

# GUJARAT TECHNOLOGICAL UNIVERSITY

## BE-5 SEMESTER – OLD PAPER – S22 TO S25 – QUESTION BANK

**Subject Name & Code:**

**Oil Hydraulics and Pneumatics- 3151913**

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### **Unit 1: Introduction**

#### **Repeated Questions:**

1. **Compare/Distinguish between Hydraulic and Pneumatic systems.**
  - (WINTER 2023 - 03 Marks, SUMMER 2022 - 07 Marks, WINTER 2022 - 04 Marks)
2. **Compare/Distinguish between Hydraulic, Pneumatic, and Electrical systems.**
  - (SUMMER 2022 - 07 Marks)
3. **State the advantages and disadvantages/Merits of Hydraulic/Fluid Power systems.**
  - (SUMMER 2024 - 03 Marks, SUMMER 2022 - 03 Marks)
4. **Draw the basic/general layout/schematic of a hydraulic system and explain the function of its components (especially Reservoir/Oil Tank).**
  - (SUMMER 2025 - 03 Marks, WINTER 2023 - 04 Marks, SUMMER 2023 - 03 Marks)
5. **List/Draw ISO/ANSI symbols of basic components (Pumps, Cylinders, Valves, Reservoir, FRL, etc.).**
  - (WINTER 2024 - 07 Marks, SUMMER 2024 - 07 Marks, WINTER 2022 - 03 Marks, SUMMER 2022 - 03 Marks)
6. **List the electrical devices/elements used in the control of fluid power systems.**
  - (WINTER 2024 - 03 Marks, WINTER 2022 - 04 Marks)

#### **Other Important Questions:**

- Explain Brahmas press principle with a sketch. (SUMMER 2024 - 04 Marks, SUMMER 2022 - 04 Marks)
- State the basic requirements for a Pneumatic System. (From Syllabus)
- Give applications of Pneumatics. (SUMMER 2025 - 03 Marks)

## Unit 2: Hydraulic Oils, Fluid Properties and Filters

### Repeated Questions:

1. **List/Explain the properties/functions of hydraulic oil.**
  - (SUMMER 2025 - 04 Marks, SUMMER 2024 - 04 Marks, SUMMER 2023 - 04 Marks)
2. **What is the purpose of a filter? Explain different types/locations of filters with sketches.**
  - (SUMMER 2024 - 07 Marks, WINTER 2023 - 03 Marks, WINTER 2022 - 07 Marks)
3. **Explain Bypass Filter with a schematic diagram, its advantages, and disadvantages.**
  - (WINTER 2024 - 07 Marks, SUMMER 2025 - 07 Marks)
4. **Write a short note on Fire Resistant fluids/oils and Biodegradable oils.**
  - (WINTER 2022 - 07 Marks, WINTER 2023 - 07 Marks)
5. **Define terms related to filtration: Mesh number, Slit index, Beta ratio.**
  - (WINTER 2024 - 03 Marks)

### Other Important Questions:

- Write a short note on contaminations. (SUMMER 2022 - 07 Marks)
- Explain the types of filters and sources of contamination. (SUMMER 2024 - 07 Marks - OR part)
- Explain Flash Point, HWCF, and TAN concerning hydraulic oil. (SUMMER 2023 - 03 Marks)

## Unit 3: Hydraulic Pumps, Motors, Valves and Actuators

### Repeated Questions:

1. **Classify and explain the construction & working of various pumps (Gear, Vane, Piston).**
  - (SUMMER 2023 - 07 Marks, SUMMER 2024 - 07 Marks, WINTER 2022 - 07 Marks)
2. **Classify and explain Pressure Control Valves (Relief Valve, Reducing Valve, Sequence Valve, etc.).**
  - (SUMMER 2023 - 04 Marks, WINTER 2023 - 07 Marks, SUMMER 2024 - 03 Marks)
3. **Classify and explain Actuators (Linear - Single/Double Acting, Rotary).**
  - (SUMMER 2023 - 04 Marks, WINTER 2023 - 07 Marks, SUMMER 2024 - 03 Marks)
4. **Explain the construction and working of a Pressure Relief Valve and state its importance.**
  - (WINTER 2022 - 07 Marks, WINTER 2023 - 07 Marks)
5. **Explain the function and working of a Check Valve (Non-return valve).**
  - (SUMMER 2023 - 03 Marks, SUMMER 2024 - 03 Marks)
6. **What is an Accumulator? Classify them and explain their functions.**
  - (SUMMER 2023 - 07 Marks, SUMMER 2024 - 04 Marks, WINTER 2023 - 03 Marks)
7. **Classify Flow Control Valves.**
  - (WINTER 2024 - 03 Marks, SUMMER 2025 - 03 Marks)
8. **Explain the construction and working of a Pressure Compensated Flow Control Valve.**
  - (WINTER 2024 - 07 Marks)

