Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering
End Sem Examination Dec-2023
ME3EL04 Manufacturing Automation

Programme: B.Tech. Branch/Specialisation: ME

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. Manufacturing lead time will _____ due to automation. **1**

(a) Increases (b) Reduced

(c) Remain same (d) None of these

ii. CNC machine tools are an example of _____. **1**

(a) Enterprise level (b) Plant level

(c) Cell level (d) Device level

iii. A quality control inspector using a micrometer to measure the diameter of a shaft comes under the category of _____. **1**

(a) Manual work systems

(b) An automated system

(c) Worker-Machine Systems

(d) None of these

iv. Which function is not the part of business function? **1**

(a) Sales Forecast (b) Sales and marketing

(c) Order Entry (d) Tool design

v. Which one is comes under the category of discrete variable? **1**

(a) Limit switch open or closed

(b) Work part present or not present in a fixture

(c) Motor on or off

(d) All of these

vi. Mixing and blending of ingredients comes in the category of _____. **1**

(a) Process Industries (b) Discrete Manufacturing Industries

(c) No such industry exists (d) None of these

vii. Full form of ATC in respect of FMS- **1**
(a) Automatic Transport Chip
(b) Alternate Transport Carrier
(c) Automatic Tool Change
(d) None of these

viii. AGV is important in FMS. What it stands for? **1**
(a) Aggressive geared vehicle
(b) Alternate groomed vehicle
(c) Automated guided vehicle
(d) None of these

ix. Arrange the various key stages of Machine vision systems sequentially. **1**
(P) Decision-making
(Q) Image processing
(R) Image acquisition
(a) P -Q - R (b) R -Q - P (c) Q - R- P (d) R -P - Q

x. Which is/are the forms of CMM probe? **1**
(a) Touch-trigger Probe (b) Displacement type probe
(c) Proximity Probe (d) All of these

Q.2 i. Write down reasons for automation. **2**
ii. Explain some challenges in adopting automation. **3**
iii. Explain the types of automation, their advantages and limitation. **5**
OR iv. Explain the ten strategies of automation. **5**

Q.3 i. Define the production system and write its components. **2**
ii. Explain the technological processing capability and physical product limitations of a production system. **3**
iii. Elaborate reasons for the necessity of manual labor in production systems. **5**
OR iv. Average batch quantity = 100 units, average setup time = 3.0 hr per batch, number of operations per batch = 5, and average operation time is 6.0 min per piece for the population of parts made in the plant. Non-operation time = 7.5 hr. The plant has 20 production machines that are 100% utilized (setup and run time), and it operates 40 hr/wk. **5**

Determine-
(a) Weekly plant production rate
(b) Work-in-process for the plant

Q.4 i. Write about three steps of Analog-to-digital conversion. **3**
ii. Explain the steady-state optimization control system and adaptive control system. **7**
OR iii. Compare the continuous control for process industries and discrete control for discrete manufacturing industries on various basis. **7**

Q.5 i. What is meant by AS-RS? How it is implemented in FMS? **4**
ii. Compare the advantages and suitability of various methods of workpiece transport in FMS. **6**
OR iii. Elaborate the technologies used in commercial AGV systems for vehicle guidance. **6**

Q.6 Attempt any two:
i. Explain the CMM with its types. **5**
ii. Explain the various machine vision elements and application of machine vision. **5**
iii. Explain the Inspection for variables and inspection for attributes with suitable examples. **5**

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Marking Scheme
Manufacturing Automation (T) - ME3EL04 (T)

Q.1	i)	b) Reduced		**1**
	ii)	d) Device level		**1**
	iii)	a) Manual work systems		**1**
	iv)	d) Tool design		**1**
	v)	d) All of these		**1**
	vi)	a) Process Industries		**1**
	vii)	(c) Automatic Tool Change		**1**
	viii)	c) Automated guided vehicle		**1**
	ix)	b) R -Q - P		**1**
	x)	d) All of these		**1**
Q.2	i.	4 reasons	(4* 0.5 marks)	**2**
	ii.	challenges in adopting automation.	(6* 0.5 marks)	**3**
	iii.	Types of automation –	3 marks	**5**
		minimum 2 Advantages	1 mark	
		minimum 2 limitations	1 mark	
OR	iv.	Ten strategies of automation	(10*0.5 marks)	**5**
Q.3	i.	Production system	1 mark	**2**
		Its components.	1 mark	
	ii.	Technological Processing Capability	1.5 mark	**3**
		Physical Product Limitations.	1.5 mark	
	iii.	Reasons for the necessity	(1 mark*5)	**5**
OR	iv.	(a) weekly plant production rate	2.5 marks	**5**
		(b) work-in-process for the plant	2.5 marks	
Q.4	i.	Steps of Analog-to-digital conversion.	(1 mark*3)	**3**
	ii.	Optimization Control System	3.5 marks	**7**
		Adaptive Control System.	3.5 marks	
OR	iii.	Continuous control for process	3.5 marks	**7**
		Control for discrete manufacturing	3.5 marks	
Q.5	i.	AS-RS	2 Marks	**4**
		Implementation	2 Marks	
	ii.	Any three method	(2 Marks*3)	**6**
OR	iii.	Any three technology	(2 Mark*3)	**6**
Q.6		Attempt any two:		
	i.	Explanation of CMM	2 Marks	**5**
		Types	3 Marks	
	ii.	Elements	2.5 Marks	**5**
		Application	2.5 Marks	
	iii.	Inspection for variables	2.5 Marks	**5**
		Inspection for attributes….examples.	2.5 Marks	

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P.T.O.