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J-3855[S-8032]

[2037]

BCA/B.Sc. IT

MATH - II (Computer Oriented Methods)

(BCA - 301) /B.Sc. (IT - 404)

Time : 03 Hours

Maximum Marks : 75

Instruction to Candidates:

- 1) Section - A is **compulsory**.
- 2) Attempt any **Nine** questions from Section - B.

Section - A

Q1)

(15 x 2 = 30)

- a) Define symmetric and skew symmetric matrix.
- b) Define Inverse of a matrix and give necessary conditions for its existence.
- c) Explain matrix multiplication and give its one important property.
- d) Explain Gauss Jordan method.

e) Given $A = \begin{pmatrix} 4 & 1 \\ 9 & 0 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 0 \\ 7 & 1 \end{pmatrix}$ and $C = \begin{pmatrix} 2 & 0 \\ 0 & 3 \end{pmatrix}$

Show that $(A + B)' = A' + B'$ and

$$(AC)' = C' A'$$

- f) Find the maximum and minimum for the function $f(x) = x^3 - 3x^2 + 2$.
- g) Find first order partial derivative for $u = \frac{x + y}{x - y}$.
- h) Find $\int x \log x dx$.
- i) What is measure of control tendency? Name two important measures which you like.

P.T.O.

- j) What is coefficient of kurtosis?
- k) Explain the term statistics and give its two uses.
- l) Explain the method Simpson $\frac{3}{8}$ rule and give its one application.
- m) Solve $\int \left(4e^x - x^{-2} + \frac{3}{x} \right) dx$.
- n) Explain method of substitution for solving integral of a function with an example.
- o) The marginal cost of a firm is $2 + 3e^x$, where x is output. Find the total cost function, if fixed cost is Rs. 500.

Section - B

(9 x 5 = 45)

Q2) Find the value of $\begin{vmatrix} 2 & 7 & 2 \\ 3 & 10 & 4 \\ 4 & 13 & 5 \end{vmatrix}$.

Q3) Find the inverse of the matrix $\begin{pmatrix} 1 & -3 & -8 \\ 3 & 1 & -4 \\ 2 & 5 & 6 \end{pmatrix}$, if it exists.

Q4) Given $A = \begin{pmatrix} 2 & 6 \\ 0 & 3 \end{pmatrix}$, $B = \begin{pmatrix} \frac{1}{2} & -1 \\ 0 & \frac{1}{3} \end{pmatrix}$,

$C = \begin{pmatrix} 1 & 4 \\ 6 & 8 \end{pmatrix}$ and $D = \begin{pmatrix} -\frac{1}{2} & \frac{1}{4} \\ \frac{3}{8} & -\frac{1}{10} \end{pmatrix}$

Show that B is inverse of A and D is inverse of C.

Q5) Solve the following set of equations simultaneously.

$$x - 2y + 3z = 1, 3x - y + 4z = 3 \text{ and } 2x + y - 2z = -1$$

Q6) Following is record of hours worked per week of 100 workers in textile industry.

Hours/weeks	31-33	34-36	37-39	40-42	43-45	46-48
No. of workers	3	8	25	31	20	13

Calculate coefficient of variation and interpret the results.

Q7) Compare and contrast the following

- (i) Mean v/s Median.
- (ii) Mode v/s Mean

Q8) If

Q9) Differentiate w.r.t. x

(i) $y = \sqrt{\frac{(x-1)(x+2)}{(2x-1)(x-3)}}$

(ii) $\frac{1 + \sqrt{x}}{1 - \sqrt{x}}$

$(x - y)e^{\frac{x}{x-y}} = a$, prove that $y \frac{dy}{dx} + x = 2y$

Q10) Integrate the following functions w.r.t. x

(i) $\int (3x + 5)^6 dx$

(ii) $\frac{1}{(x^2 + 1)(x - 2)} dx$

Q11) (i) Integrate $\frac{1}{x^2 + x + 1}$ w.r.t. x

(ii) Find $\int_2^3 \frac{6x^2 + 1}{\sqrt{2x^3 + x - 2}} dx$

Q12) Compare and contrast Simpson's $\frac{1}{3}$ rule with Simpson's $\frac{3}{8}$ rule with at least one example for each.

Q13) If $I(t) = 3t^{1/3}$ crores of rupees per year, what will be the capital formation in the time period of 5 years and during the last year of the plan. Given $k(t) =$

$$\text{capital formation} = \int_0^t I(t) dt.$$

