Reg. No. | | | | | | | | | | |

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

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

END SEMESTER DEGREE EXAMINATIONS, DECEMBER - 2020

SUBJECT: Multi-sensor data fusion [ICE 4011]

30-12-2020

TIME: 3 HOURS MAX. MARKS: 50

Instructions to candidates :*Answer ALL questions and missing data may be suitably assumed.*

Include diagrams and equations wherever necessary

1A. Describe any 6 properties of the fusion node.

1B. Define mutual information between two random variables and obtain mutual information formula.

1C. Explain the centralized and hierarchical network topologies each with an example.

(3+3+4)

2A. Explain the puzzle-solving metaphor.

2B. Distinguish between the three types of IFS available in the smart sensor model.

2C. 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.

(3+3+4)

3A. Describe 4 scales of measurement.

3B. Explain the importance of data fusion in the information processing cycle.

3C. Given data for five people in Table 3C. Each person vector has a height, score on some test, and age. Determine the Mahalanobis distance of another person v = (61, 637, 53) from the set of data.

Table 3C

X Height	Y Score	Z Age
77	547	27
61	553	31
74	578	35
67	632	48
71	615	54
76	657	57

(2+4+4)

4A. List the key features of Dasarathy's data fusion I/O model.

4B. Describe the waterfall data fusion framework.

4C. Explain the original JDL data fusion model and mention its limitations.

(2+3+5)

5A. Differentiate greedy vs global NNSF

5B. Write a note on the information filter.

5C. Illustrate the Kalman filter cycle with a block diagram.

(3+3+4)