2018

CBCS

1st Semester

PHYSICS

PAPER—C1P

(Honours)

(Practical)

Full Marks : 20

Time : 1 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Attempt any one set of question frpm the following

Total Marks = 20 (Programming, execution, I/O (or, graphical display) = 15 Viva + LNB =05

Instruction :

Write down the necessary fornula.

Write the computer code in (PYTHON or in C) clearly

Print the input and output

Display your result graphically if asked.

1. (i) Write a computer program to find the trace, Tr (A) of the following matrix : 7

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

(ii) Evaluate $\int \log x \, dx$ within limit 4 to 5·2 by Simpson's 1/3 rule. 8

2. (i) The temperature θ of a well stirred liquid by the isothermal heating coil is given by the equation

$\dfrac{d\theta}{dt} = k(100 - \theta)$, where k is a constant of the system. Write a computer program to solve the equation by Range-Kutta fourth order method to find θ at $t = 1·0$ see for $k = 2·5$ Initial condition $\theta = 25°c$ at t = 0 sec. 7

(ii) Write down the program to print the Fibonacci sequence. 8

3. (i) Write a computer program to compute $n!$ where $n = 10$. 7

(ii) Write a computer program to evolute $f(15)$, given the following table of values. 8

x	10	20	30	40	50
$y = f(x)$	46	66	81	93	101

4. (i) Write a computer program where you utilize random number generator to evaluate the value of π with the level of accuracy of 10^{-4}. 7

(ii) Compute $\left(\dfrac{N}{n}\right) = \dfrac{N!}{n!(N-n)!}$ for $N = 7$, $n = 3$, 8

5. (i) Given some data : $x = 87, 91, 85, 75, 28, 122, 66, 56$, find the (arithmetic) mean and rms value of the variable x. 7

(ii) Write a computer program to find the cosine series

$$\cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{2\sim} + \dots$$ 8

6. (i) Write down the program to check whether 153 is Armstrong number. 7

(ii) Calculate the value of the elliptic integral of the first kind. 8

$$k(0·25) = \int_0^{\pi/2} \frac{dx}{\sqrt{1 - 0·25 \sin^2 x}}$$

Divide the interval $[0, \pi/2]$ into 1000 equal parts and use composite Trapezoidal rule to evaluate the integral.

7. (i) Write down the computer program to find the octal number of decimal number 20. 7

(ii) Find the surface area and volume of cuboids of width, length and height are 22, 23, 24 by computer program. 8

8. (i) Write down the program to calculate the mean, variance and standard deviation of 34, 88, 32, 12, 10. 7

(ii) Write down the computer program to check 1999 and 2018 are leap year or not. 8

9. (i) The distance travelled by a car in km, at intervals of 2 min are given as follows : 8

Time (m)	2	4	6	8	10
Distance (km)	0·75	2·00	3·50	5·35	8·00

Write a computer program to evaluate the velocity at $T = 5$ min.

(ii) Write a computer program following Newton-Raphson method to find out a real root of the equation $\cos = 3x - 1$, around $x \approx 1$. 7

10. (i) Consider the error function, $erf(x) = \dfrac{2}{\sqrt{\pi}} \displaystyle\int_0^x e^{-t^2} dt$, the values of which are given as following : 7

x	1·0	1·2	1·4	1·6	1·8	2·0
erf (x)	0.84270	0·91031	0·95229	0·97635	0·98909	0·99532

Write a forward or backward difference interpolation program to calculate the value of erf (1·433).

(ii) Write a computer program to find the roots of the equation by Bisection method $x^3 + 3x - 5 = 0$ 8

The first approximation to the root is 4

The second approximation to the root is 5

The number of integration is 5

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