SS – 692

III Semester B.C.A. Degree Examination, November/December 2018
(Y2K8) (Repeaters)
COMPUTER SCIENCE
BCA 306 : Numerical Analysis and Linear Programming

Time : 3 Hours Max. Marks : 60/70

Instructions : 1) *Answer **all** Sections.*
2) *Section – **D** is applicable to only students of **2012** and **2013** and onwards.*
3) ***60** marks for prior to **2012-13**.*

SECTION – A

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

1) Define :
   i) Round off error ii) Truncation error.
2) Find the sum of 0.123×10^3 and 0.456×10^2.
3) Define interpolation.
4) Write the formula for Newton-Raphson method.
5) Explain Gauss elimination method.
6) Write the formula for Taylor's series method.
7) Define surplus variable.
8) Define feasible region of a LPP.

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 secant method. Perform 3 iterations.
10) Using Lagrange's interpolation formula find f(6) from the following data :

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

P.T.O.

11) Evaluate $\int_0^3 \frac{dx}{(1+x)^2}$ by using Simpson's $\frac{3}{8}^{th}$ rule.

12) Solve the system of equations by Gauss elimination method :

$x + 2y + z = 3;$

$2x + 3y + 3z = 10;$

$3x - y + 2z = 13.$

13) Solve $\frac{dy}{dx} = y - x^2$, $y(0) = 1$ by Picard's method. Hence find the value of y(0.1) and y(0.2).

SECTION – C

III. Answer **any five** 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 root between 2 and 3 of the equation $x^3 - 2x - 5 = 0$ using bisection method in 5 stages.

16) Find the equation of the cubic curve which passes through the points (4, –43), (7, 83), (9, 327) and (12, 1053). Hence find f(10).

17) Solve by Gauss Jocobi method :

$10x + 2y + z = 9;$

$x + 10y - z = -22;$

$-2x + 3y + 10z = 22.$

18) Solve $\frac{dy}{dx} = x + y^2$; $y(0) = 1$ for $x = 0.2$ using Runge-Kutta method.

19) Evaluate $\int_0^1 \frac{dy}{1+x^2}$ using Simpson's $\frac{1}{3}^{rd}$ rule by dividing into 6 equal parts.

20) a) A factory manufactures two articles A and B. To manufacture the article A, a certain machine has to be worked for 1.5 hours and in addition a craftsman has to work for 2 hours. To manufacture the article B, the machine has to be worked for 2.5 hours and in addition the craftsman has to work for 1.5 hours. In a week the factory can avail of 80 hours of machine time and 70 hours of craftsman's time. The profit on each article A is Rs. 5 and that on each article B is Rs. 4. If all the articles produced can be sold away, find how many of each kind should be produced to earn the maximum profit per week. Formulate the LPP. **4**

b) Solve using graphical method :

Max $z = 5x + 7y$

Subject to

$x + y \leq 4$;

$3x + 8y \leq 24$;

$10x + 7y \leq 35$;

$x, y \geq 0$. **3**

21) Solve by simplex method :

Max $z = 4x + 10y$

Subject to constraints

$2x + y \leq 50$;

$2x + 5y \leq 100$;

$2x + 3y \leq 90$;

$x, y \geq 0$.

SECTION – D

(1×10=10)

IV. Answer **any one** of the following :

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

Max $z = x_1 + 2x_2 + x_3$

Subject to

$2x_1 + x_2 - x_3 \leq 2$

$-2x_1 + x_2 - 5x_3 \geq -6$

$4x_1 + x_2 + x_3 \leq 6$

$x_1, x_2, x_3 \geq 0.$ **5**

b) Use Newton Raphson method to find the real root of the equation $x^3 - 37 = 0$ which is near to $x = 3$ using 5 stages. **5**

23) a) Develop the divided difference table from the given data. Write down the interpolation polynomial. **5**

x	0	1	3	2	5
f(x)	2	1	5	6	– 183

b) Use Taylor's series method to find y at $x = 0.1$ considering terms upto the third degree given $\frac{dy}{dx} = x^2 + y^2$ and $y(0) = 1$. **5**
