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THIRD SEMESTER **B.Tech. [EP]**

Class Test-2 ***September-2020***

EP-203: MATHEMATICAL PHYSICS

Time: 1.5 Hours ***Max. Marks: 20***

Note :	Answer **ALL** questions. Assume suitable missing data, if any.

1. A vector field given by $\vec{A} = (x^2 + xy^2)\hat{\imath} + (y^2 + x^2y)\hat{\jmath}$. Show that the field is irrotational. **(3)**

2. Use Green's theorem in a plane to evaluate the integral $\oint_C [(2x^2 - y^2)dx + (x^2 + y^2)dy]$ where C is the boundary in the xy-plane of the area enclosed by the *x*-axis and the semi-circle $x^2 + y^2 = 1$ in the upper half *xy*-plane. **(5)**

3. Derive the various possible solutions to Laplace 's equation in Cartesian coordinates by the method of separation of variables. **(5)**

4. Derive the solution of the equation for the vibrating rectangular membrane. **(7)**