V—111—2017

FACULTY OF SCIENCE

B.Sc. (First Semester) EXAMINATION

OCTOBER/NOVEMBER, 2017

(CBCS Pattern)

PHYSICS

Paper II (PHY-112)

(Mathematical Methods in Physics)

(MCQ+Theory)

(Saturday, 18-11-2017)   **Time : 10.00 a.m. to 12.00 noon**

Time—2 Hours   *Maximum Marks—40*

N.B. :— (i) All questions are compulsory.

    (ii) All questions carry equal marks.

    (iii) Use of logarithmic table and non-programmable calculator is permitted.

(MCQs)

1. Attempt all :   10

    (i) Green's theorem in the plane is a special case of :

        (a) Gauss theorem   (b) Gauss divergence theorem

        (c) Stokes' theorem   (d) Laplace's theorem

    (ii) If curl of a vector is zero, that vector is known as :

        (a) Definite   (b) Solenoid

        (c) Rotational   (d) Irrotational

    (iii) If divergence of a vector of a point is negative, then that point is in .... of that vector field.

        (a) Source   (b) Sink

        (c) Source or sink   (d) Source and sink

P.T.O.

(iv) In complex number the value of i is given by :

(a) $\sqrt{2}$ (b) $\sqrt{+1}$

(c) $\sqrt{-1}$ (d) 1

(v) Product of the complex number $(3 + 3i)$ and $(3 - 3i)$ is :

(a) 9   (b) 12

(c) 3   (d) 18

(vi) The moduli of product of two complex number is equal to the product of their :

(a) Real   (b) Imaginary

(c) Argument   (d) Moduli

(vii) If $f'(x)$ goes from ...., then the point is minima.

(a) positive to negative

(b) negative to positive

(c) zero to negative

(d) negative to zero

(viii) Total differentiation of $g = f(x, y)$ is given by :

(a) $dg = \left(\dfrac{\partial f}{\partial y}\, dx + \dfrac{\partial f}{\partial y}\, dy \right)$

(b) $dg = \dfrac{\partial}{\partial x}\, dx + \dfrac{\partial}{\partial y}\, dy$

(c) $dg = \left(\dfrac{\partial}{\partial x} + \dfrac{\partial}{\partial y} \right) g$

(d) $dg = \dfrac{\partial f}{\partial x}\, dx + \dfrac{\partial f}{\partial y}\, dy$

(*ix*)   A function is said to be odd if *f*(–*x*) = ...

(*a*)   –*f*(*x*)

(*b*)   *f*(*x*)

(*c*)   *f*(2*x*)

(*d*)   2*f*(*x*)

(*x*)   Function having .... magnitude discontinuties can be represented by Fourier series.

(*a*)   Negative

(*b*)   Zero

(*c*)   Finite

(*d*)   Infinite

(Theory)

2.   Attempt the following questions (any *five*) :   10

(*a*)   Define divergence of vector field.

(*b*)   What is Argand diagram ?

(*c*)   Define chain rule in partial differentiation.

(*d*)   What is Dirichlet's condition ?

(*e*)   State Green's theorem.

(*f*)   Define Moduli and argument in complex number

(*g*)   State cosine series in Fourier series.

3.   Attempt the following questions :   10

(*a*)   Explain physical significance of curl of vector field.

Or

Explain multiplication of complex number using argand diagram.

P.T.O.

(b) Explain Laplace equation in problems of spherical summetry.

Or

Explain physical application of Fourier series analysis square wave.

4. Attempt the following questions : 10

(a) Derive vector tripple product, three vector $\vec{A}, \vec{B}$ and $\vec{C}$ as

$$\vec{A} \times (\vec{B} \times \vec{C}) = \vec{B}\ (\vec{A} \cdot \vec{C}) - \vec{C}(\vec{A} \cdot \vec{B}) \cdot$$

Or

(b) State Fourier series, evaluate the coefficient a_o, a_n, b_n of Fourier series.