



**SEVENTH SEMESTER B. TECH. (INSTRUMENTATION AND CONTROL ENGG.)**

**END SEMESTER DEGREE EXAMINATIONS, DECEMBER – 2018**

**SUBJECT: MULTI SENSOR DATA FUSION [ICE 4011]**

**TIME: 3 HOURS**

**MAX. MARKS: 50**

**Instructions to candidates**

- Answer **ALL** questions.
- Missing data may be suitably assumed.

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| 1A | Describe three fusion network topologies with example.   | 5 |
| 1B | Illustrate any three ways of system improvement due to multi-sensor data fusion.   | 3 |
| 1C | Compare ordinal and ratio scale in terms of properties and mathematical operations.  | 2 |
| 2A | Given two time series, $P = (6.3, 2.7, 8.3, 6.9)^T$ and $Q = (5.2, 1.1, 7.4, 8.3)^T$ , find cumulative matrix D in DTW using dynamic programming.  | 4 |
| 2B | Describe gating method of data association.  | 4 |
| 2C | Let $X = (x_1, x_2, x_3, x_4)^T$ denote an input vector. By partitioning X using two different clustering algorithms, resulting identity vectors are: $A = (\alpha_1 \alpha_1 \alpha_2 \alpha_2)^T$ , $B = (\beta_1 \beta_2 \beta_2 \beta_1)^T$ , $\alpha_1 = [1 \ 1 \ 0 \ 0]$ , $\alpha_2 = [0 \ 0 \ 1 \ 1]$ , $\beta_1 = [1 \ 0 \ 0 \ 1]$ , $\beta_2 = [0 \ 1 \ 1 \ 0]$ . Write the corresponding two co-association matrices. | 2 |
| 3A | Describe the role of data mining in information processing cycle with necessary diagram.   | 4 |
| 3B | Summarize the characteristics of recommended data fusion levels.   | 3 |
| 3C | Discuss evidence combination type decision algorithm.  | 3 |
| 4A | Explain JDL data fusion model with necessary diagram.  | 5 |
| 4B | With a diagram, describe waterfall data fusion model.  | 3 |
| 4C | What are the benefits of net-centric environment?  | 2 |
| 5A | Write a note on Kalman filtering.  | 5 |
| 5B | Describe Bayesian filtering.   | 3 |
| 5C | Write any four duality between data fusion and resource management.  | 2 |

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