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QP – 461

III Semester B.C.A. Degree Examination, April/May 2021
(Y2K8 Scheme) (R)
COMPUTER SCIENCE
BCA 306 : Numerical Analysis and Linear Programming

Time : 3 Hours | Max. Marks : 60/70

Instructions : *Answer **all** Sections.*
*(Section – **D** is applicable only for the students of **2012-13** and onwards).*
***60** marks for Repeater students prior to **2012-13**.*

SECTION – A

I. Answer **any five** of the following : **(5×2=10)**

1) Write any two types of errors.
2) Subtract 0.0943 E-3 from 0.5352 E-3.
3) Write the formula for Secant method.
4) Explain Gauss Elimination method for system of linear equations.
5) Write the formula for Trapezoidal rule for numerical integration.
6) Write the formula for Newton – Back – Ward interpolation formula.
7) Write the Newton – divided difference formula.
8) Define surplus variables.

SECTION – B

II. Answer **any three** of the following : **(3×5=15)**

9) Find a real root of the equation $x^3 - 2x - 5 = 0$ in (2, 3), using Newton-Raphson method. Correct to three decimal places in four stages.

10) Estimate f(1.4) from the following data :

x	1	2	3	4	5
f(x)	10	26	58	112	194

11) Evaluate $\int_0^3 \frac{dx}{(1+x)^2}$ by using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule. Divide into 3 equal parts.

P.T.O.

12) Solve $10x + 2y + z = 9$, $x + 10y - z = -22$, $-2x + 3y + 10z = 22$ using Gauss-Jacobi Method.

13) Solve $\frac{dy}{dx} = x + y$, and $y(0) = 1$ for $x = 1.1$ using Taylor's Series Method upto 3rd degree.

SECTION – C

III. Answer **any five** questions of the following : **(5×7=35)**

14) Determine the single-precision machine representation of the decimal number 52.234375 in both single precision and double precision.

15) Find the real root of the equation $f(x) = x^3 - 5x + 1 = 0$ between (0, 1) using bisection method perform in five stages.

16) Using Lagrange's interpolation formula find f(6) from the following data :

x	3	7	9	10
f(x)	168	120	72	63

17) Evaluate $\int_0^1 \frac{dx}{1+x}$ using trapezoidal rule by taking $h = \frac{1}{6}$.

18) Solve by Gauss elimination method.
$2x + y + z = 10$, $3x + 2y + 3z = 18$, $x + 4y + 9z = 16$.

19) Solve $\frac{dy}{dx} = x + y$ with initial condition $y = 1$ when $x = 0$ when $x = 0.2$ using Runge Kutta fourth order.

20) a) A company owned by Shree group produces two products P and Q. Each P requires 4 hours of grinding and 2 hours of polishing and each Q requires 2 hours of grinding and 5 hours of polishing. The total available hours for grinding is Rs. 20 and for polishing is Rs. 24. Profit per unit of P is Rs. 6 and that of Q is Rs. 8. Formulate the LPP. **3**

b) Solve using graphical method.
Min $Z = 3x + 2y$ subject to the constraints,
$5x + y \geq 10$, $2x + 2y \geq 12$ and $x + 4y \geq 12$, where $x, y \geq 0$. **4**

21) Solve by simplex method
Max $z = x_1 - x_2 + 3x_3$ subject to
$x_1 + x_2 + x_3 \leq 10$, $2x_1 - x_3 \leq 2$, $2x_1 - 2x_2 + 3x_3 \leq 0$,
Where $x_1, x_2, x_3 \geq 0$. **7**

SECTION – D

IV. Answer **any one** of the following : **(1×10=10)**

22) a) Write the dual of the following LPP :

Max $Z = 2x + 2x_2$ subject to

$4x + 5x_2$

$7x_1 + 8x_2 \leq 9$

$10x_1 + 11x_2 \leq 12$, $x_1, x_2 \geq 0$. **5**

b) Find a real root of the equation $x^3 - 2x - 5 = 0$ in (2, 3) using secant method. Perform only 4 iterations. **5**

23) a) Find f(10) using Newton's divided difference formula. **5**

x	4	7	9	12
f(x)	–43	83	327	1053

b) Use Taylor's series method to find y at x = 1.1 given that $\frac{dy}{dx} = x + y$ and y(1) = 0, upto terms containing third degree. **5**