) 5! b) (5!/2!)

c) ((5 - 1)!) d) (5^2) (CO2) **Understand [LOT**

20. In how many ways can 3 different rings be worn on 3 fingers?

a) 6 b) 9

c) 27 d) 3 (CO2) **Understand [LOT]**

21. The derivative of (x^n) with respect to (x) is: (CO3) **Remember [LOT]**

a) (n x^{n-1}) b) (x^n \log x)

c) (n x^{n+1}) d) (log x)

22. ({d}/{dx}(sin x)) is:

a) (sin x) b) (cos x)

c) (-cos x) d) (-sin x) (CO3) **Remember [LOT]**

23. ({d}{dx}/(log x)) is: (CO3) **Understand [LOT]**

a) (x) b) (e^x)

c) ({1}/{x}) d) (log e)

24. If (f'(a) = 0) and (f''(a) > 0), then (f(x)) has:

a) Maximum at (x = a) b) Minimum at (x = a)

c) Point of inflection d) None of these (CO3) **Remember [LOT]**

25. If (f'(a) = 0) and (f''(a) < 0), then (f(x)) has: (CO3) **Understand [LOT]**

a) Minimum b) Maximum

c) Saddle point d) None of these

26. If (y = e^x), then {dy}/{dx} =

a) (x e^{x-1}) b) (e^x)

c) (e^{x+1}) d) (x e^x) (CO3) **Understand [LOT]**

27. For maximum or minimum, which condition must hold first?

a) (f'(x) = 0) b) (f''(x) = 0)

c) (f(x) = 0) d) None of these (CO3) **Remember [LOT]**

28. If (R = 100x - 2x^2), maximum revenue occurs when:

a) (x = 50) b) (x = 25)

c) (x = 20) d) (x = 10) (CO3) **Remember [LOT]**

29. . The rate of interest which is actually earned or paid on a sum in a year is called:

(A) Nominal rate (B) Real rate (CO3) **Understand [LOT]**

(C) Effective rate (D) Periodic rate

30. If the nominal rate is 10% compounded semi-annually, the effective annual rate is:

(A) 10.25% (B) 10.5%

(C)10% (D)9.75% (CO3) **Remember [LOT]**

31. The value of an asset after depreciation follows which formula?

(A) (C(1 + r)^n) (B) (C(1 - r)^n)

(C) (C(1 + r/n)^{n}) (D)None (CO4) **Understand [LOT]**

32. Payments at the beginning of each period represent:

(A) Ordinary annuity (B) Annuity due

(C) Deferred annuity (D) Perpetuity (CO4) **Understand [LOT]**

33. Present value of a perpetuity paying ₹500 annually at 10% interest is:

(A) ₹5000 (B) ₹4500

(C) ₹5500 (D) ₹4000 (CO4) **Understand [LOT]**

34. If ₹10,000 is invested at 12% p.a. compounded monthly, effective rate = ?

(A) 12% (B) 12.68%

(C) 13% (D) 11.8% (CO4) **Remember [LOT**

35 . Average due date is used to determine:

(A) Discounted cash flow (B) Equivalent single payment date

(C) Depreciation value (D) Future value of annuity (CO4) **Understand [LOT]**

36.. In an ordinary annuity payments are made:

(A) At the beginning of each period (B) At the end of each period

(C) Continuously (D) Randomly (CO4) **Remember [LOT**

37. An annuity due is one in which payments are made:

(A) At the end of each period (B) At the beginning of each period

(C) After a deferred period (D) None of these (CO4) **Understand [LOT]**

38. If an annuity continues forever, it is called: (CO4) **Understand [LOT]**

(A)Deferred annuity (B) Perpetuity

(C) Continuous annuity (D) Ordinary annuity

39. The present value of a perpetuity paying ₹1,000 per year at 5% is:

(A) ₹20,000 (B) ₹10,000

(C) ₹15,000 (D) ₹25,000 (CO4) **Remember [LOT]**

40. The effective rate of interest is always:

(A) Equal to nominal rate (B) Greater than nominal rate (for more frequent compounding)

(C) Less than nominal rate (D) Independent of compounding (CO4) Understand [LOT]

UNIT - 1 (Section –B)

