

This question paper contains 4 printed pages]

B—149—2019

FACULTY OF SCIENCE

B.Sc. (First Semester) EXAMINATION

MARCH/APRIL 2019

(CBCS/GGPA Pattern)

PHYSICS

Paper II (PHY-112)

(Mathematical Methods in Physics)

(MCQ & Theory)

(Thursday, 4-4-2019)

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) Vectors having same magnitude but opposite direction are :
- (a) Null vector
 - (b) Equal vector
 - (c) Unequal vector
 - (d) Negative vector
- (ii) If \vec{A} and \vec{B} are two collinear vectors, then $\vec{A} \times \vec{B} = \dots\dots\dots$
- (a) 0
 - (b) $AB\hat{n}$
 - (c) \vec{A}
 - (d) \vec{B}

P.T.O.

- (iii) The gradient of scalar is :
- (a) Vector (b) Scalar
(c) Zero (d) Finite
- (iv) If z is a complex number and z^{-1} is a multiplicative inverse of z , then $z.z^{-1}$ is equal to :
- (a) z^2 (b) z^{-2}
(c) 1 (d) 0
- (v) The modulus of the product of two complex numbers is the product of their :
- (a) Imaginary part (b) Argument
(c) Real part (d) Moduli
- (vi) If $z_1 = 3 + 4i$ and $z_2 = 2 + 3i$, then $z_1 - z_2$ is :
- (a) $3 - i$ (b) $1 + i$
(c) i (d) $5 + 7i$
- (vii) The polar co-ordinates any given point in a plane is defined by :
- (a) (x, y) (b) $(i^2, \sqrt{-1})$
(c) $\left(\frac{\theta}{x}, \frac{\theta}{y}\right)$ (d) (r, θ)
- (viii) The conversion between Cartesian co-ordinate is established by basic :
- (a) Algebra (b) Geometry
(c) Trigonometry (d) Vectors
- (ix) A function is said to be odd if $f(-x) =$
- (a) $-f(x)$ (b) $f'(x)$
(c) $f(-x)$ (d) $f'(-x)$

- (x) Wave form of full wave rectifier are represented by series.
- (a) Sine (b) Cosine
(c) Finite (d) Infinite

Theory

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

- (a) Define scalar triple product.
(b) State Stokes theorem.
(c) Define conjugate of a complex number.
(d) What is Argand diagram ?
(e) Explain the condition for maxima and minima.
(f) State Dirichlet's theorem.
(g) State even and odd function.

3. Attempt the following questions :

- (a) Define curl of a vector field and give its physical significance. 5

Or

With the help of Argand diagram explain multiplication of the complex numbers.

- (b) State and explain chain rule. 5

Or

Evaluate the coefficient b_n of Fourier series in the interval 0 to 2π .

P.T.O.

4. Attempt the following questions :

10

(a) State vector triple product of three vectors \vec{A} , \vec{B} and \vec{C} and prove :

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

Or

(b) Write notes on :

- (i) Extraction of roots for complex number upto n th root of unity.
- (ii) Physical applications of Fourier series to the square wave.