

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER- VII EXAMINATION – SUMMER 2026****Subject Code:3171922****Date:26-05-2026****Subject Name: Automation in Manufacturing****Time: 02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

					MARKS
Q.1	(a)	What is flexibility in manufacturing? Explain briefly with suitable example.			03
	(b)	List the ten strategies of Automation.			04
	(c)	Briefly explain three phases of a typical automation migration strategy.			07
Q.2	(a)	Draw usual pneumatic circuit involving all basic elements.			03
	(b)	Briefly explain levels of automation.			04
	(c)	Explain working of hydraulic circuit for ram of a hydraulic shaper with the help of a neat sketch.			07
		OR			
Q.3	(c)	Explain break even analysis for automation with suitable example.			07
	(a)	What is Group Technology? Explain with suitable example.			03
	(b)	Explain production flow analysis with a suitable example.			04
	(c)	A flexible machining system consists of two machining workstations and a load/unload station. Station 1 is the load/unload station. Station 2 performs milling operations and consists of two servers (two identical CNC milling machines). Station 3 has one server that performs drilling (one CNC drill press). The stations are connected by a part handling system that has four work carriers. The mean transport time is 3.0 min. The FMS produces two parts, A and B. The part mix fractions and process routings for the two parts are presented in the table below. The operation frequency is 1 for all operations. Determine: (i) maximum production rate of the FMS, (ii) corresponding production rates of each product, (iii) utilization of each station, and (iv) number of busy servers at each station.			07

Part	Part mix	Operation	Description	Station	Process time
A	0.4	1	Load	1	4
		2	Mill	2	30
		3	Drill	3	10
		4	Unload	1	2
B	0.6	1	Load	1	4
		2	Mill	2	40
		3	Drill	3	15
		4	Unload	1	2

OR

- Q.3** (a) Briefly explain the components of Flexible Manufacturing System. **03**
 (b) Discuss advantages of Flexible Manufacturing Systems. **04**
 (c) Explain Rank order clustering used for Group Technology with a suitable example. **07**
- Q.4** (a) Explain 'end effectors' for robotics with suitable example. **03**
 (b) Briefly explain working of sensor in adaptive robotics. **04**
 (c) Write short note on 'selection criteria for sensors and actuators for robotics applications'. **07**
- OR**
- Q.4** (a) What is a transducer in robotics? **03**
 (b) Briefly explain limitations of hydraulic systems. **04**
 (c) Briefly explain the procedure of designing an AGV system with suitable example. **07**
- Q.5** (a) What is automatic transfer machine? **03**
 (b) Explain AS/RS with a neat sketch. **04**
 (c) Explain application of CMM for automated inspection with a suitable example. **07**
- OR**
- Q.5** (a) What is modular automation? **03**
 (b) Briefly discuss feasibility of automation in economic sense. **04**
 (c) Explain modular design for casting shop with a suitable example. **07**
