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BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Tech.(ME)-2024

Course Name – Manufacturing Automation

Course Code - BTM40109

(Semester IV)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Identify the basic elements of an automated system.
 - a) Power, program, control system
 - b) Machine, worker, tool
 - c) Product, process, profit
 - d) Sensors, PLC, LAN
- (ii) Identify which of the following is NOT one of the three basic elements of an automated system.
 - a) Power
 - b) Program of instructions
 - c) Control system
 - d) Human resource management
- (iii) Distinguish programmable automation from fixed automation.
 - a) Higher production rate
 - b) Fixed sequence of operations
 - c) Capability to change operation sequence by programming
 - d) No need of control system
- (iv) Select the most appropriate automation type for high product variety and medium volume.
 - a) Fixed automation
 - b) Programmable automation
 - c) Flexible automation
 - d) Manual production
- (v) State the production volume suitable for fixed automation.
 - a) Low
 - b) Medium
 - c) High
 - d) Variable
- (vi) Recognize the power source most commonly used in automation.
 - a) Steam
 - b) Electricity
 - c) Solar
 - d) Hydraulic oil
- (vii) Recall the basic types of workpart transfer.
 - a) Manual and automatic
 - b) Continuous and intermittent
 - c) Fixed and flexible
 - d) Batch and mass

- (viii) Identify an example of a linear transfer mechanism.
- a) Geneva mechanism
 - b) Walking beam
 - c) Cam system
 - d) Indexing table
- (ix) Identify the type of assembly line suitable for high production volume.
- a) Manual assembly
 - b) Flexible assembly
 - c) Automated assembly line
 - d) Job shop
- (x) Explain the relationship between product variety and automation level.
- a) High variety always needs fixed automation
 - b) Low variety requires manual production
 - c) High variety favors flexible automation
 - d) Variety has no impact
- (xi) Identify the primary objective of process planning in manufacturing.
- a) Increase inspection time
 - b) Define sequence of operations
 - c) Increase labor cost
 - d) Reduce automation
- (xii) Identify the main objective of advanced manufacturing planning.
- a) Increase inventory
 - b) Optimize production resources
 - c) Increase machine downtime
 - d) Reduce flexibility
- (xiii) Identify the advantages of electro-pneumatic systems over hydraulic systems.
- a) Higher leakage
 - b) Faster response and cleaner operation
 - c) Lower control accuracy
 - d) Higher noise
- (xiv) Calculate the proportion of downtime (D) for a line with an efficiency (E) of 60%.
- a) 0.6
 - b) 0.4
 - c) 0.3
 - d) 0.2
- (xv) Calculate the number of work centers required if the total production hours required is 165 hours/week and one center operates 65 hours/week.
- a) 2
 - b) 3
 - c) 4
 - d) 1

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Describe automation and list the three basic elements required for an automated system. (3)
3. Compare Fixed Automation and Flexible Automation in terms of production rate and capability to handle product variety. (3)
4. Apply factory automation sensors to improve process monitoring. (3)
5. Explain the role of SCADA systems in industrial control. (3)
6. Analyze how lean manufacturing tools contribute to waste reduction. (3)

OR

Analyze the advantages of CAPP over manual process planning. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Describe the five levels of the automation hierarchy in a manufacturing enterprise. (5)
8. Summarize the principles of Just-in-Time (JIT) production system. (5)
9. Evaluate the role of FMS in achieving manufacturing flexibility. (5)
10. Justify the need for Intelligent Manufacturing Systems (IMS). (5)
11. Explain the role of RFID technology in automated manufacturing systems. (5)
12. Explain the Production Flow Analysis (PFA). (5)

OR

Explain Cellular Manufacturing with an example. (5)