Turn Over

|--|

.....

Max. Marks: 80

QP CODE: 25019997

Reg No Ξ. .....

Name 5

# B.Sc DEGREE (CBCS) ) REGULAR/ IMPROVEMENT/ REAPPEARANCE / MERCY **CHANCE EXAMINATIONS, FEBRUARY 2025**

### **Fourth Semester**

B.Sc Statistics Model I

# Complementary Course - MM4CMT05 - LINEAR ALGEBRA, THEORY OF EQUATIONS, NUMERICAL METHODS AND SPECIAL FUNCTIONS

2017 Admission Onwards

**DBFD4328** 

Time: 3 Hours

Part A

Answer any ten guestions. Each question carries 2 marks.

- Define a column matrix . Give an example. 1.
- Define non singular matrix and give an example. 2.
- Find the matrix whose characteristic roots are 3 and 4. 3.
- Write an example of a complete polynomial equation 4.
- Find the equation whose roots are the negative reciprocals of the roots of  $x^4 + 7x^3 + 8x^2$  -5. 9x + 10 = 0
- 6. Write an example of a reciprocal equation of odd degree with like signs of coefficients
- Compute the first two approximations to the root of the equation  $x^3 + x 1 = 0$  using 7. the bisection method.
- Use the method of false position to compute the first approximation to a root of the 8. equation  $x^3 - x^2 - 1 = 0$ , given that the root lies between 1 and 2.
- Find the next two approximations to a real root of the equation  $\cos x = 3x 1$  using the 9. iteration method, if the first approximation is  $x_0 = 0.5000$ .
- 10. Find  $\Gamma(\frac{7}{2})$
- 11. Express in terms of beta function  $\int_0^1 x^3 (1-x)^{4/3} dx$
- 12. Evaluate  $\int_0^{\frac{\pi}{2}} sin^3 \theta \cos^{\frac{5}{2}} \theta \, d\theta$

 $(10 \times 2 = 20)$ 

### Part B

Answer any six questions.

Page 1/2

- 13. Solve 2x y + 2z = 8, 3x + 2y 2z = -1, 5x + 3y 3z = 3
- 14 Express the following matrix as the sum of a symmetric and a skew symmetric matrix,

$$\begin{pmatrix} -1 & 7 & 1 \\ 2 & 3 & 4 \\ 5 & 0 & 5 \end{pmatrix}$$

- 15. Solve the equation  $x^4 2x^3 3x^2 + 8x 4 = 0$  if two roots are 1, 2.
- 16. If  $\alpha, \beta, \gamma$  are the roots of the cubic x<sup>3</sup> + 3x + 2 = 0, Form an equation whose roots are  $(\beta \gamma)^2$ ,  $(\gamma \alpha)^2$ ,  $(\alpha \beta)^2$
- 17. a) Write Descarte's Rule of signs b) Show that the equation  $x^4 + 7x^2 + 3x - 5 = 0$  have at least two imaginary roots
- 18. Solve using Cardons method  $28x^3 9x^2 + 1 = 0$
- 19. Use Newton Raphson method to obtain a root of the equation  $x^4 + x^2 80 = 0$ , correct to four decimal places, by taking the initial approximation as  $x_0 = -3$ .
- 20. Solve using iteration method sinx = 10 (x 1) correct to 3 decimal places

21. Prove that 
$$\int_0^\infty rac{x^{m-1}}{(a+bx)^{m+n}} dx = rac{eta(m,n)}{a^n b^m}$$
 where m,n,a,b are positive

(6×5=30)

#### Part C

#### Answer any **two** questions.

Each question carries **15** marks.

22. a) Solve the system of equations using Cramer's rule 3x + y + 2z = 3, 2x - 3y - z = -3, x + 2y + z = 4

b) Evaluate the determinant of  $\begin{pmatrix} -2 & 2 & 1 \\ 0 & -2 & -1 \\ 1 & 3 & 1 \end{pmatrix}$ 

23. a) State Cayley Hamilton Theorem

b)Find the charecteristic equation of the matrix  $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$  and verify that it is satisfied by A and hence find inverse of A

- 24. a) Solve the equation  $x^3 12x^2 + 39x 28 = 0$  whose roots are in A.P b) Solve the equation  $x^3 - 5x^2 - 16x + 80 = 0$ , given that the sum of two of its roots is zero
- 25. a) Explain the procedure of Method of false position for solving an equation f(x)=0.give the geometrical interpretation also

b) Find a real root of the equation  $x^3 - x - 3 = 0$  by using method of bisection

(2×15=30)