🧠 SPOS (System Programming and Operating System) VIVA QUESTIONS & ANSWERS

◆ 1️⃣ Pass-I of Two Pass Assembler

Question	Answer
1. What is an assembler?	It converts assembly language code into machine code.
2. What are the two passes of an assembler?	Pass-I and Pass-II.
3. What is the main function of Pass-I?	To generate symbol table, literal table, and intermediate code.
4. What is symbol table?	It stores symbols (labels, variables) with their addresses.
5. What is literal table?	It stores constants (like ='5') with assigned addresses.
6. What is intermediate code?	It is an intermediate representation generated after Pass-I.
7. What is a pseudo instruction?	An instruction that doesn't produce machine code (e.g., START, END, LTORG).
8. What is opcode table?	It stores mnemonic operation codes and their binary equivalent.
9. What happens during LTORG?	Literals are assigned memory locations.
10. Why assembler uses two passes?	To resolve forward references and generate final addresses.

◆ 2️⃣ Pass-II of Two Pass Assembler

Question	Answer
1. What is the purpose of Pass-II?	To generate actual machine code using tables from Pass-I.
2. What inputs are used in Pass-II?	Intermediate code, symbol table, and literal table.
3. What is forward reference?	A symbol used before it is defined.
4. What is machine code?	Binary or hexadecimal code that can be executed by CPU.
5. Why is Pass-II required?	To convert assembly instructions into object code.
6. What is the output of Pass-II?	Object code (final executable).
7. What does (IS,04)(1)(S,1) mean?	It means Instruction Statement, opcode 04, operand 1, symbol 1.
8. What are assembler directives?	Instructions to assembler (e.g., START, END, EQU, ORIGIN).
9. What is difference between Pass-I and Pass-II?	Pass-I creates tables; Pass-II generates machine code.
10. What data structures are used in assembler?	Symbol table, literal table, opcode table, pool table.

◆ 3️⃣ Pass-I of Macro Processor

Question	Answer
1. What is a macro?	A single name representing a group of instructions.
2. What is a macro processor?	It expands macros before assembly.
3. What is the function of Pass-I in macro processor?	To create MNT, MDT, and Intermediate code without macro definitions.
4. What is MNT?	Macro Name Table — stores macro name and pointer to MDT.
5. What is MDT?	Macro Definition Table — stores body of macro.

Question	Answer
6. What is ALA?	Argument List Array — stores macro arguments.
7. What is macro definition?	The code written between MACRO and MEND.
8. What is macro call?	Using macro name with parameters in the program.
9. Why macros are used?	To reduce code repetition and errors.
10. What is the output of Pass-I?	MNT, MDT, ALA, and intermediate code without macro body.

◆ **4** **Pass-II of Macro Processor**

Question	Answer
1. What is main function of Pass-II?	To expand macros in source code using MDT and ALA.
2. What is macro expansion?	Replacing macro call with its actual statements.
3. What inputs are used in Pass-II?	MNT, MDT, ALA, and intermediate code.
4. What is #0, #1 used in MDT?	It indicates argument positions.
5. What happens to macro body in Pass-II?	It is replaced with actual code.
6. What is difference between assembler and macro processor?	Assembler converts to machine code, macro processor expands macros.
7. What is the output of Pass-II macro processor?	Expanded source code ready for assembly.
8. What is advantage of macro processor?	Reduces coding time and increases reusability.
9. What is the use of MEND?	It marks the end of macro definition.
10. How many passes are used?	Two passes — one for table creation, one for expansion.

◆ **5** **CPU Scheduling Algorithms (FCFS, SJF, Priority, Round Robin)**

Question	Answer
1. What is CPU scheduling?	It decides which process runs next on CPU.
2. What is FCFS?	First Come First Serve — process arriving first gets CPU first.
3. What is SJF?	Shortest Job First — process with smallest burst time runs first.
4. What is Priority Scheduling?	Process with highest priority runs first.
5. What is Round Robin?	Each process runs for a fixed time (quantum) in a cycle.
6. What is preemptive scheduling?	CPU can be taken from a running process.
7. What is non-preemptive scheduling?	Once CPU is given, it can't be taken until process completes.
8. What is turnaround time?	Time from process submission to completion.
9. What is waiting time?	Time a process spends in ready queue.
10. Which is best for time-sharing?	Round Robin scheduling.
11. Which algorithm may cause starvation?	SJF and Priority scheduling.
12. What is time quantum?	The fixed time slice given to each process in RR.

◆ 🔢6 Page Replacement Algorithms (LRU)

Question	Answer
1. What is paging?	Memory management technique that divides memory into pages.
2. What is page fault?	When required page is not found in main memory.
3. What is page replacement?	Replacing one page with another when memory is full.
4. What is LRU?	Least Recently Used — replaces page that hasn't been used for longest time.
5. What is FIFO?	First In First Out — replaces oldest page first.
6. What is Optimal algorithm?	Replaces page that won't be used for longest future time.
7. What is frame?	Fixed-size block of physical memory.
8. What causes thrashing?	Too many page faults due to less memory.
9. What is hit ratio?	Percentage of page requests found in memory.
10. What is fault ratio?	Percentage of page requests not found in memory.

