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BCA (II)-203

2018

Time : 3Hrs

Full Marks : 80

Candidates are required to give their answers in their own words as far as practicable.

The questions are of equal value.

Answer any five questions in which Q. No. 1 is compulsory.

1. Indicate the correct answer :

- (a) A singular square matrix of order 4 has the rank
- (i) Less than 4
 - (ii) Equal to 4
 - (iii) Greater than 4
 - (iv) None of these
- (b) Which one of the following is true?
- (i) Inverse of rectangular matrix can exist
 - (ii) Inverse of non-singular square matrix exist
 - (iii) Inverse of a singular matrix exist
 - (iv) Inverse of a matrix always similar
- (c) In an upper triangular matrix, all elements below the principal diagonal are
- (i) Non zero
 - (ii) Zero
 - (iii) Both
 - (iv) None of these

P.T.O.

(d) $1 + \Delta$ is equal to

- (i) E (ii) $1 - E$
(iii) $E - 1$ (iv) None of these

(e) Simpson's 1/3rd rule has been approximate through the curve which is

- (i) Parabolic (ii) Elliptic
(iii) Cubic (iv) None of these

(f) $\Delta_0 f(a) = \dots\dots\dots$

(i) $\frac{b - a}{f(b) - f(a)}$

(ii) $\frac{f(b) - f(a)}{b - a}$

(iii) $\frac{f(b) + f(a)}{b + a}$

(iv) None of these

(g) If $f(x)$ is a polynomial of degree n in x , then the n th difference of $f(x)$ is

- (i) Zero
(ii) A polynomial of degree n
(iii) Constant
(iv) None of these

(h) After n bisection of unknown $[a, b]$ the length of the sub interval will be

(i) $\frac{a - b}{2^n}$

(ii) $\frac{b - a}{2^{n-1}}$

(iii) $\frac{b - a}{2^n}$

(iv) $\frac{ab}{2^n}$

2. (a) Derive Langrang's interpolation formula.

(b) The value of x and y are given as below:

x	5	6	9	11
y	17	13	14	16

Find the value of y when $x = 10$

3. (a) Derive Newton's forward difference interpolation formula

(b) Evaluate $\left(\frac{\Delta^2}{E}\right)x^3$

4. Find Simpson's 1/3rd integration formula and using this formula evaluate:

$$\int_0^6 \frac{ax}{1+x^2}$$

5. Discuss Gauss's elimination method and applying this method solve:

$$5x - y - 2z = 142$$

$$x - 3y - z = -30$$

$$2x - y - 3z = 5$$

6. (a) Discuss the equation of the pattern $y = ax^b + c$ in curve fitting.

(b) Fit a curve of the form $y = ax^b + c$ to the following data:

x	2	4	6	8	10
y	5.0	8.6	13.9	25.3	35.6

7. Find the first and second derivative of this function tabulated at $x = 0.6$

x	0.4	0.5	0.6	0.7	0.8	..
y	1.5836	1.7974	2.0442	2.3275	2.654	

8. Explain Newton's Raphson Method to solve of an algebraic equation.

Find the positive root of $2x^3 - 3x - 6 = 0$ by Newton's Raphson method.

9. Define an inverse of a matrix.

Find the inverse of the following matrix

$$\begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$$

using any method.
