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(20524) Roll No. .....

B.Sc.(Comp.Sc.)-IV Sem.

NP-3605

B.Sc. (Com. Science)

Examination, May-2024

Computer Oriented Numerical Techniques

(BCS-401)

Time : Three Hours] *[Maximum Marks : 75*

Section-A

Note : Attempt **all** questions.

1. If $f(x)=4\cos x-6x$, find percentage error in f(x) for $\Delta x=0.005$ and $x=1$. 3
2. Prove that $(E^{1/2}+E^{-1/2})(1+\Delta)^{1/2}=2+\Delta$ 3
3. Karl Pearson's coefficient of skewness of a distribution=0.32. S.D.=6.5, AM=29.6 From the above data find the mode and the median for the distribution. 3
4. Determine E(2X+5) 3

   The probability distribution of random variable X is $P(x)=\frac{1}{2},\frac{1}{6},\frac{1}{3}, x=3,1,-2$

5. Evaluate $\int_{-1}^{2}\frac{dx}{1+x^2}$ taking h=0.2, using Trapezoidal Rule. 3

Section-B

Note : Attempt any **two** questions.

6. Using Lagrange's interpolation formula, find the value of y corresponding to x=3 from the following table: 7.5

x	0	1	2	4
f(x)	580	556	520	385

7. By the method of least squares, find the straight line that best fits the following data: 7.5

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

8. Using Poisson distribution, find the probability that the ace of spades will be drawn from a pack of well-shuffled cards atleast once in 104 consecutive trials. 7.5

Section-C

Note : Answer any **three** questions.

9. (a) Perform five iterations of the bisection method to obtain the smallest

positive root of the equation
$f(x)=x^3-5x+1=0$ 7.5

(b) Find a solution of $x^3+x-1=0$ by iteration method.

10. (a) Prove that $\left(\frac{\Delta^2}{E}\right)e^x \cdot \frac{Ee^x}{\Delta^2 e^x} = e^x$ 7.5
the interval of differencing being h.

(b) From the following table, evaluate f(3.8) using Newton backward interpolation formula: 7.5

x	0	1	2	3	4
f(x)	1.00	1.50	2.20	3.10	4.60

11. (a) Use Picard's method to approximate y when x=0.1, given that y=1 when x=0 and $\frac{dy}{dx} = \frac{y-x}{y+x}$ 7.5

(b) Estimate y(1) if $2yy' = x^2$ and y(0)=2 using Runge-Kutta method of fourth order by taking h=0.5. Also compare the result with exact value. 7.5

12. (a) To test the effectiveness of innoculation against cholera, the following table was obtained. 7.5

	Attached	Not atteched	Total
Inoculated	30	160	190
Not Inoculated	140	460	600
Total	170	620	790

(The figures represent the number of persons) use χ^2-test to defined or refute the statement. The inoculation prevents attack from cholera.

(b) A sample of 6 persons in an office revealed an average daily smoking of 10, 12, 8, 9, 16, 5 cigarattes. The average level of smoking in the whole office has to be estimated at 90% level of confidence.

t=2.015 for 5% degree of freedom. 7.5

13. (a) Apply Gauss forward formula to obtain f(x) at x=3.75 from the table below: 7.5

x	2.5	3	3.5	4	4.5	5
y	24.145	22.043	20.225	18.644	17.262	16.047

(b) Use Taylor series method to solve the equation
$\frac{dy}{dx} = -xy, y(0) = 1$ 7.5