Sessional Examination, 2018
3rd semester, Physics (M)
Paper: 301

Time: 45 mins **Total Marks: 15**

Answerer any three of the following. Each question carries 5 marks and all the symbols have their usual meaning.

1. (a) If A is non-singular, then show that eigen values A^{-1} are the reciprocals of the eigen values of A.
   (b) Give an example of a 3x3 Skew Hermitian matrix. Shows that every principal diagonal element of a Skew Hermitian matrix must is either zero or purely imaginary number.
2. (a) Define a unitary matrix. Show that the modulus of the determinant of a unitary matrix is unity.
   (b) Find eigen values and eigen vectors of the matrix, $A = \begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}$.
3. Describe the atomic view of dielectric. Obtain a relation between $\vec{D}, \vec{E}$ and $\vec{P}$.
4. Discuss Gauss's law in presence of dielectric.

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1. What is Kelvin Double Bridge? Write its construction and its application to measure low resistance.
2. Find the expression for growth of current in LR circuit and define time constant.
3. What do you mean by mutual induction? Find the expression for mutual inductance between two coils.
4. Derive an expression for vector potential.
5. Calculate the magnetic field at a distance due to an infinitely long straight conductor.
6. Using $\boldsymbol{j}$ operator deduce the expression for electric current in LCR circuit when the alternative e.m.f. is $\boldsymbol{E = E_o Sin(\omega t)}$.