End Semester Examination of Semester–II, 2016
Subject : MATHEMATICS (PG)
Paper : MTMPG-206 (Practical)
Full Marks : 10
Time : 2 Hrs

The figures in the margin indicate the marks
corresponding to the question

Candidates are requested to give their answers
in their own word as far as practicable.
Illustrate the answers wherever necessary.

Advance Numerical and Statistical Techniques
using C / C++ / MathLab.

One problem allotted by lottery. 8

1. Write a program to the value of $\sin(48^0)$ using the following data:

θ^0	45^0	50^0	55^0	60^0
$\sin\theta$	0·7071	0·7660	0·8192	0·886

2. Write a program to find the value of $e^{0.45}$

x	0·1	0·2	0.3	0·4	0·5
e^x	1·10517	1·22140	1·3498	1·49182	1·64872

3. Write a program to find the value of y(7) from the following table:

x	5	6	9	11
y	12	13	14	16

4. Using Lagrange Interpolation write a program to find the regression line of y on x for the data:

x	1·53	1·78	2·60	2·95	3·42
y	33·50	36·30	40·00	45·80	53·50

5. Write a program to find the calculate linear regression co-efficients from the following:

x :	1	2	3	4	5	6	7	8
y :	3	7	10	12	14	17	20	24

6. Write a program to find the Calculate the Cubic spline for the following data :

x:	0	1	2	3
y :	2	−6	−8	2

in the interval [1, 2] and [2, 3].

7. Write a program to fit a st-line with the following data:

x:	1	2	3	4	5
y :	14	27	40	55	68

8. Write a program to find the best values of a and b so that y = a + bx the given data:

x :	0	1	2	3	4
y :	1·0	2·9	4·8	6·7	8·6

9. Write a program to find the value $y(0.80)$ from the differential equation $\frac{dy}{dx} = y - x^2$ by Milene Method when

x :	1.	0.2	0.4	0.6
y :	1	1.12186	1.46820	1.75790

10. Write a program to find the values of $y(0.1)$ and $y(0.2)$ correct upto four decimal places. From the differential equation:

$$\frac{dy}{dx} = y - x, \quad y(0) = 2.$$

11. Write a program to solve the differential equation

$$\frac{dy}{dx} = \log_{10}(x + y) \text{ with } y(0) = 1.$$

Find the values of $y(0.2)$ and $y(0.5)$ by Euler modified method.

12. Write a program to solve the system of equations:

$2x + y + z = 3$

$x + 3y + z = -2$

$x + y + 4z = -6$

by LU decomposition method.

13. Write a program to solve the system of equation by Gauss Elimination method.

$3x_1 + 9x_2 - 2x_3 = 11$

$4x_1 + 2x_2 + 13x_3 = 24$

$4x_1 - 2x_2 + x_3 = -8$

14. Write a program to solve the system of equation by Gauss-elimination method:

$2x_1 - 2x_2 = 1$

$-x_1 + 2x_2 - 3x_3 = -2$

$-2x_2 + 2x_3 - 4x_4 = -1$

$x_3 - x_4 = 3.$

15. Write a program to solve the system of equation

$8x_1 + 2x_2 - 2x_3 = 8$

$x_1 - 8x_2 + 8x_3 = 4$

$2x_1 + x_2 + 9x_3 = 12$

By Gauss-Seidal method correct upto 3 decimal places.

16. Write a program to find the eigen values of the matrix

$$\begin{pmatrix} 2 & -2 & 6 \\ -2 & 5 & 4 \\ 6 & 4 & 1 \end{pmatrix}$$

17. Write a program to find the eigen values of the matrix

$$\begin{pmatrix} 5 & 4 & 3 \\ 4 & 5 & 4 \\ 3 & 4 & 5 \end{pmatrix}$$

18. Write a program to compute $\int_0^1 \frac{dx}{1+x^2}$ by Gauss method by taking 5 ordinates.

19. Write a program to evaluate $\int\limits_1^2\int\limits_1^2 \dfrac{dx\,dy}{1+x^2+y^2}$ using Simpson's

$\dfrac{1}{3}$ rule taking h = k = 0·25.

20. Write a program to evaluate $\int\limits_0^{\frac{\pi}{2}}\int\limits_0^{\frac{\pi}{2}} \cos(x+y)dx\,dy$ using Trape-

Zoidal rule for $h^0 = k^0 = \dfrac{\pi}{8}$.

21. Write a program to evaluate $\int\limits_0^1\int\limits_0^1 \dfrac{\sin(xy)}{1+xy}dx\,dy$

with h = k = 0·05

22. Write a program to fit a parabola with the following data

x :	0	1	2	3	4
y :	1 0	2·9	4·8	6·7	8·6

23. Write a program to evaluate $\int\limits_0^1\int\limits_0^2 \dfrac{2xy}{\sqrt{(1+x^2)(1+y^2)}}dx\,dy$

using h = k = 0·05

Viva : 2

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