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

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

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.

Q.1 i. Which one of these is an example of fixed automation? **1**

(a) CNC machine
(b) Robots
(c) Automatic assembly machines
(d) All of these

ii. The enterprise level automation includes- **1**

(a) Marketing and sales (b) Designing
(c) Production planning (d) All of these

iii. Which one is correct out of these statements– **1**

I. Car and truck have hard variety
II. Different models of car have hard variety
III. Motorcycle and car have soft variety
IV. Tractor and scooter have soft variety-

(a) Only I (b) I and II
(c) I, II and III (d) All of these

iv. Availability of an equipment is defined as – **1**

(a) (MTBF-MTTR)/MTBF (b) (MTBF-MTTR)/MTTR
(c) MTBF/(MTBF-MTTR) (d) None of these

Where, MTBF-mean time between failures; MTTR-mean time to repair

v. A controller should be able to handle – **1**

(a) Process and timer-initiated interrupts
(b) Operator related interrupts
(c) Both of these
(d) None of these

vi. Which of these is not a PLC programming language – **1**
(a) Ladder logic diagram (b) Functional block diagram
(c) Sequential function chart (d) Functional list

vii. Which of the material handling system is most suitable for in-line type layout of FMS? **1**
(a) Conveyor system (b) In-floor towline carts
(c) Automated guided vehicle (d) None of these

viii. Which statement among these is/are correct – **1**
I. Less space is required in storage system that utilizes randomized storage
II. More space is required in storage system that utilizes randomized storage
III. Higher throughput rates are obtained in randomized storage system
(a) Only I (b) Only II
(c) Only III (c) Both II and III

ix. When the variety in parts is substantial, which of this measurement equipment is appropriate – **1**
(a) Direct computer controlled CMMs
(b) Manual and semi-automatic measurement and gages
(c) Dedicated automatic measurement and machine vision system
(d) None of these

x. Which of these is a part of machine vision system – **1**
(a) Image acquisition and digitization
(b) Image processing and analysis
(c) Image interpretation
(d) All of these

Q.2 i. Give the reasons why enterprises undertake automation. **2**
ii. Comment on three elements of automation. **3**
iii. Discuss any two advanced functions of automation. **5**
OR iv. Explain the ten strategies of automation. **5**

Q.3 i. Explain why manual labour is preferred in factories over automation. **4**
ii. Discuss the functions of manufacturing support system. **6**

OR iii. A certain batch of parts is routed through six machines in a batch production plant. The setup and operation times for each machine are given in the table below. Batch size is 100 and the average non-operation time per machine is 12 hr. Determine: **6**
(a) Manufacturing lead time and
(b) Hourly production rate for operation 3.

Machine	1	2	3	4	5	6
Setup time (hr)	4	2	8	3	3	4
Operation time (min)	5.0	3.5	6.2	1.9	4.1	2.5

Q.4 i. Explain the difference between discrete and continuous control. **2**
ii. What are the different types of control used in process industries? Explain any one with block diagram. **3**
iii. Explain interrupt in control systems and its type. What are their levels? **5**
OR iv What is programmable logic controller (PLC)? Explain its construction and working. **5**

Q.5 Attempt any two:
i. What is flexible manufacturing system (FMS)? Discuss the different types of FMS based on level of flexibility. **5**
ii. What are guidance technologies used in AGV? Discuss any one. **5**
iii. Discuss the different measures of assessing the performance of storage system. **5**

Q.6 Attempt any two:
i. Differentiate contact type and non-contact type inspection techniques? **5**
ii. Give classification of CMM on the basis of mechanical structure. Discuss the conditions in which CMMs are more appropriate to be used? **5**
iii. Discuss machine vision system. **5**

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Marking scheme
ME3EL04 Manufacturing Automation

Q.1	i.	Which one of these is an example of fixed automation? (c) Automatic assembly machines	**1**
	ii.	The enterprise level automation includes- (d) All of these	**1**
	iii.	Which one is correct out of these statements– (a) Only I	**1**
	iv.	Availability of an equipment is defined as – (a) (MTBF-MTTR)/MTBF	**1**
	v.	A controller should be able to handle – (c) Both of these	**1**
	vi.	Which of these is not a PLC programming language – (d) Functional list	**1**
	vii.	Which of the material handling system is most suitable for in-line type layout of FMS? (a) Conveyor system	**1**
	viii.	Which statement among these is/are correct – (a) Only I	**1**
	ix.	When the variety in parts is substantial, which of this measurement equipment is appropriate – (a) Direct computer controlled CMMs	**1**
	x.	Which of these is a part of machine vision system – (d) All of these	**1**

Q.2	i.	Any four reasons why enterprises undertake automation. 0.5 mark for each	(0.5 mark * 4)	**2**
	ii.	Three elements of automation. 1 mark for each	(1 mark * 3)	**3**
	iii.	Any two advanced functions of automation. 2.5 marks for each function	(2.5 marks * 2)	**5**
OR	iv.	Ten strategies of automation 0.5 mark for each strategy	(0.5 mark * 10)	**5**

Q.3	i.	Manual labour is preferred in factories over automation At least six reason 2/3 mark for each reason	(2/3 mark * 6)	**4**
	ii.	Functions of manufacturing support system 1 mark for each function	(1 mark * 6)	**6**
OR	iii.	Determine: (a) Manufacturing lead time (b) Hourly production rate for operation 3.	3 marks 3 marks	**6**

Q.4	i.	Difference b/w discrete and continuous control 0.5 mark for each difference	(0.5 mark * 4)	**2**
	ii.	Types of control used in process industries Block diagram Explanation	0.5 marks 0.5 marks 2 marks	**3**
	iii.	Explanation of interrupt in control systems Its type Levels of interrupt	3 marks 1 mark 1 mark	**5**
OR	iv	Programmable logic controller (PLC) Definition Construction of PLC Working of PLC	 1 mark 3 marks 1 mark	**5**

Q.5		Attempt any two:		
	i.	Definition of flexible manufacturing system (FMS) Types of FMS based on level of flexibility 2 marks for each type (2 marks * 2)	1 mark 4 marks	**5**
	ii.	Name of guidance technologies used in AGV Description of any one	1 mark 4 marks	**5**
	iii.	Measures of assessing the performance of storage system. At least five measures 1 mark for each	(1 mark * 5)	**5**

Q.6		Attempt any two:		
	i.	Contact type Non-contact type Advantages of non-contact type	2 marks 2 marks 1 mark	**5**
	ii.	Classification of CMM (six types) Six conditions 0.5 mark for each (0.5 mark * 6)	2 marks 3 marks	**5**
	iii.	Definition of machine vision system Description of three functions	1 mark 4 marks	**5**

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