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0304N35

Candidate's Seat No :_____

M.Sc Semester-4 Examination

508

Physics

April-2024

Time : 2-30 Hours] **[Max. Marks : 70**

Instructions: (i) Attempt All Questions.

(ii) Symbols and terminology have their usual meaning

Q.1 (A) Examine four potential outcomes for a system of simultaneous linear equations. Give an example to illustrate each of these. [07]

(B) The following set of equations can be solved by using the Gauss elimination method. [07]

$10x - 7y + 3z + 5u = 6$, $-6x + 8y - z - 4u = 5$, $3x + y + 4z + 11u = 2$ and $5x - 9y - 2z + 4u = 7$.

OR

Q.1 (A) Applying factorization method to solve following equations. [07]

$2x + 3y + z = 9$, $2x + 2y + 3z = 6$ and $3x + y + 2z = 8$.

(B) Explain the benefits and drawbacks of the Newton-Raphson theory for resolving non-linear simultaneous equations. [07]

Q.2 (A) R is the resistance to motion of a train at speed V; find a low of the type $R = a + bV^2$ connecting R and V, using the following data. [07]

V (km/hr)	10	20	30	40	50
R (kg/ton)	8	10	15	21	30

(B) Explain method of group averages. State its limitations. [07]

OR

Q.2 (A) The following values of x and y are supposed to follow the law $y = ax^2 + b\log_{10}x$. Find graphically the most probable values of the constants a and b. [07]

x	2.85	3.88	4.66	5.69	6.65	7.77	8.67
y	16.7	26.4	35.1	47.5	60.6	77.50	93.4

(B) Fit a curve of the form $y = ae^{bx}$ to the following data: [07]

x	0	1	2	3
y	1.05	2.10	3.85	8.30

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Q.3 (A) Write a program to read a series of 100 float values through keyboard, with help of a function calculate the standard deviation of the series. Print result from main() [07]

$$s = \sqrt{\frac{1}{n}\sum (x_i - avg)^2}$$

(B) Define a structure named **personal**, that would contain name, age, height and weight as its elements. Using this structure write a program to read information for a group of 100 persons. Program should find out and print average age of the group. [07]

OR

Q.3 (A) Write a program to read a positive number, call a function to get lowest digit in that number. Input/output operations should be performed from main(). eg. 3424 → 2 [07]

(B) Mention major advantages of using pointers in C language. [07]
Write a program to initialize an array with 10 values, using pointers find out number of values greater than average of all values in the array. Print results with proper message from main().

Q.4 (A) A file named **input** contains a series of float values. Code a program to read these values and then write all values less than zero in a file named **output1** and remaining values in another file named **outout2**. Read content of file named **output2** and find out and print sum of all values. Program should check errors in opening the input file. [07]

(B) Write the basic concept of Trapezoidal method for numerical integration. [07]
Write a program to integrate the following. Get limit values from user.

$$\int_a^b (1 + x^2)\, dx$$

OR

Q.4 (A) A file named **sample.dat** is given, write a program to copy content of the file into a user specified file. The program should print how many uppercase letters are there in the file. [07]

(B) Write a program based on RK4 method to get solution of the ordinary differential equation given below with following conditions. [07]
Find y(0.2), if dy/dx = (y – x)/(y + x), y(0) = 1.

Q.5 Answer **Any Seven** questions from the following: (**two** marks each). [14]

(i) In solving simultaneous equations by Gauss-Jorden method, the coefficient matrix is reduced to _____ matrix. (null, unit, diagonal)

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(ii) To which form the coefficient matrix is transferred when $AX = B$ is solved by Gauss elimination method.

(iii) Only in cases when the coefficient matrix is diagonally dominant does the Gauss-Seidal iteration converge. (TRUE or FALSE)

(iv) What is the underlying assumption of the method of moments?

(v) Write down the least squares principle.

(vi) Get the linear form of $y = ax^b + c$.

(vii) Write prototype of the functions corresponding to the following function call statements

```
int x;   float y[10];
i). sample(x, 5.5);      ii). testing(&x, y, 5);
```

(viii) What is meant by recursive function?

(ix) How a union is different from structure?

(x) What is a pointer? How a pointer variable is initialized?

(xi) Correct errors in the following statements

```
structure sample
{       char name[15];
        int age = 23;
} student[10];
```

(xii) Write output of the following program segment

```
int x[10] = {2, 4, 6, 8, 10, 12, 14, 16, 18 },  y = 0, *px ;
for (px = x;  px < x+3;  px++)
        sum += *px;
printf("%d %d", *px, y);
```

***** PAPER ENDS *****