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AO—108—2018

FACULTY OF SCIENCE

B.Sc. (First Semester) EXAMINATION

MARCH/APRIL, 2018

(CBCS/CGPA Pattern)

PHYSICS

Paper II (Phy-112)

(Mathematical Methods in Physics)

(MCQ & Theory)

(Wednesday, 4-4-2018)   **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 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*)   Gauss's divergence theorem relates volume integral of divergence of a vector to .... of normal component of that vector.

       (*a*)   Line integration   (*b*)   Surface integration

       (*c*)   Volume integration   (*d*)   Cube integration

                                                              P.T.O.

(*ii*) $\nabla \times (\nabla\phi)$ where ϕ is a scalar, is equal to :

    (*a*)   Finite   (*b*)   Infinite

    (*c*)   Zero   (*d*)   Undetermined

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

    (*a*)   Sink   (*b*)   Source

    (*c*)   Source or Sink   (*d*)   Source and Sink

(*iv*) $\alpha + i\beta$ is a complex number, then i equal to :

    (*a*) $i = 1$ (*b*) $i = -1$

    (*c*) $i = -1^2$ (*d*) $i = \sqrt{-1}$

(*v*) $|z| = |x + iy| = +\sqrt{x^2 + y^2}$, then $|z|$ is called :

    (*a*)   Matrix   (*b*)   Moduli

    (*c*)   Negative   (*d*)   Argument

(*vi*) A complex number and its conjugate yields .... of the real parts of the quantity obtained by sum.

    (*a*)   Zero   (*b*)   One

    (*c*)   Thrice   (*d*)   Twice

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

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

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

(*viii*) If $f'(x)$ goes from .... then the point is maxima.

    (*a*)   Positive to negative   (*b*)   Negative to positive

    (*c*)   Zero to negative   (*d*)   Negative to zero

(*ix*) For an odd function area under the curve from ($-\pi$ to π) is :

(*a*) $-\infty$ (*b*) $+\infty$

(*c*) $+1$ (*d*) 0

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

(*a*) $\sum\limits_{n=1}^{\infty} b_n \sin nx$ (*b*) $\sum\limits_{n=1}^{\infty} a_n \sin nx$

(*c*) $\sum\limits_{n=1}^{\infty} b_n \cos nx$ (*d*) $\sum\limits_{n=1}^{\infty} a_0 \sin nx$

Theory

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

(*a*) Define Gradient of a scalar field.

(*b*) Define Complex number.

(*c*) Define Implicit function.

(*d*) State Dirichlet's condition.

(*e*) State Green's theorem.

(*f*) Define Argand diagram of complex no.

(*g*) Define Fourier series.

3. Attempt the following question : 10

(*a*) Explain Divergence of a vector field.

Or

(*b*) Explain Addition of two complex no. using Argand diagram.

P.T.O.

(*c*) Explain Laplace's equation in rectangular symmetry.

Or

(*d*) Explain physical application of Fourier series analysis square wave.

4. Attempt the following question (any *one*) : 10

(*a*) Show that :

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

(*b*) Explain Graphical representation of even and odd function.