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PG CBCS

M.Sc. Semester-II Examination, 2022

Mathematics

PAPER: C-MTM 204A

(STATISTICAL AND NUMERICAL METHODS)

Full Marks: 40 **Time: 2 Hours**

GROUP-A

1. Answer any <u>four</u> questions of the following: **4×2=8**

a) Find the median of 33, 86, 68, 32, 80, 48, 70, 64.

b) Prove that $(\Delta+1)(1-\nabla)\equiv 1$.

c) Suppose π is approximated as 3.14 instead of 3.14156, find the absolute, relative and percentage errors.

d) Define null hypothesis.

e) What is the regression curve in a set of bivariate data?

f) Write down the physical significance of the correlation co-efficient.

GROUP-B

2. Answer any <u>four</u> questions of the following: **4×4=16**

a) The values of function $f(x)$ are given for certain values of x:

x:	1.1	1.2	1.3	1.4
$f(x)$:	7.831	8.728	9.697	10.744

Estimate the value of $f(x)$ for $x = 1.38$ correct to three decimal places.

b) Obtain Lagrange's interpolating polynomial for $f(x)$ and find an approximate value of the function $f(x)$ at $x = 0$, given that $f(-2) = -5, f(-1) = -1$ & $f(1) = 1$.

c) Solve the following differential equation $\frac{dy}{dx} = 3x^2 + y$, $y(0) = 0$ for $0.1 \le x \le 0.5$, using Euler's method by taking $h = 0.1$.

(d) Solve the system of equations by Crammer's rule:

$$x_1 + x_2 + x_3 = 2$$
$$2x_1 + x_2 - x_3 = 5$$
$$x_1 + 3x_2 + 2x_3 = 5$$

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e) Explain the bisection method for computing a real root of an equation $f(x) = 0$

f) Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{1 - 0.162sin^2\varphi}d\varphi$ by Simpson's 1/3 rule, correct up to three decimal places.

GROUP-C

3. Answer any <u>two</u> questions of the following: **8×2=16**

a) Describes Chi-square distribution and Student's t-distriution

b) Given $\frac{dy}{dx} = x^2 + y^2$ with $x = 0,\ y = 1$. Find $y(0.1)$ by fourth-order Runge-Kutta method by taking h=0.1.

c) Compute correlation co-efficient, regression co-efficient between the advertisement costs (x) and sales (y) as per data given below and also find the lines of regression.

Advertisement costs in thousand Rs. (x)	39	65	62	90	82	75	25	98	36	78
Sales in Lakhs Rs. (y)	47	53	58	86	62	68	60	91	51	84

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