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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **18BM3002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ADVANCED MEDICAL SIGNAL PROCESSING** | **Max. Marks :** | **100** |

**ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Explain the need for sampling and the conditions for avoiding aliasing. | CO1 | 8 |
| b. | For the given inputs x(n) = {1, 2, 0.5, 1} and h(n) = {1, 2, 1, -1}.    Determine the response of the system using linear convolution and circular convolution. | CO1 | 8 |
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| 2. | a. | Explain the biomedical signal analysis using a block diagram with its objectives. | CO2 | 10 |
| b. | Discuss on the nature of biomedical signals with suitable diagrams. | CO2 | 6 |
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| 3. | a. | Explain optimal filtering and derive the expression for finding the optimal weight vector and estimated error. | CO3 | 10 |
| b. | Explain the random noise, structured noise and physiological interference in bio signals perspective. | CO3 | 6 |
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| 4. | a. | Discuss the adaptive noise cancellation with a block diagram. | CO4 | 8 |
| b. | Illustrate the cancellation of maternal ECG from Fetal ECG. | CO4 | 8 |
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| 5. | a. | Describe the Template Matching technique in ECG QRS Detection. | CO5 | 10 |
| b. | Explain the estimation of ST segment inclination. | CO5 | 6 |
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| 6. | a. | Find the DFT of the sequence x(n) = {2,2,2,2,1,1,1,1} using radix-2 DIT-FFT algorithm. | CO1 | 12 |
| b. | Write short notes on synchronous averaging. | CO3 | 4 |
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| 7. |  | Design a Butterworth digital IIR lowpass filter using bilinear transformation by taking T = 0.1 second, to satisfy the following specifications. | CO3 | 16 |
| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. | a. | Elaborate on the adaptive segmentation of EEG and PCG signals. | CO6 | 10 |
| b. | Discuss the analysis of Ectopic beats using Pan-Tompkins Algorithm. | CO6 | 10 |