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



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

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| **Code :** | **17PH3003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MATHEMATICAL PHYSICS I** | **Max. Marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Verify divergence theorem for  over the cube bounded by | CO1 | 10 |
| b. | Find the work done by force ***F*** *= 3x2****i*** *– y2****j*** when it moves a particle along the curve *y= 2x2* in the (x, y) plane from (0, 0) to (1, 1) | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | A particle moves along a curve whose parametric equations are *x = e-t, y = 2 cos 3t, z = 2sin 3t*, where t is the time.   1. Determine its velocity and acceleration at any time. 2. Find the magnitude of velocity and acceleration at *t = 0*. | CO1 | 10 |
| b. | If ***A*** *= x2****i*** *– 4 yz* ***j*** *+ xz2****k*** and find and at the point (1, -1, 1) | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Using Cayley Hamilton’s theorem, find the inverse of the matrix | CO2 | 10 |
| b. | Solve by Cramer’s rule the system of equations  *x - 2y + 3z =9*  *2y + z = 0*  *-x + 2z = 3* | CO 2 | 10 |
| **(OR)** | | | | |
| 4. | a. | Find the Eigen values of the matrix | CO2 | 10 |
| b. | Compute the adjoint of and verify *(adj A)A = I* | CO2 | 10 |
|  |  |  |  |  |
| 5. |  | If *xy, 2y –z2* and *xz* are the components of a covariant tensor in rectangular coordinates, then find its covariant components in spherical coordinates. | CO3 | 20 |
| **(OR)** | | | | |
| 6. |  | What is a tensor? Distinguish symmetrical from anti – symmetrical tensor with examples. | CO3 | 20 |
|  |  |  |  |  |
| 7. | a. | Solve *(D2 + 3D +2)y = ex - 3* | CO4 | 10 |
| b. | Solve | CO4 | 10 |
| **(OR)** | | | | |
| 8. | a. | *(D2 +8D +12)y = 3 cos 2x* | CO4 | 10 |
| b. | Solve  , the differential equation which means that the self-induction and capacity in a circuit neutralize each other. Determine the constants in such a way that *I* is the maximum current and *i = 0* when *t = 0* | CO4 | 10 |
|  | | **Compulsory**: |  |  |
| 9. |  | Find the mean deviations from the median and the mean of the following data:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Size of items: | 4 | 6 | 8 | 10 | 12 | 14 | 16 | | Frequency | 2 | 4 | 5 | 3 | 2 | 1 | 4 | | CO5 | 20 |