

Seat No. 7484

ST - 814
Total No. of Pages : 3

B.Sc. (Part - I) (Semester - II) (CBCS)
Examination, May - 2019
PHYSICS
DSC - 1B: Electricity and Magnetism - I (Paper-III)
Sub. Code : 72843

Day and Date : Saturday, 04 - 05 - 2019
Time : 11.00 a.m. to 1.00 p.m.

Total Marks : 50

- Instructions :
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Draw neat labeled diagrams wherever necessary.
 - 4) Use of Scientific calculator is allowed.

Q1) Select correct alternative from the following: [10]

- a) The ratio of charge to potential of a body is known as _____
- i) capacitance
 - ii) inductance
 - iii) conduction
 - iv) resistance
- b) The divergence of vector field $\nabla \cdot \vec{V}$ is a _____
- i) scalar
 - ii) vector
 - iii) constant
 - iv) unit vector
- c) The amount of work done in bringing a unit positive charge from infinity to a given point against the direction of electric field is called the _____ at that point.
- i) electric field
 - ii) electric flux
 - iii) electric force
 - iv) electric potential
- d) In symbolic form, the Stoke's theorem in space is _____
- i) $\oint_C \vec{F} \cdot d\vec{r} = \iint_S (\nabla \times \vec{F}) \cdot \hat{n} \, ds$
 - ii) $\oint_C \vec{F} \times d\vec{r} = \iint_S (\nabla \times \vec{F}) \cdot \hat{n} \, ds$
 - iii) $\oint_C \vec{F} \cdot d\vec{r} = \iint_S (\nabla \cdot \vec{F}) \cdot \hat{n} \, ds$
 - iv) $\oint_C \vec{F} \cdot d\vec{r} = \iint_S (\nabla \times \vec{F}) \times \hat{n} \, ds$

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- e) $\bar{\nabla} \cdot \bar{v}$ represents the total flux flowing out in the vector field _____
- i) per unit volume
 - ii) per unit area
 - iii) per unit length
 - iv) per unit mass
- f) The gradient of scalar function is _____
- i) the maximum rate of change of the function in space
 - ii) the minimum rate of change of the function in space
 - iii) constant
 - iv) always a scalar function
- g) Electric flux Φ due to electric field E, passing through the surface area S is given as _____
- i) $\Phi = \frac{E}{S}$
 - ii) $\Phi = E.S$
 - iii) $\Phi = E \times S$
 - iv) $\Phi = E - S$
- h) For air or vacuum medium, the value of dielectric constant K is _____
- i) less than one
 - ii) equal to one
 - iii) greater than one
 - iv) equal to zero
- i) Gauss divergence theorem gives information of _____
- i) surface integral into volume integral
 - ii) line integral into surface integral
 - iii) volume integral into surface integral
 - iv) volume integral into line integral
- j) A potential due to point charge at a distance r from it is proportional to _____
- i) r
 - ii) $\frac{1}{r}$
 - iii) r^2
 - iv) $\frac{1}{r^2}$

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[20]

Q2) Attempt any two of the following.

- a) State and prove Gauss law in electrostatic.
- b) Define gradient of scalar field. Show that $d\phi = \text{grad } \phi \cdot d\mathbf{r}$ and give its physical significance.
- c) Obtain an expression for capacitance of parallel plate capacitor.

Q3) Attempt any Four of the following.

[20]

- a) Write any five properties of lines of force.
- b) Define curl of vector field. Obtain an expression for it.
- c) Find the capacitance of a parallel plate capacitor with plates of area 1cm^2 , if the distance between them is equal to 1mm and it is filled with dielectric solid having dielectric constant $k = 10$.
- d) Define vector field and divergence of vector field.
- e) Explain the physical significance of Gauss' divergence theorem in vectors.
- f) Write a note on line integral of vector field.

