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DBK-003-2015002 Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

June - 2022

Mathematics : Paper-06(A)

(C Language & Numerical Analysis-I)

Faculty Code : 003

Subject Code : 2015002

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Attempt any **Five** questions.

(2) Figure to the **right** indicate full marks of the question.

1 (A) Answer the following questions. **04**

(a) The allowable range for _____ constants is - 32768 to 32767.

(b) Which keyword declare a real variable ?

(c) The command 3^2 is invalid in C. (True/False)

(d) What is the full form of ANSI ?

1 (B) Write output of the following program. **02**

```
#include<stdio.h>
void main( )
{
    int a=2, b;
    float c=4.2;
    b=a+c/2;
    printf("%d", b);
}
```

1 (C) Write note on hierarchy of arithmetic operators. **03**

1 (D) Explain if else statement with flow chart and suitable example in C language. **05**

2 (A) Answer the following questions : **04**

(a) Scanf is a keyword in C. (True / False)

(b) Use of backslash character \v is _____?

(c) What is the significance of keyword void ?

(d) Integer, real and character constants are _____ type of constants.

2 (B) List logical operators with propose in C. **02**

2 (C) Write general form of conditional operator and explain it with suitable example. **03**

2 (D) Write rules for constructing real contacts. **05**

3 (A) Answer the following questions. **04**

(a) Write a difference between while and do-while.

(b) Which statement passes control to begin next iteration of loop without executing successor statements ?

(c) If the function *f* defined as :

```
int f(int x)
{
    int y;
    y=x/2;
    return(y);
}
```

then what is return value of f(11)?

(d) What is format specification for variable of type long double ?

3 (B) Write a program to find product of n numbers entered through keyboard. **02**

3 (C) Explain goto statement in C with suitable example. **03**

3 (D) How does for loop works ? Explain its different component with suitable example. **05**

4 (A) Answer the following questions. **04**

(a) How many loops available in C ?

(b) Command : for(;i<10 ;) in C program is vaild. (True / False)

(c) %f is format specification for variable of the type_____.

(d) What is the maximum size in bytes of a double variable in 32bit compiler ?

4 (B) Explain continue statement. **02**

4 (C) Write C program to generate first 15 terms of Fibonacci sequence. **03**

4 (D) Explain user defined function with argument and without arguments. Also give suitable example of each. **05**

5 (A) Answer the following questions. **04**

(a) C compiler convert expanded source code (.I) into object file (.OBJ). (True / False)

(b) Find error from the following statement of C program, if exists: #define f(x) 2x

(c) Which header file must be included to use pow function in C program.

(d) Which header file refers to standard input and output functions ?

5 (B) Explain the syntax long a[5][4]. **02**

5 (C) Explain initialization, declaration and general expression of two dimensional array. **03**

5 (D) Write a note Macro expansion. **05**

6 (A) Answer the following questions. **04**

(a) Which component of C processor convert object code and library function into executable code?

(b) An array can be initialize at the time of type declaration. (True / False)

(c) #define directive is used for _____. (user defined function /macro / operators)

(d) File extension of executable source code in C language is _____.

6 (B) What is the role of linker in C programming ? **02**

6 (C) Explain briefly the role of compiler in C language. **03**

6 (D) Write C program to get multiplication of matrix $A=(a_{ij})_{n\times n}$ with scalar matrix. **05**

7 (A) Answer the following questions. **04**

(a) How many solution/s exist for system of linear equations AX=0 with A is singular?

(b) If system of linear equations satisfies diagonal dominant property, then the Gauss-Seidel method can not be convegent ? (True / False)

(c) Write normal equations of linear law $y=ax+b$ fit by principle of least square.

(d) In process of Gauss elimination method, coefficient matrix of the given system is transformed into row echelon form of matrix. (True / False)

7 (B) If linear law of $y=\frac{1}{ax+b}$ is $Y=AX+B$, then **02**

Y=_____, X=_____, A=_____ and B=_____.

7 (C) Explain Gauss-Jacobi method to get solution of system of n linear equations with n unknowns. **03**

7 (D) Derive normal equations for principle of least-squares to fit the data to a parabolic law $y=ax^2+bx+c$. **05**

8 (A) Answer the following questions. **04**

(a) Write a difference between Gauss elimination method and Gauss-Jordan elimination method.

(b) A square matrix A can be uniquely expressed as a product of a lower triangular matrix L and an upper triangular matrix U, provided all the principal minors of A are non-singular.
(True / False)

(c) Write a name of iterative method to solve system of simultaneous linear equations.

(d) Convert $y = ae^{bx}$ into linear law.

8 (B) Discuss consistency of the system of simultaneous linear equations $AX=B$. **02**

8 (C) Fit a geometric curve $y = ax^b$ to the following data : **03**

x	1	2	3	4	5
y	7.1	27.8	62.1	110	161

8 (D) Explain Craut's method. **05**

9 (A) Answer the following questions. **04**

(a) Define : Reciprocal factorial polynomial.

(b) If error accrued in y_3 is 0.02, while collecting data then how much error will appear in the value of $\Delta^2 y_2$?

(c) If $p(x) = 2x^{[5]} - 3x^{[2]} - 7x^{[1]} + 5$ is representation in form of factorial polynomial of $p(x) = a_0x^5 + a_1x^4 + a_2x^3 + a_3x^2 + a_4x + a_5$ then the value of a_0 is_____.

(d) Define : Interpolation.

9 (B) Prove that $\Delta - \nabla = \Delta\nabla$. **02**

9 (C) Prove that $\Delta^n \sin(ax+b) = \left(2\sin\frac{ah}{2}\right)^n \sin\left(ax+b+\frac{nah+n\pi}{2}\right)$. **03**

9 (D) If $S_n = 1^3 + 2^3 + 3^3 ..... + n^3$, then using Newton's forward interpolation formula show that $S_n = \frac{n^2(n+1)^2}{4}$. **05**

10 (A) Answer the following questions : **04**

(a) Define : Central difference operator.

(b) Exactly n degree polynomial can be fit to set of n observation. (True/False)

(c) Best suitable range for $p = \frac{x - x_0}{h}$ to apply Gregory-Newton forward interpolation formula is _____.

(d) Write a relation between Forward difference operator and Shift operator.

10 (B) In usual notation prove that $D = \frac{1}{h}\sinh^{-1}(\mu\delta)$. **02**

10 (C) Represent the polynomial $p(x) = x^5 - 2x^3 + 3x$ into factorial polynomial, keeping $h=3$. **03**

10 (D) Derive Gregory Newton's backward interpolation formula. **05**
