



SS – 692

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III Semester B.C.A. Degree Examination, November/December 2018

(Y2K8) (Repeaters)

COMPUTER SCIENCE

BCA 306 : Numerical Analysis and Linear Programming

Time : 3 Hours

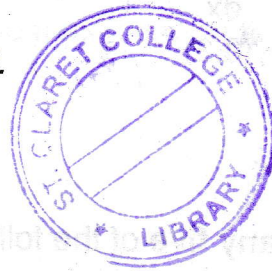
Max. Marks : 60/70

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 Jacobi 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.

10	9	7	4	2
83	72	120	168	175



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.

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b) Solve using graphical method :

$$\text{Max } z = 5x + 7y$$

Subject to

$$x + y \leq 4;$$

$$3x + 8y \leq 24;$$

$$10x + 7y \leq 35;$$

$$x, y \geq 0.$$

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21) Solve by simplex method :

$$\text{Max } z = 4x + 10y$$

Subject to constraints

$$2x + y \leq 50;$$

$$2x + 5y \leq 100;$$

$$2x + 3y \leq 90;$$

$$x, y \geq 0.$$



SECTION - D

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

(1×10=10)

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

$$\text{Max } z = x_1 + 2x_2 + x_3$$

Subject to

$$2x_1 + x_2 - x_3 \leq 2$$

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

$$4x_1 + x_2 + x_3 \leq 6$$

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

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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.

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

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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 $y(0) = 1$.

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