U-1527

B. A. / B. Sc. (Part - III) Examination, 2021

MATHEMATICS

Paper : III

Numerical Analysis & C-Programming

Time allowed : **Three Hours**

Maximum Marks : **50** Science
46 Arts

*This question paper contains **three** sections as under :*

Section-A *खण्ड–अ* ***Max. Marks-5 (Science/Arts)***

*This section contains **one compulsory** question with **10** parts, having 2 parts from each unit, short answer in **20** words for each part. All questions carry **equal** marks.*

*इस खण्ड में **एक अनिवार्य** प्रश्न हैं, जिसमें कुल **10** लघु प्रश्न होंगे । प्रत्येक लघु प्रश्न का उत्तर **20** शब्दों से अधिक न हो। सभी प्रश्नों के अंक **समान** हैं।*

Section-B *खण्ड–ब* ***Max. Marks-25 (Science/Arts)***

*This section contains **10** questions having **2** questions from each unit. Answer **5** questions (250 words each) selecting one question from each unit. All questions carry **equal** marks.*

*इस खण्ड में प्रत्येक इकाई से **2** प्रश्न लेते हुये कुल **10** प्रश्न हैं । प्रत्येक इकाई से एक प्रश्न का चयन करते हुये कुल **5** प्रश्नों के उत्तर देने हैं । प्रत्येक प्रश्न का उत्तर **250** शब्दों से अधिक न हो। सभी प्रश्नों के अंक **समान** हैं।*

Section-C *खण्ड–स* ***Max. Marks-20 (Science-20/Arts-16)***

*This section contains **4** descriptive type questions (questions may have sub division) covering all units but not more than **one** question from each unit. Answer any **two** questions (**500** words each.) All questions carry **equal** marks.*

*इस खण्ड में **4** वर्णनात्मक प्रश्न हैं (प्रश्न में भाग भी हो सकते हैं) जो सभी इकाईयों में से दिये जायेगें, किन्तु **एक** इकाई में से **एक से अधिक** प्रश्न नहीं होगा । किन्हीं **दो** प्रश्नों के उत्तर दिये जाने हैं । प्रत्येक प्रश्न का उत्तर **500** शब्दों से अधिक न हो। सभी प्रश्नों के अंक **समान** हैं।*

SECTION - A

1 (i) Why does C programming language called a higher level language ?

(ii) Write down structure of a most basic C program.

(iii) Define an identifier in C.

(iv) What is a pointer ?

(v) Define ∇ operator.

(vi) Write Newton-Gregory formula for forward interpolation.

(vii) Define Shapperd's central difference operator (δ).

(viii) Write down formula for Simpson's one third rule.

(ix) Define 'Roots' of a Algebraic equation.

(x) Write down Picard's method of successive approximation.

SECTION - B

UNIT - I

2 (i) Why is the main ( ) function is so special ?

(ii) Define keyword in C programming.

3 Draw a flow chart to find average of 'n' numbers.

UNIT - II

4 How do you define a "user define function". What is the significance of defining a function ?

5 Prove that $e^{-hD} \equiv 1 - \nabla$.

UNIT - III

6. Find the missing term in the following table:

x:	0	1	2	3	4
y:	1	3	9	x	81

Also explain why is the resulting value differs from 3^3?

7. Given that

f(20) = 14, f(24) = 32, f(28) = 35, f(32) = 40

Now use Gauss's forward formula to show that f(25) = 33.

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UNIT - IV

8. Find the first derivative of f(x) at x = 0.4 using following data :

x:	0.1	0.2	0.3	0.4
f(x):	1.10517	1.22140	1.34986	1.49182

9 Use Simpson's 1/3 rule to evaluate $\int_1^{1.3} y\,dx$ from the values of x and y tabulated as under :

x	y	x	y
1.00	1.00000	1.05	1.02470
1.10	1.04881	1.15	1.07338
1.20	1.09544	1.25	1.11803
1.30	1.14017		

UNIT - V

10 Using Bisection Method, find the real roots of the equations $x^4 - 2x^3 - x - 1 = 0$ lying in the interval [0, 1].

11 By using Newton Rephson method find the roots of equation $x^4 - x - 10 = 0$, which is nearer to x = 2, correct to the three decimal places.

SECTION - C

12 Write down the program in C to find roots of the equation $Ax^2 + Bx + C = 0$ for various values of A,B and C. Also draw a flow chart for the same.

13 (i) Prove that

$$\Delta^n 0^{n+1} = \frac{n}{2}(n+1)\,\Delta^n 0^n = \frac{n}{2}.(n+1)!$$

(ii) The values of f(x) are given at a, b and c show that the maximum or minimum is obtained by.

$$x = \frac{1}{2}\frac{(b^2-c^2)\,f(a)+(c^2-a^2)\,f(b)+(a^2-b^2)\,f(c)}{(b-c)\,f(a)+(c-a)\,f(b)+(a-b)\,f(c)}$$

14 Prove that

(i) $$D \equiv \frac{1}{h}\log(1+\Delta) \equiv \frac{1}{h}\left[\Delta - \frac{\Delta^2}{2} + \frac{\Delta^3}{3} - \frac{\Delta^4}{4} + \ldots\right]$$

and subsequently

(ii) $$D^r \equiv \frac{1}{h^r}[\log(1+\Delta)]^r$$

15 Using Euler's Modified Method, obtains a solution of equation

$$\frac{dy}{dx} = x + |y| = f(x, y)$$

With the initial condition y = 1 at x = 0 for the range $0 \le x \le 0.6$ in steps of 0.2.

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