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# MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

*(A constituent unit of MAHE, Manipal)*

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

## END SEMESTER DEGREE EXAMINATIONS, NOVEMBER - 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.

1A Explain multi sensor data fusion strategies suggested by Durrant-Whyte, Dasarathy and Boudjemma and Forbes. 5

1B Describe a single fusion node with its graphical representation. 3

1C With necessary equations, describe histogram estimation method for spatial alignment. 2

2A Explain nearest neighbour data association filter. 4

2B Given two time series, P=(2.7 1.9, 3.2, 5)$^T$ and Q=(3.2, 2.7, 1.5, 5.8)$^T$. Find the matrix of squared Euclidean distances. 3

2C Describe the application of one sided DTW for video compression. 3

3A Given data for five people in Table 3A. Each person vector has a Height, Score on some test, and Age, find the Mahalanobis distance of another person v = (66, 640, 44) from the set of data. 4

Table 3A

| X<br>Height | Y<br>Score | Z<br>Age |
|---|---|---|
| 64 | 580 | 29 |
| 66 | 570 | 33 |
| 68 | 590 | 37 |
| 69 | 660 | 46 |
| 73 | 600 | 55 |

3B With a diagram, describe the recommended refined JDL data fusion model. 4

3C Describe distributed blackboard architecture. 2

4A Explain the role of data fusion and resource management in the information processing cycle. 5

4B With a diagram explain Luo and Kay data fusion architecture. 3

4C Write a note on interpretation of Dasarathy's data fusion input/output model with the help of a table. 2

5A What is Kalman filtering? Explain. 5

5B Brief the importance of information filter. 3

5C Distinguish between multi sensor data fusion and multi sensor integration. 2

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