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

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

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| **Code :** | **16EI2001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DIGITAL CONTROL SYSTEMS** | **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. | Draw the block diagram of a typical digital control system and explain the function of each block. | CO1 | 10 |
| b. | Briefly explain the operation of R-2R ladder 3-bit D/A converter with neat circuit. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Find the Z transform of (i) x[n] = u[n] and  (ii) x[n] = cosπn | CO1 | 10 |
| b. | Explain the principle and operation of Successive Approximation type A/D Converter with neat diagram. | CO1 | 10 |
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| 3. | a. | For the sampled data control system Shown in the figure below where G(s) = 1/(s+1), find   1. The Pulse Transfer Function 2. Impulse Response 3. Step response | CO1 | 15 |
|  | b. | Derive the transfer function of zero order hold circuit. | CO1 | 5 |
| (OR) | | | | |
| 4. | a. | Determine the pulse transfer function of the open loop sampled data system where  G(s) = 1/(s+a)(s+b) | CO1 | 15 |
| b. | Determine the Initial Value and Final value of the given z-domain signal. | CO2 | 5 |
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| 5. | a. | Check for stability of the sampled data control systems represented by the following characteristic equation using Jury Stability Test.  z4 –1.7z3 +1.04z2 – 0.268z + 0.024. | CO3 | 10 |
| b. | Obtain the modified z-transform of . | CO2 | 10 |
| (OR) | | | | |
| 6. | a. | Check for the stability of the sampled data control system represented by the following characteristics equation by   1. Jury’s Stability Test 2. BilinearTransformation. | CO1 | 15 |
| b. | Draw the signal flow graph representation of state model. | CO1 | 5 |
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| 7. | a. | Check the controllability and observability of the following system  & | CO3 | 10 |
| b. | Design Deadbeat controller algorithm for a system having a model  Gp(s) with unityfeedback. The sampling period T=1.2sec. Also check whether the controller is physically realizable or not. | CO3 | 10 |
| (OR) | | | | |
| 8. | a. | Obtain the phase variable form of state model of the following system and find the controllability of the same.  y(k+3) + 4y(k+2) + 9y(k+1) + 6y(k) =u(k) | CO3 | 10 |
| b. | Derive the expression for Dahlin's control algorithm. | CO1 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Find state transition matrix Ф(k) if the system state matrix is given as A= . | CO2 | 10 |
| b. | A discrete-time system has the transfer function,.  Determine the state model of the system in Phase Variable form and Jordan canonical form. | CO2 | 10 |