

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE- SEMESTER-IV (NEW) EXAMINATION – WINTER 2024**

**Subject Code:3142310**

**Date:30-11-2024**

**Subject Name:Injection Molding Technology**

**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) | Explain the basic working principle of an injection moulding machine.                            | <b>03</b> |
| (b) | Explain the function and significance of the clamping unit in an injection                       | <b>04</b> |
| (c) | Explain in detail the basic principles of the reciprocating screw machine in injection moulding. | <b>07</b> |

- Q.2**
- |     |   |           |
|-----|---|-----------|
| (a) | Briefly explain what a thermocouple is and its role in the injection moulding machine.                                      | <b>03</b> |
| (b) | Differentiate between a standard nozzle and a needle-type nozzle.   | <b>04</b> |
| (c) | Explain the various screw types used in injection moulding machines and how they influence screw plasticization and output. | <b>07</b> |

**OR**

- |     |   |           |
|-----|---|-----------|
| (c) | Describe the constructional features of the clamping unit in an injection moulding machine. Compare toggle clamp and hydraulic clamp mechanisms, discussing their advantages and limitations. | <b>07</b> |
|-----|---|-----------|

- Q.3**
- |     |   |           |
|-----|---|-----------|
| (a) | What is a bimetallic barrel and why is it used in injection moulding?                     | <b>03</b> |
| (b) | Explain the importance of a grooved barrel in an injection moulding machine.              | <b>04</b> |
| (c) | What factors determine the tonnage of the clamping unit in an injection moulding machine? | <b>07</b> |

**OR**

- Q.3**
- |     |  |           |
|-----|--|-----------|
| (a) | What is the function of the hopper in an injection moulding machine?                       | <b>03</b> |
| (b) | Define the PVT (Pressure-Volume-Temperature) diagram in the context of injection moulding. | <b>04</b> |
| (c) | Compare hydraulic clamping with toggle clamping in terms of their working mechanism.       | <b>07</b> |

- Q.4**
- |     |  |           |
|-----|--|-----------|
| (a) | Mention two advantages and two disadvantages of the injection moulding process.                        | <b>03</b> |
| (b) | What are the key process variables that influence the quality of parts produced in injection moulding? | <b>04</b> |
| (c) | Discuss in detail the machine startup and shutdown procedures in an injection moulding machine,        | <b>07</b> |

**OR**

- Q.4**
- |     |  |           |
|-----|--|-----------|
| (a) | What are the typical materials used in injection moulding of thermosets? | <b>03</b> |
|-----|--|-----------|

- (b) List two design considerations for parts made with thermoset injection moulding. **04**
- (c) What are some common troubleshooting techniques for defects encountered in thermoset injection moulding? **07**

- Q.5**
- (a) What are the main causes of short shots in injection moulding? **03**
  - (b) What are flow marks, and how can they be prevented in injection moulding? **04**
  - (c) Explain the common faults such as crazing, discoloration, and silver streaks in injection moulding. What are their causes, and how can these defects be corrected? **07**

**OR**

- Q.5**
- (a) What is the purpose of a conveyor in an injection moulding setup? **03**
  - (b) Describe how a hopper loader operates and its importance in injection moulding. **04**
  - (c) List out the types of process variables that affect the injection cycle and explain them in detail. **07**

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