



K16U 2587

Reg. No. :

Name :

**V Semester B.Sc. Hon's. (Mathematics) Degree (Reg./Supple./Improv.)
Examination, November 2016
BHM 502 : NUMERICAL ANALYSIS**

Time : 3 Hours

Max. Marks : 80

Answer **all** the 10 questions :

(10×1=10)

1. Find two consecutive integers such that a real root of $xe^x = 1$ lies between them.
2. Write Newton Raphson formula for successive approximation.
3. Number of initial approximations needed to apply second method is _____
4. Write $\Delta^2 y_0$ in terms of y_0, y_1, y_2 .
5. Define the averaging operator μ .
6. Write Newton forward interpolation formula.
7. Define 'divided difference'.
8. If $y_1 = 4, y_3 = 12, y_4 = 19, y_x = 7$, then find x .
9. State whether the statement "inverse interpolation is meaningful only if the function is single valued". True or false.
10. Write a formula for computing $\int_{x_0}^{x_n} y dx$ in Simpson's $1/3$ rule.

Answer **any** 10 short answer questions out of 14 :

(10×3=30)

11. Find a real root of the equation $x^3 - 2x - 5 = 0$ using bisection method.
12. Using iteration method find a root of $x^3 + x^2 - 1 = 0$ correct to two decimal places.
13. Find a root of $x^3 = e^{-x}$ using Newton Raphson method.

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14. Find a polynomial $P(x)$ of degree 2 or less such that $P(1) = 1$, $P(3) = 27$, $P(4) = 64$.

15. Using regula falsi method find a real root of $x^{22} - 69 = 0$ given that the root lies between 5 and 8.

16. Find a root of $\sin x = 1 - x$ using Ramanujan's method.

17. Prove that $\Delta - \nabla = \delta^2$.

18. Construct a forward difference table :

x :	1	1.05	1.10	1.15	1.20	1.25
y :	2.7	2.8	3.0	3.1	3.3	3.4

19. Find $\frac{dy}{dx}$ at $x = 1.6$ if x and y are related as follows :

x :	1	1.2	1.4	1.6	1.8	2.0
y :	2.7	3.3	4	4.4	6	7

20. Find an approximation to $\sqrt{5}$ to 3 decimal places by iteration method.

21. Construct a backward difference table for :

x :	5	10	15	20	25
y :	4.6	6.6	8.1	9	10.1

22. Using Newton's forward difference interpolation formula, evaluate $f_{(15)}$:

x :	10	20	30	40	50
y :	46	66	81	93	101

23. Find the area bounded by the curve and x axis from 0 to 4 if the curve passes through $(0, 0)$, $(1, 2)$, $(2, 4)$, $(3, 2)$, $(4, 1)$.

24. Evaluate $\int_0^4 \frac{1}{1+x} dx$ using Simpson's $1/3$ rule taking $h = 0.5$.



Answer any 6 questions out of 9 :

(6×5=30)

25. Derive Newton's backward interpolation formula.

26. Find the volume of the solid of revolution of a curve passing through the points $(0, 1)$, $(0.25, 0.9)$, $(0.5, 0.95)$, $(0.75, 0.91)$, $(1, 0.84)$ using Simpson's $1/3$ rule.

27. Find a real root of $\sin x = 1 - x$ by Ramanujan's method.

28. Show that $\Delta - \nabla = \Delta \nabla$.

29. Find $\int_0^1 \frac{1}{x^2 + 6x + 10} dx$ for 4 sub-intervals.

30. Derive Newton's general interpolation formula.

31. Prove $\mu^2 = 1 + \frac{1}{4} \delta^2$.

32. Find a root of the equation $x \sin x + \cos x = 0$ using Newton Raphson method.

33. Explain inverse interpolation with a suitable example.

Answer any one essay question out of 2 :

(1×10=10)

34. Using Newton's forward difference formula, find $1^3 + 2^3 + 3^3 + \dots + n^3$.

35. Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.2$.

x :	1	1.2	1.4	1.6	1.8	2	2.2
y :	2.7183	3.3201	4.0552	4.953	6.0496	7.3891	9.025