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

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

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| **Code :** | **12MA349** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **DIFFERENCE EQUATIONS** | **Max. marks :** | **100** |

**Answer All Questions (5 x 20 = 100)**

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| **Q. No.** | **Sub Div** | **Questions** | **Marks** |
|  |  | **Compulsory:** |  |
| 1 | a. | Consider the difference equation . Then show that , is a non-oscillatory solution of the equation. | 10 |
| b. | Let x1(n) and x2(n) be two linearly independent solutions of second order difference equation of the form where p(n) > 0, n ϵ Z+ . Then prove that the following statements hold  i. x1(n) and x2(n) cannot have a common zero, that is if x1(r) = 0, then x2(r) ≠ 0.  ii. If x1(n) has a zero at n1 and a generalized zero at n2>n1, then x2(n) must have a generalized zero in (n1,n2]. | 4+6 |
|  |  |  |  |
| 2. | a. | A drug is administered once every four hours. Let D(n) be the among of the drug in the blood system at the nth interval. The body eliminates a certain fraction p of the drug during each time interval. If the amount administered is D0, find D(n) and . | 10 |
| b. | Prove that a continuous map f on the real line cannot have a globally attracting unstable fixed point. | 10 |
|  |  | (OR) |  |
| 3. | a. | Consider the difference equation Find the equilibrium point and determine their stability. Also draw the stair step diagram. | 10 |
| b. | Investigate the stability of each equilibrium point separately for logistic difference equation . | 10 |
|  |  |  |  |
| 4. | a. | Prove that the operators ∆, ∆-1 and E are linear. | 10 |
| b. | Consider the third order difference equation . Show that the functions 2n, (– 2)n and (– 3)n form a fundamental set of solutions of the equation. | 10 |
|  |  | (OR) |  |
| 5. | a. | Solve the equation | 10 |
| b. | Solve the equation | 10 |
|  |  |  |  |
| 6. | a. | Find the solution of the difference system x(n+1) = A x(n) where | 10 |
| b. | Let B be a k x k non singular matrix and let me be any positive integer. Then there exists some k x k matrix C such that Cm = B | 10 |
|  |  | (OR) |  |
| 7. | a. | Find the general solution of x(n+1) = A(n), where | 10 |
|  | b. | Solve the system x(n+1) = A x(n), x(0) = (1 1 1)T | 10 |
|  |  |  |  |
| 8. | a. | Show that | 5 |
| b. | Show that *t2 log t + t3 = o(t4), t →∞* | 5 |
| c. | Suppose that **.** Prove that  i) for some null sequence v(n)  ii) for some positive null sequence µ(n) | 5+5 |
|  |  | (OR) |  |
| 9. | a. | Find an asymptotic estimate of a fundamental set of solutions of , where , and | 10 |
| b. | Investigate the asymptotic behaviour of solutions of the equation | 10 |