



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:VII
Class:FINAL	Program:B.Tech
Branch Code:ROB	Pattern:2022
Name of Course:Intelligent Manufacturing Systems	Course Code:ROB224005C
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

Question No. 1

- 1a) Differentiate between Continuous Manufacturing Systems and Intermittent Manufacturing Systems, detailing their typical product volume and process characteristics. (6) CO1

Question No. 2

- 2a) Explain the necessity of Information and Communications Technology (ICT) in the context of Intelligent Manufacturing Systems (IMS). Briefly describe the function of RFID Technologies in supporting IMS. (6) CO2

Question No. 3

- 3a) Describe the primary functions and components of the Perception Layer (Physical Layer) within an Intelligent Manufacturing Framework. (8) CO3

OR

- 3b) Analyze the specific role of the Data Processing Layer and explain how it differs from the Intelligence Layer in terms of data transformation. (8) CO3

- 3c) Justify the critical role of the Network Layer (Communication Layer) in ensuring real-time, secure data transfer between the Physical and Intelligence layers. (8) CO3

OR

- 3d) Explain the ultimate purpose and typical functionalities executed within the Application Layer, providing two practical examples. (8) CO3

Question No. 4

- 4a) A machine shop processes custom orders from variety of clients. A machining centre in a job shop for a local manufacturing company has five unprocessed jobs remaining at a particular point in time. The jobs are labelled J1, J2, J3, J4, and J5 in the order they entered the shop. The respective processing time and due date are given in the table below:

JOB	Processing time (in days)	Due date (in days)
J1	11	65
J2	32	48
J3	34	34

J4	5	36
J5	6	35

When the jobs are assumed to enter the shop in the sequence of SPT, find the value of the mean flow time and average tardiness.

OR

- 4b) Explain the process of Computer-Aided Process Planning (CAPP) and its significant contribution to the optimization of the process plan selection. (8) CO4
- 4c) Describe how Fuzzy Cognitive Maps can be employed for production planning when factor relationships are non-linear or based on expert knowledge. (8) CO4

OR

- 4d) Define break-even analysis. Discuss its role in managerial decision-making with reference to cost, volume, and profit relationships. (8) CO4

Question No. 5

- 5a) Describe the step-by-step procedure for using Taguchi Design of Experiments for parametric optimization of a machining process. (8) CO4

OR

- 5b) Explain the concept of the Signal-to-Noise (S/N) ratio in Taguchi's methodology and its role in achieving robust design. (8) CO4
- 5c) Elaborate on the working principle of Fuzzy Logic and provide a relevant example of its application in the optimization of a machining parameter. (8) CO4

OR

- 5d) Justify the use of Fuzzy Logic for manufacturing process modelling when the process variables are characterized by uncertainty and vagueness. (8) CO4

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