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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14EC3001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **STATISTICAL DIGITAL SIGNAL PROCESSING** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | A random phase sinusoid is given by . Where A is fixed amplitude and is fixed angular frequency. The  is random phase having a uniform PDF over the range -π to +π,  . Check whether the process is harmonic or not? | CO1 | 15 |
| b. | White noise with power spectral density, Pxx (ejw) =σ2 is passed through a filter with impulse response h(n) = 0.5n u(n). What is the output power spectral density? | CO1 | 5 |
| (OR) | | | | |
| 2. | a. | Show that the power spectrum of a WSS random process can be factorized as Px (z) = σ0 2 H(z) H\*(1/z\*). | CO2 | 15 |
| b. | Define Periodogram. How DFT is used for its computation? | CO2 | 5 |
| 3. | a. | Compare Parametric and Non-Parametric methods of spectral estimation | CO2 | 5 |
|  | b. | Find the j+1th co-efficient of normal equation by developing Levinson- Durbin recursion algorithm. | CO3 | 10 |
|  | c. | Briefly Compare the performance measures for the Nonparametric methods of Spectrum Estimation. | CO2 | 5 |
| (OR) | | | | |
| 4. | a. | Explain in detail about Linear Mean Square Estimation and its usefulness in linear Prediction. | CO3 | 10 |
|  | b. | Explain in detail about the Autoregressive Spectrum Estimation with relevant diagrams. | CO2 | 10 |
| 5. | a. | Outline the procedure for design of a causal IIR Wiener filter that produces minimum mean square estimate of x(n). | CO3 | 20 |
| (OR) | | | | |
| 6. | a. | Explain in detail the steps involved in the development of discrete Kalman filter. | CO3 | 15 |
|  | b. | What is least mean squared error criterion? Explain. | CO1 | 5 |
| 7. | a. | Discuss adaptive noise cancellation using LMS algorithm. | CO3 | 12 |
|  | b. | Explain direct form FIR adaptive filter. | CO3 | 8 |
| (OR) | | | | |
| 8. | a. | With necessary equations and diagrams, discuss about the interpolation and decimation in multirate signal processing. | CO3 | 15 |
|  | b. | Define wavelet. List the applications of wavelet transform. | CO2 | 5 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Discuss in detail the steepest descent algorithmic steps and its limitations. | CO3 | 20 |

ALL THE BEST