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

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

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| **Code :** | **17EC3073** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BIOLOGICAL 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. | Describe the sequence of operations during the rhythmic activity of the human heart? | CO1 | 10 |
| b. | Draw a sample EEG signal and bring out the specific nature of each segment. Also, specify the ECG acquisition procedure using Einthoven’s triangle. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Differentiate complex cepstrum and power cepstrum. | CO1 | 5 |
| b. | How will you separate the noise sequence from an input sequence using homomorphic filtering? | CO2 | 15 |
|  |  |  |  |  |
| 3. | a. | Explain the direct method of estimation of parameters in ARMA models. | CO1,CO3 | 5 |
|  | b. | Deduce an approach for estimating the parameters of auto regressive (AR) models, using least square method. | CO1,CO6 | 15 |
| (OR) | | | | |
| 4. | a. | Describe the Blackman-Tukey algorithm for the estimation of Power Spectral Density function in a WSS process. | CO1,CO3 | 10 |
|  | b. | How can the periodogram method be used to solve the drawbacks of Blacman Tukey method based spectral estimation? | CO1,CO3 | 10 |
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| 5. | a. | Differentiate supervised and unsupervised pattern classification methodologies. | CO4 | 10 |
|  | b. | How will you record the PCG signals using sensors? Specify the characteristics of various heart sounds associated with PCG signals. | CO1,CO2 | 10 |
| (OR) | | | | |
| 6. | a. | Describe any one of the probabilistic classifiers used for pattern classification applications. | CO4 | 10 |
|  | b. | With an example, illustrate the methodology of k-NN algorithm in the context of categorizing any two input patterns. | CO4 | 10 |
|  |  |  |  |  |
| 7. | a. | How can you incorporate the wavelet concepts for bio-signal processing applications? | CO2 | 5 |
|  | b. | Describe any one of the probabilistic classifiers used for pattern classification applications. | CO4 | 15 |
| (OR) | | | | |
| 8. | a. | Draw a neatly labelled architecture of back propagation neural network. | CO5 | 5 |
|  | b. | What are the objectives of Principal Components Analysis (PCA)? With proper diagrams briefly explain how these objectives are achieved. | CO3 | 15 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Distinguish between ERP signals and EEG signals. | CO1 | 5 |
|  | b. | How will you calculate the expected value and the variance of the periodogram? | CO1, CO2 | 5 |
|  | c. | Write short notes on logistic regression analysis | CO6 | 5 |
|  | d. | Discuss spectrogram analysis. | CO2 | 5 |