

SUBJECT:MECHANICAL MANUFACTURING ENGINEERING IIICODE:IMV321SUPPLEMENTARY EXAMINATIONSUPPLEMENTARY EXAMINATIONDATE:06 January, 2020DURATION:3 hrsTOTAL:100 MarksASSESSOR:Mr. TK Sibane and Prof. K GuptaMODERATOR:Mr. Daniel ChelopoNUMBER OF PAGES:3 PAGES	<u>PROGRAM</u>	:	NATIONAL DIPLOMA ENGINEERING: INDUSTRIAL						
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# **INSTRUCTIONS:**

A Calculator of any make or model is permitted

## **REQUIREMENTS:**

NIL

#### **INSTRUCTIONS TO STUDENTS**

- 1. Read the questions carefully.
- All questions are compulsory. 2.
- Show all calculations. 3.

- 4. Number your answers strictly according to the questions.
- Sketch the block diagrams wherever required. 5.

<b>QUESTION 1</b>	[25 Marks]
<b>1a.</b> What are the three basic industry categories?	[5]
<b>1b.</b> What is the difference between consumer goods and capital goods?	[5]
<b>1c.</b> What is the difference between hard product variety and soft product variety?	[5]
<b>1d.</b> What is lean production?	[5]
1e. In lean production, what does continuous improvement mean, and how	is it usually
accomplished?	[5]
QUESTION 2	[25 Marks]
<b>2a.</b> How does material handling fit within the scope of logistics?	[5]
<b>2b.</b> What is an automated guided vehicle system (AGVS)?	[5]

**2c.** Name three categories of automated guided vehicles. [3] 2d. What features distinguish self-guided vehicles from conventional AGVs? [5] **2e.** Provide a definition of material handling. [3] [4]

2f. Name the four major categories of material handling equipment.

## **QUESTION 3**

## [30 Marks]

**3a.** Apply the rank order clustering technique to the part-machine incidence matrix in the following table to identify logical part families and machine groups. Parts are identified by letters, and machines are identified numerically.

	Parts								
Machines	Α	в	С	D	Е	F	G	н	I
1	1								1
2		1					1		
3			1		1			1	
4		1				1	1		
5			1					1	
6						1	1		
7	1			1					
8			1		1				

#### **QUESTION 4**

#### [20 Marks]

[4]

4a. Name three of the four conditions under which automated production lines are appropriate

**4b.** What are the three basic control functions that must be accomplished to operate an automated production line? [6]

**4c.** Develop the form code (first five digits) in the Opitz System (with the help of chart) for the part illustrated in the figure below [10]



Digit 1 Digit 2		Digit 3			Digit 4			Digit 5							
Part class		e	External shape, external shape elements			Internal shape, internal shape elements			Plane surface machining			Auxiliary holes and gear teeth			
0	L/D 0.5	0	1	Smooth, no shape e lements	0	n	No hole, o breakthrough	0	No surface m achining	0		No auxiliary hole			
1	0.5 < L/D < 3	1	end	No shape elements	1	ped	No shape elements	1	Surface plane and/or curved in one direction, external	1		Axial, not on pitch circle diameter			
al narts	L/D 3	2	ed to one	मु े Thread	2	oth or step o one end	Thread	2	External plane surface related by graduation around the circle	2	eth	Axial on pitch circle diameter			
8 otation		3	Stepp	Functional groove	3	Smoo	Functional groove	3	External groove and/or slot	3	lo gear te	Radial, not on pitch circle diameter			
4		4	ends	No shape elements	4	ends	No shape elements	4	Extemal spline (polygon)	4		Axial and/or radial and/or other direction			
5		5	d to both	Thread	5	d to both	Thread	5	External plane surface and/or slot, external spline	5		Axial and/or radial on PCD and/or other directions			
б		б	Steppe	Functional groove	б	Steppe	Functional groove	б	Internal plane surface and/or slot	б		Spurgear teeth			
nal narts		7		Functional cone		Functional cone		Functional cone		Functional cone		7	, Internal spline (polygon) 7	eth	Bevelgear teeth
∞ Vonrotatio		8	(	perating thread		Op	erating thread	8	Internal and external polygon, groove and/orslot	8	th gear tee	Other gear teeth			
9		9		All others	9		Allothers	9	All others	9	Wi	All others			