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



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

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **17MA3020** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ORDINARY DIFFERENTIAL EQUATIONS** | **Max. Marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Prove that there exists a unique solution to the IVP on I, where A(t) be an matrix that is continuous in t on a closed and bounded interval I. | CO1 | 10 |
| b. | Prove that the set of all solutions of the system on I, forms an n dimensional vector space over the field of complex numbers. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Prove that a solution matrix  of  on I is a fundamental matrix of  if and only if det | CO1 | 10 |
| b. | For the linear system , where , Verify whether the matrix  is fundamental or not. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Prove that is a solution of  on some interval I if and only if  is a solution of | CO2 | 10 |
| b. | Explain briefly about fixed point Method. | CO2 | 10 |
| **(OR)** | | | | |
| 4. |  | State and prove Picard’s Theorem. | CO4 | 20 |
|  |  |  |  |  |
| 5. | a. | If the function f(t,x)be continuous and bounded on the infinite strip  S = , then the initial value problem  has atleast one solution x(t) existing on the interval | CO3 | 10 |
| b. | State and prove Alekseev’s formula. | CO5 | 10 |
| **(OR)** | | | | |
| 6. | a. | Discuss briefly about the applications of Bihari’s Integral Inequality. | CO5 | 10 |
| b. | If is nonincreasing in x, then prove that   1. there exists lower and upper solutions  of  such that  on 2. there exists a unique solution x of   such that | CO3 | 10 |
|  |  |  |  |  |
| 7. | a. | Discuss briefly about the eigen function expansion. | CO6 | 10 |
| b. | Show that the Green’s function for  is | CO6 | 10 |
| **(OR)** | | | | |
| 8. |  | Consider the BVP Show that x is the solution of this BVP if and only if , x satisfies  where  is the Green’s function defined by | CO5 | 20 |
|  | | **Compulsory**:- |  |  |
| 9. |  | If the function  in the BVP  satisfies the Lipschitz condition  uniformly in t where K is a Lipschitz constant such that  Then the  defined by  converges to a function which is a unique solution of . In addition the upper bound on the error is given by | CO6 | 20 |