Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14MA2001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **VECTOR CALCULUS AND COMPLEX ANALYSIS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | A particle moves along a curve whose parametric equations are , , , t being the time. Find the component of its velocity, speed and acceleration at  in the direction of . | CO5 | 10 |
| b. | Determine, so that the vector  is solenoidal. | CO5 | 10 |
| **(OR)** | | | | |
| 2. | a. | Calculate the curvature and torsion of the curve . | CO5 | 10 |
| b. | Prove that  and hence deduce that, if  is solenoidal. | CO5 | 10 |
|  |  |  |  |  |
| 3. | a. | Verify Gauss divergence theorem  taken over the cube bounded by the plane x=0,x=1,y=0,y=1,z=0,z=1. | CO1 | 15 |
| b. | Show that  is conservative. Find  such that. | CO1 | 5 |
| **(OR)** | | | | |
| 4. | a. | Verify Green’s theorem for, where C is bounded by. | CO1 | 15 |
| b. | Find the work done when a force moves a particle in the XY plane from (1, 1) to (2, 8) along the curve. | CO1 | 5 |
|  |  |  |  |  |
| 5. | a. | Show that the function is a harmonic function and find corresponding analytic function and its conjugate harmonic. | CO2 | 15 |
| b. | Find the constants  if is analytic. | CO2 | 5 |
| **(OR)** | | | | |
| 6. | a. | Find the orthogonal trajectories of the family of curves  Constant. | CO4 | 10 |
| b. | Prove that f(z)=sinz is analytic and hence find its derivative. | CO2 | 10 |
|  |  |  |  |  |
| 7. | a. | Find the image of the circle  under the mapping . | CO3 | 10 |
| b. | Find the bilinear transformation which maps the points z = 0, 1,  on to the points w= i,1,-i. | CO3 | 10 |
| **(OR)** | | | | |
| 8. | a. | Discuss the Joukowski’s transformation . | CO3 | 10 |
| b. | Evaluate , where C is . | CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Find the Laurent’s series of  in the region.  i)  ii)  iii) . | CO6 | 10 |
| b. | Evaluate using contour integration. | CO6 | 10 |