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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VII - THEORY EXAMINATION (2024 - 2025)

Subject: Elements of Flexible Manufacturing System and Process Engineering

Time: 3 Hours Max. Marks: 100

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A 20

1. Attempt all parts:-

1-a. What is the primary advantage of FMS in terms of production flexibility? [CO1, K1] 1

(a) Limited adaptability

(b) Fixed production processes

(c) High customization capability

(d) Low variety

1-b. What type of flexibility refers to the ability to change the product mix quickly? [CO1, K1] 1

(a) Volume flexibility

(b) Product flexibility

(c) Routing flexibility

(d) Process flexibility

1-c. Coding and classification systems are used in GT for:[CO2, K1] 1

(a) Tracking the location of different machine parts

(b) Managing inventory of machine parts

(c) Identifying and organizing similar machine parts into families

(d) Analyzing the efficiency of different machining processes

1-d. The methods commonly used for cell formation in GT include: [CO2, K1] 1

(a) Mathematical programming and graph theoretic models

(b) Genetic algorithms and neural networks
(c) Statistical analysis and regression models
(d) Simulation and optimization techniques

1-e. Acceptance testing in the context of an FMS implementation aims to: [CO3, K1] 1
(a) Assess employee performance
(b) Determine the market viability of the products
(c) Verify the proper functioning of the system
(d) Test the durability of the equipment

1-f. Data visualization techniques in manufacturing data systems for an FMS help in: [CO3, K1] 1
(a) Enhancing aesthetics of product designs
(b) Facilitating realtime monitoring and control
(c) Ensuring proper data backup and disaster recovery
(d) Minimizing data storage requirements

1-g. What are the advantages of Computer-Aided Process Planning (CAPP) over conventional process planning methods? [CO4, K1] 1
(a) Increased flexibility and adaptability
(b) Improved communication between design and manufacturing
(c) Enhanced accuracy and efficiency
(d) All of the above

1-h. Which principle does a Generative CAPP system rely on? [CO4, K1] 1
(a) Predefined templates and rules
(b) Manual input from process planners
(c) Utilization of algorithms and rules
(d) Statistical analysis of production data

1-i. The primary function of an Automated Storage and Retrieval System (AS/RS) is to: [CO5, K1] 1
(a) Optimize energy consumption in warehouses
(b) Improve communication between departments
(c) Efficiently store and retrieve goods
(d) Enhance workplace safety

1-j. In Computer-Aided Process Planning (CAPP), the backward approach involves: [CO5, K1] 1
(a) Starting with the final product design and working backwards
(b) Sequentially planning each manufacturing process step
(c) Utilizing algorithms to automate process planning tasks
(d) Evaluating process feasibility based on available resources

2. Attempt all parts:-

2.a.	How can FMS be classified based on their characteristics? [CO1, K2]	2
2.b.	What is mean by mono code and poly codes structures? [CO2,K2]	2
2.c.	What are the considerations for ensuring seamless data flow between different components of an FMS? [CO3, K1]	2
2.d.	Describe the advantages and challenges of using mathematical programming models for determining optimal index positions in manufacturing. [CO4, K2]	2
2.e.	Discuss the advantages and disadvantages of conveyors in material handling systems compared to manual handling methods.[CO5, K1]	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Provide examples of processing and quality assurance equipment used in an FMS. [CO1, K2]	6
3-b.	Explain the concept of quality assurance in an FMS. [CO1,K2]	6
3-c.	Explain the effect of machining parameters on production rate? [CO2, K2]	6
3-d.	Explain the different optimization models which help in improving productivity in manufacturing? [CO2, K3]	6
3.e.	How does the choice of manufacturing data system impact the overall performance of an FMS? [CO3, K2]	6
3.f.	Describe the sequential approach to tolerance allocation and its steps involved in determining manufacturing tolerances. [CO4, K2]	6
3.g.	Explain how CAD-based CAPP systems leverage geometric and engineering data to generate accurate and optimized process plans. [CO5, K2]	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain the the Working and principle of Co-ordinate Measuring Machine (CMM)? [CO1, K2]	10
4-b.	What are the challenges in maintaining and ensuring reliability in an FMS? [CO1,K2]	10

5. Answer any one of the following:-

5-a.	Explain the process of solving optimization models for machining processes? [CO2, K2]	10
5-b.	How does GT facilitate the implementation of just-in-time (JIT) production? [CO2, K2]	10

6. Answer any one of the following:-

6-a.	Explain the concept of data security and privacy in manufacturing data systems. [CO3, K2]	10
6-b.	How does data integration contribute to the synchronization of operations within an FMS? [CO3, K2]	10

7. Answer any one of the following:-

7-a.	Describe the principle of a Generative CAPP system and how it differs from conventional process planning methods. [CO4, K2]	10
7-b.	Explain the concept of optimal index positions in manufacturing and their significance in achieving efficient and synchronized production sequences.[CO4, K2]	10

8. Answer any <u>one</u> of the following:-

8-a.	Explain the forward approach in CAPP and its advantages in terms of early detection of potential manufacturing issues. [CO5, K2]	10
8-b.	Explain the concept of Automated Guided Vehicles (AGVs) and their applications in material handling and logistics. [CO5, K2]	10