Marks: 10

1. If A= $[5\ -2\ 2\ 2\ 3\ -2\ 5\ 2\ 6]$ and B= $[4\ 6\ -6\ 2\ 2\ 3\ -6\ -4\ 3]$ Find 4A -3 B (CO1) Understand **[LOT]**
2. Find the co-factor of the elements and find the value of determinate (CO1) **Remember [LOT]**
   Where $A = [3\ 5\ 4\ 1\ 2\ -2\ 5\ 3\ 1]$
3. If A= $[3\ 5\ 6\ 1\ 5\ 3\ 5\ 9\ 3]$ and B= $[2\ 2\ 3\ 2\ 1\ 1\ 1\ 2\ 1]$ find A × B (CO1) Understand **[LOT]**
4. Solve the following system of equation using by Cramer's Rule

   5x-7y +z = 11, 6x - 8y- z =15 , 3x +2y - 6z = 7 (**CO 1) Apply [LOT]**

5 . Solve the rank of the matrix A = $[1\ 2\ 3\ 2\ 3\ 4\ 3\ 4\ 5]$ (CO1) Apply **[LOT]**

6. If A= $[1\ 2\ 2\ 2\ 1\ 2\ 5\ 2\ 1]$ Find $A^2 - 4A$- 5I (CO1) Apply **[LOT]**

20 Marks Questions

7. Solve the the following system of linear equation by Using matrix Method

   3x+2y-2z = 3 ,x+2y+3z =6 , 2x -y +z = 2 **(CO 1)** Apply **[HOT]**

8. Evaluate (i) If A= $[1\ 2\ 2\ 2\ 1\ 2\ 5\ 2\ 1]$ $A^{-1}$and hence prove that $A^2 - 4A$- 5I = 0

   (CO1) Evaluate **[HOT]**

   (ii) Let $A = [1\ -2\ 5\ 3\ 4\ 0\ ], B = [3\ 1\ 0\ -3\ 2\ 5\ ]\ and\ C = [4\ 3\ -2\ 1\ 2\ 6\ ]$ (CO1) Evaluate [HOT]

$$Verify\ that\ (A+B)+C = A+(B+C)$$

UNIT - 2 (Section –B)

Marks questions (10)

9. Find the value of ${}^{6}P_4$ and ${}^{10}P_5$ (C02) Understand [LOT]

10. Find the number of permutations of the word "MATHEMATICS". (C02) Understand [LOT]

11. List all Permutation of the letter "ABCD" (Co2 Understand **[LOT]**

12. From 7 boys and 5 girls, 6 are to be selected to admission for a particular house. In how many ways can be done if there must be exactly 2 girls.

(Co2) Remember [**LOT]**

13. Prove that ${}^{n}P_{r} = {}^{n-1}P_{r} + r.\ {}^{n-1}P_{r-1}$ (Co2) Analyze **[HOT]**

20 Marks Questions

14. (i) Prove that ${}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$ (Co2) Analyze **[HOT]**

(ii) If ${}^{n}P_{r}= 720$ and ${}^{n}C_{r}= 120$, find r. (Co2) Remember **[HOT]**

15. (i) Find the how many ways can a committee of 5 members be selected from 6 men and 5 ladies, Consisting of 3 men and 2 ladies? (Co2) Create [**HOT]**

(ii) Find the how many 4 – letters words with or without meaning, can be formed out of the letters of the word 'LOGARITHMS' if repetition of letters is not allowed? (Co2) Create [**HOT]**

UNIT III

(Differentiation) (Section –B)

10 Marks Questions: -

16. $If\ \ xy\ =\ x^3 + y^3\ find\ \frac{dy}{dx}.$ (Co3) Understand **[LOT]**

17. $If\ x^3 + y^3 = sin\ (x + y), find\ \frac{dy}{dx}$ (Co3) Remember [**LOT]**

18. If $y = x\ log\ x\ -\ x\ then\ find\ \frac{dy}{dx}.$ (Co3) Remember **[LOT]**

19. If x Cos y = Sin (x+ y), find $\frac{dy}{dx}$ (Co3) Apply **[LOT]**

20. $If\ x^3 + y^3 = 3axy, find\ \frac{dy}{dx}$ (Co3) Apply **[LOT]**

21. $Solve\ the,\ \frac{dy}{dx}, when\ x = a(t + sin\ sin\ t)\ and\ y = a(1 - cos\ cos\ t\ )$ (Co3) Apply **[LOT]**

22 $If\ y = \sqrt{sin\ x + \sqrt{sin\ sin\ x\ + \sqrt{sin\ sin\ x + \sqrt{sin\ sin\ x + \ \ldots\ldots\ldots\infty}}}}\ find\ \frac{dy}{dx}.$

