

ANSWERS OF QUESTION SET

→ SHORT ANSWER TYPE QUESTION

Ans. 1 Address Bus : The address bus carries addresses and is one way bus from microcontroller/processor to the memory or other devices. 8051 contains 16-bit address bus.

Data Bus : Data bus carries data in binary form between micro-controller and other external units such as memory. It is bi-directional. 8051 micro-controller has 8-bit data bus.

Ans. 2 a. Features of 8051 micro-controller are -

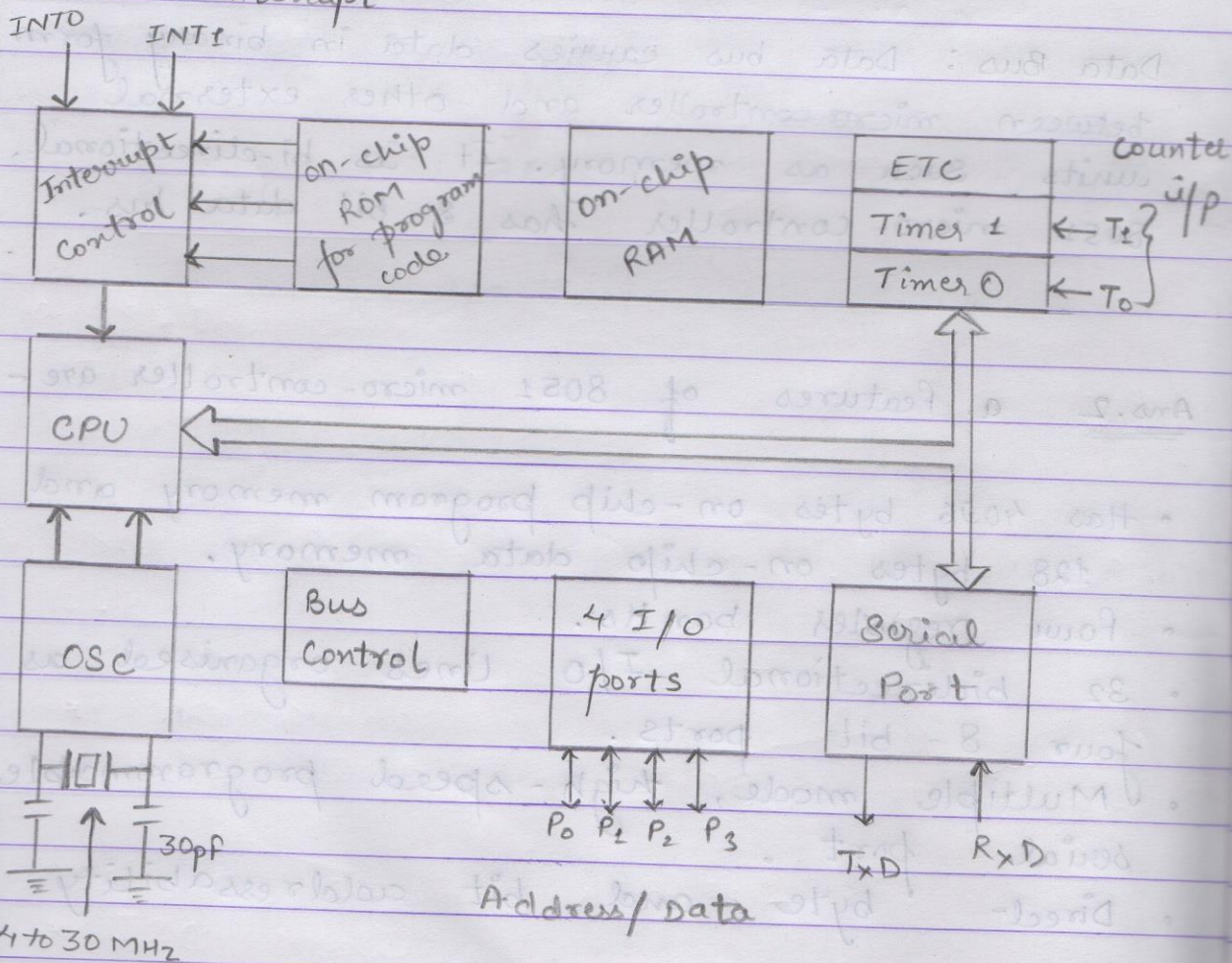
- Has 4096 bytes on-chip program memory and 128 bytes on-chip data memory.
- Four register banks.
- 32 bidirectional I/O lines organised as four 8-bit ports.
- Multiple mode, high-speed programmable serial port.
- Direct byte and bit addressability.

