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

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **17PH3003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MATHEMATICAL PHYSICS I** | **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 *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 | 8 |
| b. | Compute over the triangle bounded by lines y = 0, x = 1, y =x and verify by Green’s theorem. | CO1 | 12 |
| (OR) | | | | |
| 2. | a. | A particle acted on by constant forces *4****i*** *+* ***j*** *-3****k*** and *3****i*** *+* ***j*** *–* ***k*** is displaced from the point ***i*** *+ 2****j*** *+3****k***to the point *5****i****+4****j*** *+****k*.** Find the total work done by the forces | CO1 | 8 |
| b. | Evaluate using strokes’ theorem for  *F = (y – z+2)****i****+ (yz+4)****j*** *–xy****k***, where S is the surface of the cube *x= y = z =0; x =y = z = 2* above the xy plane. | CO1 | 12 |
|  |  |  |  |  |
| 3. | a. | Verify Cayley Hamilton’s Theorem and hence find the inverse  of the matrix | CO2 | 10 |
| b. | and =  Find the inverse of A and also find X if AX = B | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Solve by Cramer’s rule the system of equations  *x −2y– z=2*  *x+y=1*  *−2x+y−3z=−23* | CO2 | 10 |
| b. | Find the eigen value and the eigen vector for the matrix | CO2 | 10 |
|  |  |  |  |  |
| 5. |  | Find the covariant and contravariant components of the acceleration vector in cylindrical and spherical coordinates. | CO3 | 20 |
| (OR) | | | | |
| 6. |  | Explain what is meant by the rank of a tensor. Show that multiplication of tensors results in addition of their ranks and contraction reduces the rank by two. | CO3 | 20 |
|  |  |  |  |  |
| 7. |  | The differential equation for a circuit containing resistance R, self-inductance L and capacitance C, in terms of current i and the time t is,  E(t) being the electromotive force which is the sum of voltage drops in a closed circuit according to kirchoff’s second law. Find the current i and interpret the result physically. | CO4 | 20 |
| (OR) | | | | |
| 8. | a. | Solve (D2 -5D + 6)y = e3x | CO4 | 8 |
| b. | Solve | CO4 | 12 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. |  | Evaluate the values of mean, mode and median for the following grouped cumulative data:   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | No. of days absent | < 5 | <10 | <15 | <20 | <25 | <30 | <35 | <40 | <45 | | No of Students | 29 | 124 | 349 | 442 | 478 | 487 | 493 | 497 | 500 | | CO5 | 20 |