

**M.Sc. II Semester Degree Examination, Sept./Oct. - 2024****PHYSICS****Computational Physics****(NEP)**

Time : 3 Hours

Maximum Marks : 70

Note : Answer **any five** of the following questions with Question **No.1 (Q1)** is **Compulsory**, each question carries **equal** marks.

1. (a) Write a C-program to check the entered letter is an vowel or consonant using switch. **5**
- (b) Describe arithmetic expressions in C. **5**
- (c) Explain scanf and printf statements with examples. **4**

2. (a) Obtain the general formula for numerical integration and hence obtain Trapezoidal rule. **9**
- (b) Using the method of least squares, find the linear line $y=ax+b$ that fits the following data : $(x, y)=(1, 2), (2, 3), (3, 4), (4, 5)$ and $(5, 6)$. **5**

3. (a) Set-up wave equation for a vibrating string. **8**
- (b) List out Laplace's equation in cylindrical and spherical coordinates. **6**

4. (a) List out the differences between discrete random variable and continuous random variable. **6**
- (b) Show that Poisson's distribution approaches Gauss distribution for larger 'n' and mean value ' μ '. **8**

5. (a) What are experimental errors ? Explain the types and sources of experimental errors. **6**
- (b) By least square method, determine the constants 'a' and 'b' by fitting the curve $y=ae^{bx}$ to the following data : **8**

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62



6. (a) Solve by Euler's modified method, the problem $dy/dx=(x+y)$, $y(0)=0$ choosing $h=0.2$ and compute $y(0.2)$ and $y(0.4)$. **8**
- (b) Obtain the heat equation for heat flow from a body in space. **6**
7. (a) Explain Poisson's distribution. If the probability of producing a defective screw $p=0.01$, what is the probability that a lot of 100 screws will contain more than 2 defectives ? **7**
- (b) Calculate the four digit value of $\ln 9.2$ from $\ln 9.0=2.1972$, $\ln 9.5=2.2513$ by linear Lagrange interpolation and determine the error using $\ln 9.2=2.2192$. **7**
8. (a) The distances in cm traversed by a particle at different times (seconds) are given below : **5**
- | | | | | | | | |
|--------------|------|------|------|------|------|------|------|
| t(s) | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 |
| x(cm) | 4.01 | 4.16 | 4.29 | 4.36 | 4.40 | 4.38 | 4.32 |
- Find the acceleration and momentum of the particle (for $m=1\text{g}$) of the particle at $t=0.2$ seconds.
- (b) The box contains 6 red and 4 blue balls. Find the probability of drawing first the red and then the blue ball. **5**
- (c) Explain the rules of significant figures with examples. **4**

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