b. 8051 family members -

Features	8031	8051	8052	8751
Program Memory (Bytes)	None	4K ROM	8K ROM	4K EPROM
Data Memory (Bytes)	128 RAM	128 RAM	256 RAM	128 RAM
Timers / Counters (16-bit)	2	2	3	2
I/O pins	32	32	32	32
Serial port	1	1	1	1

Ans.3 Block diagram of Microcontroller 8051 -

External Interrupt



Ans.4 Features of MSP430x5xx series micro-controller are -

- Von-Neumann Style architecture.
- Works in ultra-low power mode.
- Has 16-bit RISC processor features.
- High performance A to D conversion.
- Wake-up from standby mode in $< 5\mu s$.

Ans.5 • The watchdog timer (WDT+) performs a controlled system restart after a software problem occurs.

- This module provides safety mechanism.

Ans.6 Features of Timer - A :

- Asynchronous 16-bit timer/counter with four operating modes.
- Selectable and configurable clock source.
- Interrupt vector register for fast decoding of all timer-A interrupts.

Features of Timer - B :

- Asynchronous 16-bit timer/counter with four operating modes and four selectable lengths.

- Double - buffered compare latches with synchronized loading.
- Configurable output with PWM capability.

Ans. 7 Features of Real-Time Clock (RTC) :

- Used as a straight forward counter.
- Configurable with calendar function or general purpose counter.
- Interrupt capability.
- Programmable alarms in ~~real~~ real-time clock mode.

Ans. 8 . The Universal Serial Communication Interface (USCI) module supports multiple serial communication modes.

- USCI supports two channels, basically A and B.

USCI - Ax module support -

- * UART Mode
- * Pulse Shaping for IrDA communication.

USCI - Bx module supports -

* I2C Mode

* SPI Mode.

Ans. 9

Synchronous

- Used to send data in form of blocks.
- Transmission Speed is fast.
- Data is send at constant time interval.
- No need of start and stop bits.

Asynchronous

- Sends 1 byte or character at a time.
- Transmission speed is slow.
- Data is send in random order.
- Start and stops bit are needed.

Ans. 10 ADC

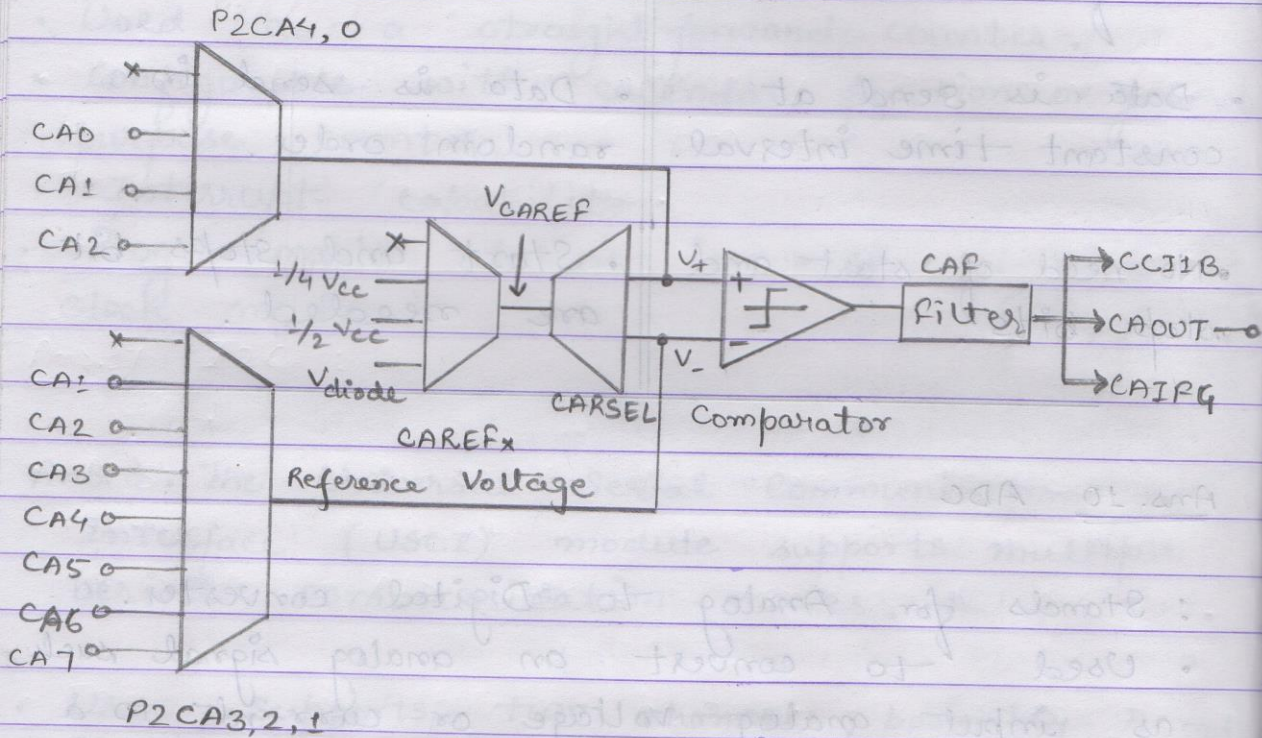
- : Stands for Analog to Digital converter.
- Used to convert an analog signal such as input analog voltage or current to a digital no. proportional to the magnitude of voltage or current.
- For eg. - In Music Recording.