⚙ IOT PRACTICALS VIVA QUESTIONS & ANSWERS

◆ 🔢7 Interfacing LED Bar

Question	Answer
1. What is LED bar?	Module with 10 LEDs used for display patterns.
2. What function is used to turn ON/OFF LED?	digitalWrite()
3. What does pinMode() do?	Sets pin as input or output.
4. What is used for delay between LEDs?	delay() function.
5. What voltage do LEDs need?	5V DC.
6. Why use resistor with LED?	To limit current.
7. Which Arduino pins are used?	Digital pins.
8. What is advantage of LED bar?	Visual indication of level or pattern.
9. How many LEDs are in bar?	Usually 10.
10. What is current limiting resistor value?	Commonly 220Ω.

◆ 🔢8 Piezo Buzzer Interfacing

Question	Answer
1. What is piezo buzzer?	A device that produces sound using vibrations.
2. What function generates sound in Arduino?	tone(pin, frequency)
3. What stops the sound?	noTone(pin)
4. What type of output is produced?	Sound frequency.
5. What voltage is used?	3.3V–5V.

Question	Answer
6. What is active buzzer?	Has built-in oscillator.
7. What is passive buzzer?	Needs external signal.
8. What are applications?	Alarm, alert, notification systems.
9. What function creates melody?	Multiple tone() with different frequencies.
10. Why buzzer used in IoT?	For alert or warning signals.

◆ 9 Ultrasonic Sensor

Question	Answer
1. What is Ultrasonic sensor?	It measures distance using sound waves.
2. What are its pins?	VCC, GND, TRIG, ECHO.
3. What is TRIG pin used for?	Sends ultrasonic signal.
4. What is ECHO pin used for?	Receives reflected signal.
5. What is formula for distance?	Distance = (Time × 343) / 2.
6. What is range?	2cm to 400cm.
7. What type of signal used?	Ultrasonic sound.
8. What voltage needed?	5V.
9. What is used in parking systems?	Ultrasonic sensor.
10. Why divide by 2 in formula?	Because wave travels twice (forward and back).

◆ 10 Light Sensor (LDR)

Question	Answer
1. What is LDR?	Light Dependent Resistor.
2. How does it work?	Resistance decreases with light increase.
3. What type of output?	Analog.
4. Which pin reads data?	Analog pin A0.
5. What happens in dark?	LED turns ON.
6. What happens in light?	LED turns OFF.
7. What voltage needed?	5V.
8. What is threshold value?	Value for light-dark decision.
9. What are applications?	Automatic lights, security.
10. What is full form of LDR?	Light Dependent Resistor.

◆ 11 Water Level Sensor

Question	Answer

Question	Answer
1. What does water level sensor detect?	Amount of water present.
2. What is output type?	Analog voltage.
3. Which pin is used?	A0 (Analog input).
4. What happens if tank full?	LED or buzzer turns ON.
5. What happens if empty?	LED OFF.
6. What voltage used?	5V.
7. What are uses?	Water tanks, irrigation.
8. What are electrodes made of?	Copper.
9. Can it control motor?	Yes, automatically.
10. What is the range?	0 to 100% water level.

◆ 1️⃣2️⃣ **Soil Moisture Sensor**

Question	Answer
1. What does it measure?	Water content in soil.
2. What type of output?	Analog.
3. Which pin used?	A0.
4. What happens when soil is dry?	LED/Buzzer turns ON.
5. What happens when soil is wet?	LED OFF.
6. What voltage used?	5V.
7. What are uses?	Smart irrigation, gardening.
8. What are electrodes made of?	Metal.
9. What is threshold value?	Minimum moisture for alert.
10. What is application?	Automatic watering system.

◆ 1️⃣3️⃣ **DHT11/DHT22 Temperature Sensor**

Question	Answer
1. What does DHT11 measure?	Temperature and humidity.
2. How many pins?	3 or 4.
3. Which pin reads data?	Digital pin D2.
4. What is data type?	Digital output.
5. What is temperature range?	0°C–50°C.

Question	Answer
6. What is humidity range?	20%–90%.
7. What library used?	DHT.h
8. What is difference DHT11 vs DHT22?	DHT22 is more accurate and wider range.
9. What voltage needed?	3.3V–5V.
10. What is used for alert?	LED or buzzer.

◆ 1️⃣4️⃣ Obstacle Detector (IR Sensor)

Question	Answer
1. What is IR sensor?	Infrared sensor detects obstacle using reflection.
2. What are its pins?	VCC, GND, OUT.
3. What type of output?	Digital.
4. What happens when obstacle near?	Output LOW or HIGH (depends on module).
5. What happens when obstacle far?	No output change.
6. What voltage used?	5V.
7. What are applications?	Robots, counters, security.
8. What is detection range?	2cm–30cm.
9. Why IR used instead of ultrasonic?	Short range, less power.
10. What component emits IR?	IR LED.