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

Question Paper Code: 4023060

M.E. / M.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024
Third Semester
CAD/CAM
P23CCE45 – COMPETITIVE MANUFACTURING SYSTEMS
(Regulation 2023)

Time: Three Hours Maximum: 100 Marks

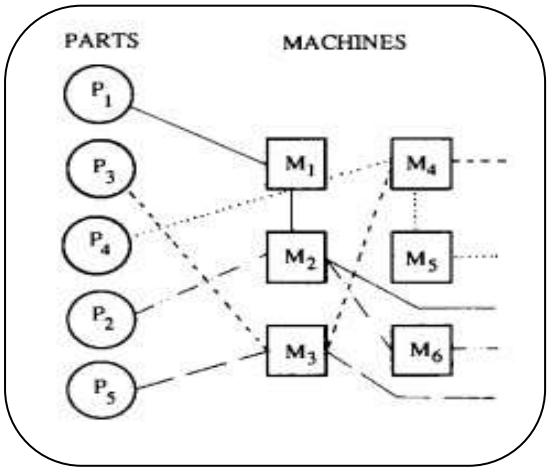
Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. Mentions the steps involved in a laptop manufacturing industry that has to design it for easy recycling and repair.

2. Identify the appropriate control technology for a beverages bottle cap manufacturing industry. Also mention the process parameters that will be monitored and controlled by this technology.

3. Using cluster analysis method form a machine cells (MC) from the part families and machines represented in the figure below:



4. Draw the structure of Knowledge based scheduling system.

5. Enumerate the typical functions performed by the FMS software.

6. Briefly list the key functional considerations for an effective tool management software package.

7. List the specific challenges that might arise when integrating steps like Sort, Set in Order, while implementing the 5S system to improve efficiency, productivity, and safety in a manufacturing environment.

8. Automotive industries apply the Hoshin planning system for aligning its long – term strategic goals with daily operations. Mention the ways it can help the industry respond effectively to technological advancements like electric vehicles and automation technology.

9. Enumerate the 5 ZEROs the Just In Time tries to achieve.

10. How can the Kanban system be effectively applied to streamline operations and improve productivity in a software development team?

PART – B (5 x 16 = 80 Marks)

11. (a) Consider an automated cell consisting of CNC machine tool, a parts storage unit and a robot for loading and unloading the parts between the machine and the storage unit. Possible errors that might affect this system can be divided into the following categories: (1) machine and process, (2) cutting tools, (3) work holding fixtures, (4) part storage unit, and (5) load / unload robot. Develop a list of possible errors (deviations and malfunctions) that might be included in each of these five categories. (16)

(OR)

(b) One of the joints of a certain industrial robot has a type L joint with a range of 0.5 m. the bit storage capacity of the robot controller is 10 bits for this joint. The mechanical errors form a normally distributed random variable about a given taught point. The mean of the distribution is zero and the standard deviation is 0.06 mm in the direction of the output link of the joint. Determine the control resolution (CR_2), accuracy, and repeatability for this robot joint. (16)

12. (a) Sketch the basic structure of the Opitz system of parts classification and explain in detail. (16)

(OR)

(b) Enumerate the various functions of supervisory computers in a flexible manufacturing system and explain them in detail. (16)

13. (a) Mention the steps involved in selection of software for effective functioning of an automated industry. (16)

(OR)

(b) Sketch a typical system design and corresponding database layout for flexible manufacturing system and explain the flow process in detail. (16)

14. (a) Explain the concept of Poka-Yoke be effectively implemented in an industrial setting to reduce errors and improve quality control? Can you provide examples of specific Poka-Yoke techniques that have been successful in preventing defects during the manufacturing process? (16)

(OR)

(b) Discuss about an industry foster a Lean culture to continuously improve efficiency, reduce waste, and enhance overall productivity? What specific practices or strategies can be implemented to encourage employees at all levels to adopt Lean principles in their daily work? (16)

15. (a) Study about the implementation of a flexible workforce strategy in the automotive industry enhances operational efficiency and adaptability to market demands? What specific practices or models can be employed to effectively manage and integrate a flexible workforce within traditional manufacturing environments? (16)

(OR)

(b) Discuss the implementation of a preventive maintenance program in a foundry industry improve equipment reliability and overall production efficiency? What specific strategies and techniques can be utilized to effectively monitor equipment health and minimize downtime in this high-demand environment? (16)

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