### Other Important Questions:

- What is a positive displacement pump? State its advantages. (WINTER 2022 - 03 Marks)
- Explain pump cavitation. (SUMMER 2022 - 07 Marks - OR part)
- Explain counterbalance and unloading valves. (SUMMER 2024 - 03 Marks - OR part)
- Explain the principle of hydrostatic transmission. (SUMMER 2025 - 07 Marks - OR part)
- Differentiate between a hydrostatic and hydrodynamic system. (WINTER 2024 - 07 Marks - OR part)
- Explain the reservoir's accessories and functions of heating/cooling devices. (SUMMER 2022 - 03, 04 Marks - OR part)

## Unit 4: Air Preparation and Service Unit

### Repeated Questions:

1. **What is an FRL Unit? Why is it required? Explain its components in detail with a symbol.**
  - (SUMMER 2025 - 07 Marks, WINTER 2023 - 07 Marks, WINTER 2022 - 07 Marks, SUMMER 2023 - 07 Marks)
2. **Write a short note on the Air Receiver.**
  - (WINTER 2024 - 04 Marks, SUMMER 2025 - 04 Marks)
3. **Explain the selection/types of Air Compressors.**
  - (SUMMER 2024 - 03 Marks)

### Other Important Questions:

- How is compressed air generated in a pneumatic system? (WINTER 2024 - 03 Marks)
- Explain the pipeline layout. (From Syllabus)

## Unit 5: Pneumatic Cylinders, Motors and Valves

### Repeated Questions:

1. **Explain the Quick Exhaust Valve with a sketch and its application in a circuit.**
  - (SUMMER 2023 - 03 Marks, SUMMER 2025 - 04 Marks, WINTER 2024 - 03 Marks - OR part, SUMMER 2025 - 04 Marks)
2. **Explain the Time Delay Valve with a sketch and its application.**
  - (SUMMER 2023 - 04 Marks, SUMMER 2024 - 04 Marks, SUMMER 2025 - 07 Marks - OR part, WINTER 2022 - 03 Marks)
3. **Explain the Shuttle Valve (OR valve) and Twin Pressure Valve (AND valve) with a sketch.**
  - (SUMMER 2025 - 07 Marks, WINTER 2022 - 04 Marks)
4. **Explain the construction and working of Telescopic Cylinders.**
  - (WINTER 2024 - 04 Marks, SUMMER 2024 - 04 Marks - OR part)
5. **Write a short note on limited rotation air motors / pneumatic motors.**
  - (WINTER 2024 - 04 Marks)

### Other Important Questions:

- Explain cushioning in pneumatic cylinders. (WINTER 2023 - 04 Marks)
- Explain the working of a poppet-type 3/2 DCV. (WINTER 2022 - 03 Marks)

## Unit 6: Circuit Design

### Repeated Questions:

1. **Draw and explain basic circuits for controlling Single Acting and Double Acting Cylinders using 3/2, 4/2, 5/2, and 4/3 DCVs.**
  - (This is a very common theme across all papers, e.g., WINTER 2024 - 04 Marks, SUMMER 2023 - 04 Marks, WINTER 2023 - 04 Marks, SUMMER 2022 - 04 Marks)
2. **Draw and explain a Sequencing Circuit for two Double Acting Cylinders (using sequence valves or limit switches).**
  - (SUMMER 2024 - 07 Marks, WINTER 2022 - 07 Marks, SUMMER 2025 - 07 Marks)
3. **Explain Meter-in, Meter-out, and Bleed-off circuits. State their advantages/disadvantages.**
  - (SUMMER 2023 - 07 Marks, SUMMER 2024 - 07 Marks - OR part, WINTER 2023 - 03 Marks, SUMMER 2025 - 03 Marks)
4. **Explain the principle and draw a circuit for a Regenerative circuit.**
  - (WINTER 2024 - 03 Marks, WINTER 2023 - 04 Marks)
5. **Develop pneumatic circuits for logic gates (OR, AND).**
  - (WINTER 2022 - 07 Marks, SUMMER 2022 - 07 Marks - OR part)
6. **Explain power losses in hydraulic/flow control circuits.**
  - (WINTER 2023 - 07 Marks, SUMMER 2025 - 07 Marks)

### Other Important Questions:

- Explain a double pump hydraulic circuit. (SUMMER 2022 - 07 Marks)
- What is regeneration in a hydraulic system? (SUMMER 2023 - 03 Marks)
- Explain the cascade method for sequencing. (From Syllabus)

## Unit 7: Automation and Simulation

### Repeated Questions:

1. **Explain the necessity/role of automation in fluid power. Give its advantages and disadvantages.**
  - (SUMMER 2025 - 03, 04 Marks, WINTER 2023 - 03, 04, 07 Marks, WINTER 2022 - 03 Marks)
2. **Classify types of automation (Fixed, Flexible, Programmable).**
  - (SUMMER 2025 - 07 Marks, WINTER 2023 - 07 Marks, SUMMER 2023 - 07 Marks - OR part)
3. **What are the different circuit design/simulation software available? Explain their role.**
  - (WINTER 2024 - 03 Marks, SUMMER 2024 - 03 Marks)

### Other Important Questions:

- Differentiate between circuit design software and circuit simulation software. (WINTER 2023 - 03 Marks)
- Write the steps for circuit simulation in software. (WINTER 2024 - 04 Marks)

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