Q. Code:503474

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

M.E / M.TECH. DEGREE EXAMINATIONS, MAY 2024

Second Semester

IR22204 - FLEXIBLE MANUFACTURING SYSTEM

(Mechanical Engineering)

(Regulation 2022)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Apply the concepts of PPC and GT to the development of FMS.	**3**
CO 2	Discuss the planning and scheduling methods used in manufacturing systems.	**2**
CO 3	Identify various workstations, system support equipment	**4**
CO 4	Identify hardware and software components of FMS.	**4**
CO 5	Summarize the concepts of modern manufacturing such as JIT, supply chain management and lean manufacturing etc	**5**

PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Brief the benefits of Flexible Manufacturing System (FMS).	**1**	**2**
2.	Draw the structure of a manufacturing system. Name its elements.	**1**	**3**
3.	Summarize the types of flexibility in FMS.	**1**	**2**
4.	What are the components of knowledge-based scheduling system?	**1**	**2**
5.	Describe the function of supervisory computer in FMS.	**2**	**2**
6.	Brief the importance of manufacturing database system.	**2**	**2**
7.	Why periodic time-initiated events need to be recorded by the computer control in FMS?	**2**	**3**
8.	How significant is the utilization statistical process control in an FMS? Brief.	**2**	**2**
9.	Brief about the general-purpose computer languages used for simulation modelling.	**3**	**2**
10.	Summarize the limitations of simulation modelling.	**3**	**2**

11.	How the data in a database are related?	**3**	**2**	
12.	Write the advantages of relational database over hierarchical database.	**3**	**3**	
13.	Can group technology be implemented in a mass production? Comment.	**4**	**3**	
14.	Write the usage of clustering algorithm in machine-part incidence matrix.	**4**	**2**	
15.	How possibility distribution concept is beneficial in FMS?	**4**	**3**	
16.	What are the formulations used to model the group technology problem?	**4**	**2**	
17.	How the FMS planning projects will be beneficial to the company?	**5**	**2**	
18.	How Automated Guided Vehicles (AGV) are classified?	**5**	**2**	
19.	How are variation planning utilized in FMS?	**5**	**3**	
20.	Can FMS benefit from knowledge-based planning aids?	**5**	**3**	

PART- B (5 x 10 = 50 Marks)

		Marks	CO	RBT LEVEL
21. (a)	How does the single-product scheduling problem address the scheduling of parts and subassemblies associated with a single product?	**(10)**	**1**	**3**
	(OR)			
(b)	With neat illustration, describe how the components of a knowledge-based scheduling system, are utilized for solving scheduling problems.	**(10)**	**1**	**3**
22. (a)	Summarize and explain the functions performed by FMS software.	**(10)**	**2**	**2**
	(OR)			
(b)	Discuss the primary functions of a computer control in assembly line.	**(10)**	**2**	**2**
23. (a)	Describe the steps in the simulation modelling process in an FMS.	**(10)**	**3**	**2**
	(OR)			
(b)	Discuss the database and software functions required for the operation of an FMS.	**(10)**	**3**	**2**

24. (a)	Using rank order clustering algorithm rearrange the following part-machine incidence matrix.	**(10)**	**4**	**3**

$$[a_{ij}] = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{bmatrix} & 1 & & 1 & 1 \\ 1 & & 1 & & \\ & 1 & & 1 & \\ 1 & & 1 & & \end{bmatrix} \end{array}$$

part number

machine number

(OR)

(b)	Structure a knowledge-based system for the implementation of group technology. Illustrate and discuss your system structure in detail.	**(10)**	**4**	**3**
25. (a)	Elaborate on the usage of artificial intelligence in the development of FMS.	**(10)**	**5**	**2**

(OR)

(b)	Discuss the developments in flexible manufacturing systems toward the factory of the future.	**(10)**	**5**	**2**

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	How might the principles of flexible manufacturing systems be effectively applied within the aerospace industry to enhance operational efficiency and productivity? Justify with illustrations.	**(10)**	**5**	**3**

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