(Co3) Remember **[LOT]**

20 Marks Questions

23 **(i) *Find the* Maximum and minimum value**

y = $x^3 + 6x^2 - 15x + 5$ (Co3) Apply **[HOT]**

(ii) If y = tan(x+ y). Find dy/ dx **(Co3) Apply [HOT]**

24. An orange grower finds that an orange tree producers on average, 400 oranges per year. if more than 16 tree are planted in a unit area . For each additional tree planed per unit area the grower finds that the yield decreases by 20 orange per tree. How many tree should the grower plant per unit area so as to get the maximum yield? (CO3) Evaluate [HOT]

UNIT – 4 (Section –B)

10 Marks question:

25. Calculate rate of interest p.a. does a person get who is paid at the rate of 5%C.I. payable half yearly.

(CO4) [LOT] Understand

26. Explain basic factors affecting the amount of deprecation. (CO4) [LOT] Understand

27. Define annuity and what are the different types of annuities? (CO4) [LOT] Remember

28. Calculate the how many years will the population of a village change from 2500 to 2601, if the rate of increase is 2% p.a. (CO4) [LOT] Apply

20 Marks Questions

29. On July 01, 2010, Ashok Ltd. Purchased a Machine for ₹ 1, 08,000/- and spent ₹ 12,000/- on its installation. At the time of purchase it was estimated that the effective commercial life of the machine will be 12 years and after 12 years its salvage value will be₹ 12,000. Prepare machine account and depreciation Account in the books of Ashok Ltd. For first three years, if depreciation is written off according to straight line method. The accounts are closed on December 31st, every year. (CO4) [LOT] Apply

30. Belia Ltd. Purchased a second-hand machine for Rs. 56,000/- on July 01, 2015 and spent Rs. 24,000/- on its repair and installation and Rs 5,000/- for its carriage. On September 01, 2016, it purchased another machine for Rs.2,50,000/- and spent Rs 10,000/- on installation.

(i) Deprecation is provided on machinery @ 10% p.a. on original cost method annually on December 31. Prepare machinery account from the year 2015 to 2018.

(ii) Prepare machinery account and depreciation account from the year 2015to 2018, if depreciation is provided on machinery @10% p.a. on written down value method annually on December 31.

(CO4) Analyze [HOT]

Summary Sheet

CO Wise

CO	Q. No.	Marks
CO1	Section –A 1,2,3,4,5, 6,7,8,9,10, Section- B 1,2,3,4,5,6,7,8	10 100
CO2	Section- A 11,12,13,14,15,16,17,18,19,20 Section- B 9,10,11,12,13,14,15	10 90
CO3	Section -A- 2 1,22,23,24,25,26.27,28,29,30 Section- B 16,17,18,19,20,21,22,23,24	10 110
CO4	Section- A 31,32,33,34,35,36,37,38,39,40, Section- B 25,26,27,28,29,30	10 80
	Total =	**420**

Unit Wise

Unit	Q. No.	Marks
Unit 1	Section –A 1,2,3,4,5, 6,7,8,9,10, Section- B 1,2,3,4,5,6,7,8	**110**
Unit 2	Section- A 11,12,13,14,15,16,17,18,19,20 Section- B 9,10,11,12,13,14,15	**100**
Unit 3	Section -A- 21,22,23,24,25,26.27,28,29,30 Section- B 16,17,18,19,20,21,22,23,24	**120**
Unit 4	Section- A 31,32,33,34,35,36,37,38,39,40, Section- B 25,26,27,28,29,30	**90**
	Total =	**420**

Blooms Taxonomy Level (BTL) Wise

BTL	Q. No.	Marks
LOT	Section-A 1,2,3,4,5,6,7,8,9,11,12,13,14,15,16,17,20,22,23,24,25,26,27,28,29,30,33,34,35,36,37, 38,39,40 Section-B 1,2,3,4,5,6,9,10,11,12,16,17,18,19,20,21,22,25,26,27,28	220
HOT	Section –B 7,8,10,13,14,15,23,24,29,30	200
	Total =	**420**

Course Outcome:

On completion of the Course, the students will be able to:

CO 1: Understand the concepts of Matrices and Schedules with reference to business process.

CO 2: Simplify the probability of events, their Permutations and Combination.

CO 3: Apply differential calculus to solve simple business problems

CO 4: Explain mathematical formulation and solution of problems related to finance including different methods of interest calculation, future and present value of money.

Prepared by – Dr. Manoj Kumar Mandal