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

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

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| **Code :** | **12EI235** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DIGITAL CONTROL SYSTEMS** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | |
| 1. | State sampling theorem. | 1 |
| 2. | List any two Digital to Analog converters. | 1 |
| 3. | For the given routh array, determine the location of roots in the r-plane. i.e., List the number of roots in left half of r-plane and in right half of r-plane.  r4 : 1 5 8  r3 : 2 6 0  r2 : 8 8  r1 : 8 0  r0 : 8 | 1 |
| 4. | z-transform of zero order hold =\_\_\_\_\_\_\_\_\_. | 1 |
| 5. | Define Pulse transfer function. | 1 |
| 6. | Sketch the graph of Quarter decay ratio. | 1 |
| 7. | Mention any 2 frequency response plots. | 1 |
| 8. | What is ringing in digital controller? | 1 |
| 9. | Write down the formula for controllability test. | 1 |
| 10. | What is Rank of the matrix? | 1 |

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| **PART B(5 X 3= 15 MARKS)** | | |
| 11. | Derive the proof of any three properties of z-transform. | 3 |
| 12. | Write short notes on Steady state errors. | 3 |
| 13. | Illustrate the steps involved in implementing the control algorithm on a computer. | 3 |
| 14. | Describe about the rise time and peak overshoot. | 3 |
| 15. | State the concept of controllability. | 3 |

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| **PART C(5 X 15= 75 MARKS)** | | | |
| 16. | a. | Determine the Initial Value  and Final value  of the given z-domain signal. | 5 |
| b. | Determine the one-sided z-transform of the discrete sequence generated by sampling the given Continuous time functions mathematically. | 10 |
| (OR) | | | |
| 17. | a. | Explain the principles of Signal Conversion in detail. | 5 |
| b. | Describe the working of R-2R ladder type D/A Converter with its equivalent circuits. | 10 |
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| 18. |  | Find out the relation between the spectrums of the continuous-time signal to that of the discrete-time sequence and illustrate the process of sampling in detail. | 15 |
| (OR) | | | |
| 19. | a. | Analyse the stability of the following system using bilinear transformation: | 10 |
| b. | Illustrate the procedure for finding the stability analysis using Jury’s stability test. | 5 |
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| 20. |  | Elaborate the hardware features, control schemes and the design of control algorithm for a Digital Temperature Control in an Air-flow System. | 15 |
| (OR) | | | |
| 21. | a. | Realize the given Pulse Transfer function using Cascade realization. | 7 |
| b. | Show the procedure for tuning a controller using Ziegler-Nichols tuning method based on Process Reaction Curve. | 8 |
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| 22. | a. | Demonstrate the basic routes to the design of digital controller in detail. | 7 |
| b. | Describe the effect of pole and zero cancellation. | 8 |
| (OR) | | | |
| 23. | a. | Explain the velocity form of Digital PID algorithms. | 8 |
| b. | Discuss about Deadbeat and Dahlin’s algorithm. | 7 |
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| 24. | a. | Using Gilbert’s test, determine whether the given State model;  is completely controllable and observable. | 8 |
| b. | Illustrate about the Full order State Observer with the block diagram. | 7 |
| (OR) | | | |
| 25. |  | Consider the system;    Determine the suitable state feedback gain matrix, such that the system will have the closed loop poles at s = -1+j2,-1-j2,-6. | 15 |