G—52—2015

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

MARCH/APRIL, 2015

PHYSICS

Paper II (Phy-112)

(Mathematical Methods in Physics)

(MCQ and Theory)

(Tuesday, 21-4-2015)   **Time : 10.00 a.m. to 12.30 p.m.**

Maximum Marks—40

Time—2½ Hours

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

(ii)   *All* questions carry equal marks.

(iii)   Non-programmable calculator is allowed.

P.T.O.

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(MCQ)

(i) Unit vectors $\vec{i}, \vec{j}$ and $\vec{k}$ are always...................to each oth

   (a) Parallel

   (b) Perpendicular

   (c) Finite

   (d) Infinite

(ii) Laplacian operator is represented by :

   (a) ∇^2

   (b) ∇

   (c) Δ

   (d) Δ^2

(iii) Curl grad ϕ, where ϕ is a scalar, is equal to................

   (a) One

   (b) ∇^2

   (c) Zero

   (d) Finite

(iv) In the complex number $z = x + iy$, x is called as.......................
part.

    (a)   Finite

    (b)   Infinite

    (c)   Imaginary

    (d)   Real

(v) In complex number, the value of 'i' is given by :

    (a)   1

    (b) $\sqrt{+1}$

    (c) $\sqrt{-1}$

    (d) $\sqrt{2}$

(vi) If z is a conjugate of $\bar{z}$, then $\bar{z}$ is conjugate of :

    (a) z

    (b) $\bar{z}$

    (c) $z\bar{z}$

    (d) $\bar{z}z'$

(vii) In polar co-ordinate system any point in a plane is represe

by :

(a)   (sin, (∞)

5.

(b)   (r, θ)

(c)   (x, ψ)

(d)   (x, y)

(viii) Cartesian co-ordinates and polar co-ordinates related on the ba

of.....................

(a)   Algebra

(b)   Trigonometry

(c)   Statistics

(d)   Calculus

A

ted

(ix) The term a_n in Fourier series is represented by :

(a) $\dfrac{1}{\pi}\displaystyle\int_{0}^{\pi} f(x) \sin nx \, dx$

(b) $\dfrac{1}{2\pi}\displaystyle\int_{0}^{2\pi} f(x) \sin nx \, dx$

(c) $\dfrac{1}{\pi}\displaystyle\int_{-\pi}^{\pi} f(x) \sin nx \, . dx$

(d) $\dfrac{1}{\pi}\displaystyle\int_{0}^{2\pi} f(x) \cos nx \, dx$

sis

(x) The waveforms of full wave rectifier are represented by..............

series,.

(a) sine

(b) sine and cosine

(c) cosine

(d) fourier

WT

(Theory)

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

   (a) Define the curl of scalar field.

   (b) What is an Argand diagram ?

   (c) Explain the condition for maxima and minima.

   (d) Define even and odd functions of Fourier series.

   (e) Define '∇' (del) operator.

   (f) If $\sqrt{x + iy} = a - ib$, show that $x = a^2 - b^2$ and $y = -2a$

   (g) State cosine series in Fourier series.

3. Attempt the following questions :

   (a) Explain the physical significance of the divergence 0 vector.

Or

Explain subtraction of two complex number using the Arga diagram.

A.

(b) State and explain chain rule.

Or

Explain sine series in Fourier series.

4. Attempt the following question :   10

(a) State and explain in detail scalar triple product.

Or

(b) (i) Explain multiplication of two complex number using Argand diagram.

(ii) Explain full-wave rectifier using Fourier series.