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BF—112—2016

FACULTY OF SCIENCE

B.Sc. (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2016

(Old Course)

PHYSICS

Paper II (PHY-112)

(Mathematical Methods in Physics)

(MCQ & Theory)

(Saturday, 10-12-2016) **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*) 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*) Devergence of vector field is given by :

(*a*) $\nabla\phi$ (*b*) $\nabla \cdot \vec{V}$

(*c*) $\nabla \times \vec{V}$ (*d*) $\nabla \times \phi$

(*ii*) Volume integral is converted into surface integral by :

(*a*) Stokes' theorem

(*b*) Green's theorem

(*c*) Gauss's divergence theorem

(*d*) Lorentz theorem

P.T.O.

(*iii*) The gradient of a scalar field is :

(*a*) Vector (*b*) Scalar

(*c*) Zero (*d*) Infinite

(*iv*) $z = x + iy$ is a complex number, then iy is called :

(*a*) Real (*b*) Imaginary

(*c*) Fractional (*d*) Rational

(*v*) $z = r(\cos\theta + i \sin\theta)$, then r is called :

(*a*) Modulli (*b*) Argument

(*c*) Imaginary (*d*) Real

(*vi*) $z_1 = 3 + 2i$ and $z_2 = 2 + 5i$, then $z_1 z_2$ = ...

(*a*) $-4 + 19i$ (*b*) $4 + 19i$

(*c*) $-4 - 19i$ (*d*) 0

(*vii*) $\frac{\partial^2 F}{\partial x^2}$ or $\frac{\partial^2 F}{\partial y^2} > 0$ or $x > 0$, this equation shows :

(*a*) Minima (*b*) Middle range

(*c*) Finite (*d*) Maxima

(*viii*) Implicit function is a function in which dependent variable has *not* been given ..... in terms of the independent variable.

(*a*) Explicitely (*b*) Implicitely

(*c*) Dependent (*d*) Independent

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

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

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

(*x*) A function is said to be odd in Fourier series $f(-x)$ = ...

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

(*c*) $f(2x)$ (*d*) $2f(x)$

(Theory)

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

(*a*) Define gradient of scalar field

(*b*) State line integrals.

(*c*) State Green's theorem.

(*d*) Define complex number.

(*e*) Find $z_1 - z_2$ if $z_1 = 4 + 3i$ and $z_2 = 2 - 3i$.

(*f*) Define Implicit function.

(*g*) State Dirichlet's condition.

3. Attempt the following questions : 10

(*a*) Explain Divergence with Physical significance.

Or

(*b*) Explain change of variable from Cartesian to polar by using theorem of differentiation.

(*c*) Explain multiplication of two complex number using the Argand diagram.

Or

(*d*) Evaluate coefficient a_n of Fourier series :

$$f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos nx + \sum_{n=1}^{\infty} b_n \sin nx.$$

4. Attempt the following questions : 10

(*a*) Explain in detail vector Tripple product.

Or

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