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

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

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Marks** |
| 1. | a. | Prove that a solution matrix  of is a fundamental matrix of if and only if . | 10 |
|  | b. | Find the determinant of fundamental matrix which satisfies for the system where . | 10 |
| (OR) | | | |
| 2. | a. | Let  be a fundamental matrix of the system , where A constant matrix. Show that  for all values of t,s in I | 10 |
| b. | Find the fundamental system of solutions for the system  ; | 10 |
| 3. | a. | Compute the first three successive approximations for the solution of . | 10 |
| b. | Consider the initial value problem  on the rectangle . Prove that this IVP has a unique solution. | 10 |
| (OR) | | | |
| 4. |  | Let f(t,x) be continuous and be bounded by L and satisfy Lipschitz condition with Lipschitz constant K on the closed rectangle R. Then show that successive approximations given by converge uniformly on an interval  to a solution x of the IVP and this solution is unique. | 20 |
|  |  |  |  |
| 5. |  | State and prove Alekseev’s formula | 20 |
| (OR) | | | |
| 6. | a. | Let be lower and upper solutions of such that on I and .Show that there exists a solution x(t) such that on I | 10 |
| b. | State and prove Gronwall’s Inequality | 10 |
|  |  |  |  |
| 7. | a. | Define Green’s function | 5 |
| b. | Solve the boundary value problem | 15 |
| (OR) | | | |
| 8. |  | Explain Sturm – Liouville problem. Let  and be the eigen functions of the Sturm-Liouville problem corresponding to two eigen values . Establish a relation connecting the wronskian | 20 |
|  | |  |  |
|  | | **Compulsory**: |  |
| 9. |  | State Picard’s Theorem | 20 |