

QP CODE: 24001065



Reg No :

Name :

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, MARCH 2024

Sixth Semester

CHOICE BASED CORE COURSE - MM6CBT03 - NUMERICAL ANALYSIS

Common for B.Sc Mathematics Model I & B.Sc Mathematics Model II Computer Science

2017 Admission Onwards

5BA9F519

Time: 3 Hours

Max. Marks : 80

Part A

*Answer any **ten** questions.*

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

1. State iteration method to find the root of an equation $f(x) = 0$.
2. Give the formula for finding the root of the equation $f(x) = 0$ using Aitken's Δ^2 -process.
3. What is generalized Newton's formula?
4. Explain Ramanujan's method to find a smallest root of the equation $f(x) = 0$.
5. Derive the formula for third order backward difference.
6. Prove that a) $E \equiv 1 + \Delta$ b) $\nabla = 1 - E^{-1}$.
7. What is called method of separation of symbols?
8. Define Discrete Fourier Transform (DFT).
9. Define Inverse Discrete Fourier Transform IDFT.
10. Define Truncation and Rounding error in numerical Differentiation.
11. Write General formula for Numerical Integration using Newtons forward difference formula.
12. Evaluate the integral $\int_0^{0.4} y dx$ using Booles rule for numerical integration.

x	0	0.1	0.2	0.3	0.4
f(x)	0	0.0100	0.0400	0.0899	0.1593

(10×2=20)





Part B

Answer any **six** questions.

Each question carries **5** marks.

13. Find a real root of the equation $x^3 - x^2 - 1 = 0$ by regula-falsi method.
14. Use the Newton-Raphson method to find a root of the equation $x \sin x + \cos x = 0$.
15. Write a shortnote on errors in polynomial interpolation.
16. Write the forward difference table.
17. The table below gives the values of $\tan x$ for $0.10 \leq x \leq 0.30$. Find $\tan 0.50$.

x	0.10	0.15	0.20	0.25	0.30
y	0.1003	0.1511	0.2027	0.2553	0.3093

18. Explain the difference between Fourier series and Fouries Transform.
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. Derive the Trapezoidal Rule from the general formula and evaluate $\int_0^\pi x \sin x dx$, with five ordinates.
21. Integrate $\cos x^2$ from "0" to "1" by simpsons $\frac{1}{3}$ rule with $h = 0.25$.

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **15** marks.

22. (i) Explain the bisection method for finding a real root of the equation $f(x) = 0$.
(ii) Find a real root, which lies between 0 and 1, of the equation $x = e^{-x}$ using bisection method to a tolerance of 0.05%.
23. a) Write a short note on Newton's forward difference formula.
b) Using Newton's forwad difference formula, find the sum $S_n = 1^3 + 2^3 + 3^3 + \dots + n^3$.
24. Find the Fourier Series of the function defined by $f(t) = \begin{cases} -1, & \text{if } -\pi < t < 0. \\ 0, & \text{if } t = 0. \\ 1, & \text{if } 0 < t < \pi. \end{cases}$





25. Find the value of $\int_1^5 \log x dx$ taking 8 sub interval , correct upto four decimal places by
- (a) Simpsons 1/3 rule
 - (b) Trapezoidal rule
 - (c) Simpsons 3/8 rule

(2×15=30)

