Y—149—2019

FACULTY OF SCIENCE

B.Sc. (F.Y.) (First Semester) (Backlog) EXAMINATION

OCTOBER/NOVEMBER, 2019

(CBCS Pattern/Old Course)

PHYSICS

Paper (PHY-112)

(Mathematical Methods in Physics-II)

(MCQ + Theory)

(Thursday, 21-11-2019)   **Time : 10.00 a.m. to 12.00 noon**

Time— Two Hours   *Maximum Marks—40*

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

         (*ii*)   *All* questions carry equal marks.

        (*iii*)   Use of non-programmable calculator and log table is allowed.

        (*iv*)   Figures to the right indicate full marks.

        (*v*)   Symbols have their usual meanings.

(MCQ)

1.   Choose the *correct* alternative :   10

     (*i*)   The vector triple product of three vectors $\vec{A}, \vec{B}$ and $\vec{C}$ is given by :

         (*a*) $\bar{A} \cdot (\bar{B} \cdot \bar{C})$ (*b*) $\bar{A} \times (\bar{B} \times \bar{C})$

         (*c*) $\vec{A} \cdot (\vec{B} \times \vec{C})$ (*d*) $\vec{A} \cdot (\vec{B} \cdot \vec{C})$

     (*ii*) $\vec{\Delta} \cdot \vec{\Delta} \times \vec{A}$ is equal to :

         (*a*)   zero   (*b*)   infinite

         (*c*)   finite   (*d*)   none of these

(*iii*) The curl of a vector field is :

    (*a*)   zero   (*b*)   scalar

    (*c*)   finite   (*d*)   vector

(*iv*) In the complex number $z = re^{i\theta}$, the angle θ is called as :

    (*a*)   Modulus   (*b*)   Argument

    (*c*)   Gaussian plane   (*d*)   Vector Identity

(*v*) If $Z_1 = 2 + 3i$ and $Z_2 = 4 + i$, then $Z_1 - Z_2$ is :

    (*a*) $6 + 4i$ (*b*) $-2 + 2i$

    (*c*) $-2 - 2i$ (*d*) $3 + 4i$

(*vi*) If Z is a complex number and Z^{-1} is a multiplication inverse of Z, then $2Z^{-1}$ is equal to :

    (*a*)   1   (*b*)   0

    (*c*) Z^2 (*d*) Z^{-2}

(*vii*) Implicit functions are expressed in the form :

    (*a*) $f(x) = \infty$ (*b*) $f(x, y) = 0$

    (*c*) $f(x, y) = \dfrac{\partial y}{\partial x}$ (*d*) $f(x, y) = \dfrac{\partial x}{\partial y}$

(*viii*) The chain rule is total differentiation of ....function.

    (*a*)   Composite   (*b*)   Implicit

    (*c*)   Explicit   (*d*)   Continuous

(*ix*) A function is said to be even if $f(-x) =$

    (*a*) $-f(x)$ (*b*) $f(x)$

    (*c*) $f'(x)$ (*d*) $f'(-x)$

(*x*) Fourier sine series is represented by :

    (*a*) $\displaystyle\sum_{n=1}^{\infty} b_n \cos nx$ (*b*) $\displaystyle\sum_{n=1}^{\infty} b_n \sin nx$

    (*c*) $\displaystyle\sum_{n=1}^{\infty} a_n \sin nx$ (*d*) $\Sigma a_n \cos nx$

(Theory)

2. Attempt any *five* of the following : 10

   (a) State Stokes' theorem.

   (b) Define divergence of a vector field.

   (c) Find the multiplication of $z_1 = 3 + 5i$ & $z_2 = 2 - i$

   (d) Define Modulus and Argument of a complex number.

   (e) Explain the condition for maxima and minima.

   (f) State cosine series in Fourier series.

   (g) State Dirichlet's conditions.

3. Attempt the following questions : 5

   (a) Define gradient of a scalar function and give its physical significance.

   Or

   With the help of Argand diagram explain addition of two complex numbers.

   (b) State and explain chain rule. 5

   Or

   Evaluate the coefficients d_0 and d_n of Fourier series in the interval 0 to 2π.

4. Attempt the following questions : 10

   (a) State and explain scalar triple product of three vectors $\vec{A}, \vec{B}$ and $\vec{C}$.

   Or

   (b) Write notes no :

   (i) Explain physical application of square wave using Fourier series.

   (ii) Define partial differentiation and find out $\dfrac{\partial f}{\partial x}$ and $\dfrac{\partial f}{\partial y}$ of $f(x, y) = x^2y - y^2x$.