

QP CODE: 20100573



Reg No :

Name :

BSc DEGREE (CBCS) EXAMINATION, MARCH 2020

Sixth Semester

Choice Based Core Course - MM6CBT03 - NUMERICAL ANALYSIS

B.Sc Mathematics Model I, B.Sc Mathematics Model II Computer Science

2017 Admission Onwards

EF6A455A

Time: 3 Hours

Marks: 80

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Give the graphical representation of method of false position.
2. Give the formula for finding the root of the equation $f(x) = 0$ using Aitken's Δ^2 -process.
3. What is Newton-Raphson formula?
4. Explain Ramanujan's method to find a smallest root of the equation $f(x) = 0$.
5. What is interpolating polynomial?
6. What are called second forward differences?
7. Define shift operator and mean operator.
8. Define a Periodic function. Give example for a periodic function.
9. Show that for W_N defined in DFT, $W_{\frac{n}{2}} = W_N^2$
10. What is Numerical Integration? State general formula for Numerical Integration.
11. State Trapezoidal rule for finding an approximate area under a given curve.
12. Write the Booles and Weddles Rules for Numerical Integration .

(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Find a real root of the equation $x^3 - 4x - 9 = 0$ correct to three decimal places by





bisection method.

14. Find a double root of the equation $f(x) = x^3 - x^2 - x + 1 = 0$ with initial approximation $x_0 = 0.8$.
 15. Derive the formula for second order, third order and forth order backward differences.
 16. Prove that the n^{th} difference of a polynomial of degree n is a constant $a_0 n! h^n$.
 17. Using Newton's forward difference formula, find the sum $S_n = 1^3 + 2^3 + 3^3 + \dots + n^3$.
 18. Derive the Fourier Transform of $f'(x)$, the derivative of $f(x)$
 19. The following table gives angular displacements θ (in radians) at different times t (seconds) :
- | | | | | | | | |
|----------|-------|-------|-------|-------|-------|-------|-------|
| θ | 0 | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 |
| t | 0.052 | 0.105 | 0.168 | 0.242 | 0.327 | 0.408 | 0.489 |
- Calculate the angular velocity at $t = 0.06$.
20. Explain the truncation and rounding errors involved in the numerical computation of derivatives.
 21. Write the the general formula for Numerical Integration and derive Simpsons 3/8 -rule
- (6×5=30)

Part C

Answer any **two** questions.

Each question carries **15** marks.

22. (i) Use the iterative method to find a real root ,correct to three decimal places,of the equation $2x - 3 = \cos x$ lying in the interval $[\frac{3}{2}, \frac{\pi}{2}]$.
(ii) Use iterative method find a real root of the equation $x^3 = 1 - x^2$ on the interval $[0,1]$ with an accuracy of 10^{-4} .
 23. a) Find the cubic polynomial which takes the following values: $y(1) = 24$, $y(3) = 120$, $y(5) = 336$ and $y(7) = 720$. Hence, or otherwise, obtain the value of $y(8)$.
b) Value of x and $\sin x$ are given in the following table. Determine the value of $\sin 38^\circ$.
- | | | | | | | |
|----------|-----------|-----------|-----------|-----|-----------|-----------|
| x | 15 | 20 | 25 | 30 | 35 | 40 |
| $\sin x$ | 0.2588190 | 0.3420201 | 0.4226183 | 0.5 | 0.5735764 | 0.6427876 |
24. Find the DFT of the sequence $\{1, 1, 1, \dots, 1\}$ for $k = 1, 2, \dots, N-1$
 25. Estimate the value of the integral $\int_1^3 \frac{1}{x} dx$ by Simpsons $\frac{1}{3}$ rule with 4 strips and 8 strips respectively. Determine the error in each case.

(2×15=30)

