



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – MATHEMATICS

SIXTH SEMESTER – APRIL 2015

MT 6605 – NUMERICAL METHODS

Date : 20/04/2015
Time : 09:00-12:00

Dept. No.

Max. : 100 Marks

PART - A

Answer **ALL** questions:

(10 x 2 = 20 marks)

1. Define a pivot.
2. Write the condition of convergence in Gauss – Seidal method.
3. Regula – Falsi method is also called as _____.
4. Establish the Newton-Raphson formula for \sqrt{N} , where N being a positive integer.
5. Define interpolation.
6. If a,b,c are the arguments of $f(x) = \frac{1}{x}$, show that $f(a,b,c) = \frac{1}{abc}$.
7. State the Bessel's formula.
8. What is the range of p so that Stirling formula gives best results?
9. When does Simpson's rule gives exact result?
10. Write the modified Euler's formula.

PART - B

Answer any **FIVE** questions:

(5 x 8 = 40 marks)

11. Apply Cramer's rule, solve the following system of equations $3x+y-z = 3$, $2x - 8y + z = -5$,
 $x - 2y + 9z = 8$.
12. Find a real root of the equation $\cos x - 3x+1=0$ correct to seven decimal places by the method of successive approximation.
13. Explain and derive the regula falsi formula.
14. Find a cubic polynomial which takes the following set of values (0,1), (1,2), (2,1) and (3,10).
15. By means of Lagrange's formula, prove that $y_1 = y_3 - 0.3(y_5 - y_3) + 0.2(y_{-3} - y_{-5})$ approximately.
16. Using Laplace – Everett's formula to obtain $f(1.15)$ given that $f(1) = 1$, $f(1.10) = 1.049$,
 $f(1.20) = 1.096$, $f(1.30) = 1.140$.
17. Write a C program to evaluate $\int_a^b y dx$ using Simpson's 1/3 rule.
18. Using Tylor's series method solve $y' = 3x + \frac{y}{2}$, $y(0) = 1$ at $x=0.1$ and $x=0.2$.

PART - C

Answer any **TWO** questions:

(2 x 20 = 40 marks)

19. a) Using Gauss-Seidel method, solve $4x + 11y - z = 33$, $6x + 3y + 12z = 35$,
 $8x - 3y + 2z = 20$.

b) Discuss the convergence of Newton - Raphson method.

20. a) Given $\sum_1^{10} f(x) = 500426$, $\sum_4^{10} f(x) = 329240$, $\sum_7^{10} f(x) = 175212$ and $f(10) = 40365$, find $f(1)$.

b) Given $\log_{10} 654 = 2.8156$, $\log_{10} 658 = 2.8182$, $\log_{10} 659 = 2.8189$, $\log_{10} 661 = 2.8202$.

Find by using Newton's divided difference formula, the value of $\log_{10} 656$.

21. a) Find the first, second derivatives of $f(x)$ at $x = 1.5$ if

x:	1.5	2.0	2.5	3.0	3.5	4.0
f(x):	3.375	7.000	13.625	24.000	38.875	59.000

b) Find $\sin 45^\circ$ using Gauss's backward interpolation formula given that

θ	20	30	40	50	60	70	80
$\sin \theta$	0.342	0.502	0.642	0.766	0.866	0.939	0.984

22. a) The velocity v of a particle at distance s from a point on its path is given by the following table:

S(ft)	0	10	20	30	40	50	60
V(ft/s)	47	58	64	65	61	52	38

Estimate the time taken to travel 60 ft using Simpson's 1/3 rule. Compare the result with Simpson's 3/8 rule.

b) Using Runge-kutta method of order 4, solve for $y(0.1)$, $y(0.2)$ given that $y' = xy + y^2$,
 $y(0) = 1$.

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