Laxmi Narayan Dubey College, Motihari

Internal Assessment Examination-2023

1st SEMESTER

SUBJECT: PHYSICS (Minor Course MIC-1)

Name of Course: Introduction to Mathematical Physics & Classical Mechanics

Full Marks: 15

PART –A

Answer any FIVE **(5 ×1=5)**

A. Objective/ Multiple Choice Type Questions:

1. What is the derivative of the constant function f(x) = 7 with respect to x?
a) 0
b) 7
c) 1
d) -7

2. The slope of the tangent line to the curve $y = x^2$ at the point (2, 4) is:
a) 1
b) 2
c) 4
d) 8

3. If f(x) = sin(x), what is f'(x)?
a) cos(x)
b) -sin(x)
c) 1
d) 0

4. The derivative of ln(x) with respect to x is:
a) 1/x
b) ln(x)
c) x
d) 0

5. If $f(x) = e^x$, what is f'(x)?
a) e^x
b) $1/e^x$
c) x
d) 0

6. The critical point of the function $f(x) = x^2 + 4x - 7$ occurs at:
a) x = 2
b) x = -2
c) x = 0
d) x = -4

7. Which operation yields a scalar result?
A) Cross product
B) Dot product
C) Vector addition
D) Vector multiplication

8. Which of the following is the indefinite integral of $\int(4e^{(2x)} - 3/x^2)\,dx$?
A) $2e^{(2x)} - 3/x + C$
B) $2e^{(2x)} + 3/x + C$
C) $4e^{(2x)} - 3\ln(x) + C$
D) $4e^{(2x)} + 3/x + C$

PART –B

Answer any FIVE **(5 ×1=5)**

B. Fill in the blanks:

1. The derivative of the function f(x) = tan(x) is_____.
2. Time period is a _____quantity.
3. The derivative of ln(x) with respect to x is _____.
4. Force is a _____ quantity.
5. The derivative of the constant function f(x) = 7 with respect to x is _____.
6. The function $f(x) = x^4 - 3x^2 + 2$ has local minimum(s) at _____.

PART –C

Answer any FIVE **(5 ×1=5)**

C. Short Type Questions:

1. Define a vector field and provide an example from the physical world.
2. What is the gradient of a scalar field, and how is it calculated?
3. What is curl in a vector field and provide its mathematical representation.
4. What are the Einstein's postulates in special theory of relativity?
5. Define Inertial frame of reference.
6. If $f(x) = x^{(1/3)}$, what is f'(x)?
7. Evaluate $\int(5/x)\,dx$.