Chapter 2 – Troubleshooting and Repair of a Motherboard

✅ Part I: Short Questions

Q1. What is a motherboard in a computer?

- The **motherboard** is the main printed circuit board (PCB) of a computer.
- It connects the CPU, RAM, storage devices, input/output devices, and expansion cards.
- Example: ATX, Micro-ATX motherboards.

Q2. Describe motherboard.

- A **motherboard** is the backbone of a computer system.
- It provides **communication pathways (buses)** for components.
- Includes slots for RAM, CPU socket, BIOS/UEFI, ports, and expansion slots.

Q3. Describe system board and planar board.

- **System board:** Another name for the motherboard.
- **Planar board:** An older term for motherboard used in IBM PCs.
  👉 Both terms mean the same as motherboard.

Q4. Identify motherboard components.

1. CPU socket.
2. RAM slots.
3. BIOS/UEFI chip.
4. Expansion slots (PCIe).
5. Power connectors.
6. SATA/M.2 storage ports.
7. USB headers & I/O ports.
8. Chipset (Northbridge/Southbridge or modern PCH).

Q5. What are the types of RAM?

1. **DRAM (Dynamic RAM)**
2. **SRAM (Static RAM)**
3. **SDRAM (Synchronous DRAM)**
4. **DDR family:** DDR, DDR2, DDR3, DDR4, DDR5

Q6. Enumerate types and characteristics of CPU.

- **Types:** CISC, RISC, Multi-core, Microprocessors.
- **Characteristics:** Clock speed (GHz), cache memory, instruction set, number of cores, thermal design power (TDP).

Q7. What are the 4 types of processors?

1. Single-core processors.
2. Dual-core processors.
3. Quad-core processors.
4. Multi-core (Hexa-core, Octa-core).

Q8. How many types of CPU parts are there?

Main CPU parts:

1. **ALU (Arithmetic Logic Unit):** Performs calculations.
2. **CU (Control Unit):** Directs instructions.
3. **Registers:** High-speed storage.
4. **Cache memory:** Fast temporary memory.

Q9. List & Differentiate types of bus and slots.

- **Types of Bus:**
  - Data bus (transfers data).
  - Address bus (transfers memory addresses).
  - Control bus (sends control signals).
- **Slots:**
  - PCI/PCIe slots (for graphics/network cards).
  - RAM slots (DIMM).
  - M.2 slots (for SSDs).

Q10. Describe daughter boards.

- A **daughter board** is a smaller circuit board that attaches to the motherboard.
- Used to add functionality (e.g., sound card, graphics card).

✅ **Part II: Long Questions**

Q1. List commonly occurring motherboard faults.

1. Computer not powering on.
2. No display or beeping errors.
3. Overheating issues.
4. Damaged capacitors.
5. Faulty RAM/slot connections.
6. BIOS corruption.
7. Loose or burnt power connectors.

Q2. Describe diagnostic tests and preventive measures.

- **Diagnostic Tests:**
  - POST (Power-On Self-Test).
  - Multimeter checks (voltage testing).
  - Diagnostic cards (POST cards).
  - BIOS beep codes.
- **Preventive Measures:**
  - Clean dust regularly.
  - Ensure proper cooling & ventilation.
  - Use UPS to prevent power surges.
  - Update BIOS carefully.

Q3. Perform card substitution method for repairs and replacement of motherboard.

- **Card substitution method:** Replacing suspected faulty components with working ones to isolate the fault.
- **Steps:**
  1. Replace suspected RAM with a working module.
  2. Swap graphics card or other add-on cards.
  3. Test with a different power supply.
  4. If system works, faulty card is identified.
  5. If not solved → motherboard may need repair/replacement.

🌟 **Extra Important Questions**

Q1. What is BIOS and its role in troubleshooting?

- BIOS initializes hardware and loads the operating system.
- Errors in BIOS setup can cause boot failures.

Q2. What is CMOS battery and its function?

- CMOS battery powers BIOS memory.
- Stores date, time, and hardware configuration.

Q3. Symptoms of a faulty motherboard?

- Random reboots, no POST, burning smell, expansion slots not working.

Q4. Difference between Northbridge and Southbridge.

- **Northbridge:** Handles CPU, RAM, and GPU communication.
- **Southbridge:** Handles I/O devices like USB, storage, BIOS.

Q5. Why is thermal paste important?

- It fills gaps between CPU and heat sink, ensuring efficient cooling.