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

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**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **17EC3001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STATISTICAL DIGITAL SIGNAL PROCESSING** | **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. | Compare AR, MA and ARMA processes. | CO1 | 15 |
| b. | What are non parametric methods? Why are they called so? Derive the expression for Periodogram. | CO3 | 5 |
| (OR) | | | | |
| 2. | a. | Summarize the changes that take place in statistics of input signals when they are passed through linear shift invariant filters. Establish the relationships in terms of Power Spectrum. | CO2 | 12 |
| b. | Describe how the modified periodogram can be averaged by using the Welch method. | CO3 | 8 |
| 3. | a. | Show that ARMA stochastic modeling for a random process x (n) is achieved with Modified Yule-Walker Equations. | CO4 | 15 |
|  | b. | Explain the Blackman Tukey method of power spectrum estimation. | CO3 | 5 |
| (OR) | | | | |
| 4. | a. | Determine the frequency resolution, variability and figure of merit of the Bartlett, Welch (50% overlap) and Blackman-Tukey method of power spectrum estimation when x(n) has 800 samples (i.e., N=800) and quality factor is 16. | CO4 | 10 |
|  | b. | Explain how the Yule-Walker equations can be solved using Levinson-Durbin Algorithm. | CO2 | 10 |
| 5. |  | Obtain the Wiener-Hopf equations for FIR wiener filter. Also explain the significance of Minimum Mean-square Error. | CO5 | 20 |
| (OR) | | | | |
| 6. | a. | Explain the causal and non-causal IIR wiener filter. | CO5 | 15 |
|  | b. | How FIR wiener filter can be used for noise cancellation? | CO6 | 5 |
| 7. |  | Derive the weight vector update equation for the LMS algorithm. Discuss in detail the convergence issues of the LMS algorithm. | CO5 | 20 |
| (OR) | | | | |
| 8. | a. | Explain polyphase decomposition for FIR and IIR filter structure in detail. | CO6 | 15 |
|  | b. | What is discrete wavelet transform? List the applications of wavelet transform. | CO6 | 5 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Explain in detail the steps involved in the development of discrete Kalman filter. | CO5 | 15 |
|  | b. | What is least mean squared error criterion? Explain. | CO2 | 5 |

ALL THE BEST