DAC

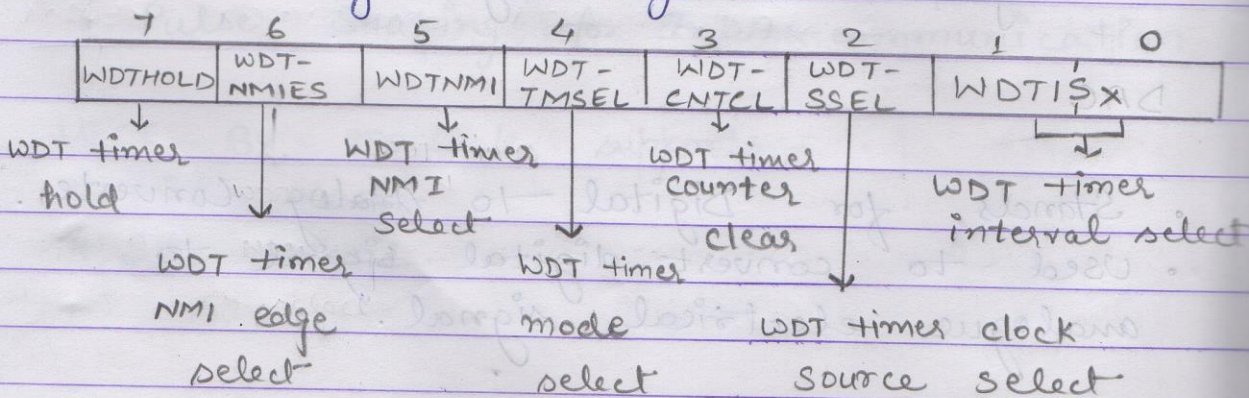
- Stands for Digital to Analog Converter.
- Used to convert digital signal to analogue electrical signal.

- for eg. - In music players, DAC are used to convert digital data streams into analog audio signal.

Ans. 11 Block Diagram of Comparator - A.



Ans. 12 Watchdog Timer Register Format



Ans. 13 The features of Unified Clock System (UCS) are -

- Low clock frequency for energy conservation and time keeping.
- High clock frequency for fast response times.
- Clock stability over operating temp. and supply voltage.
- Low-cost applications with less-constrained clock accuracy requirements.

Ans. 14 Sigma-Delta

- The SD-16 module is a multichannel 16-bit sigma-delta analog-to-digital converter.
- It consists of up to three independent sigma-delta analog-to-digital converters and an internal voltage reference.

Ans. 15 • Pull-up resistors are resistors which are used to ensure that a wire is pulled to a high logical level in the absence of an input signal.

- Pull-down resistors work in same manner as pull-up resistors, except that they pull the pin to a logical low value.

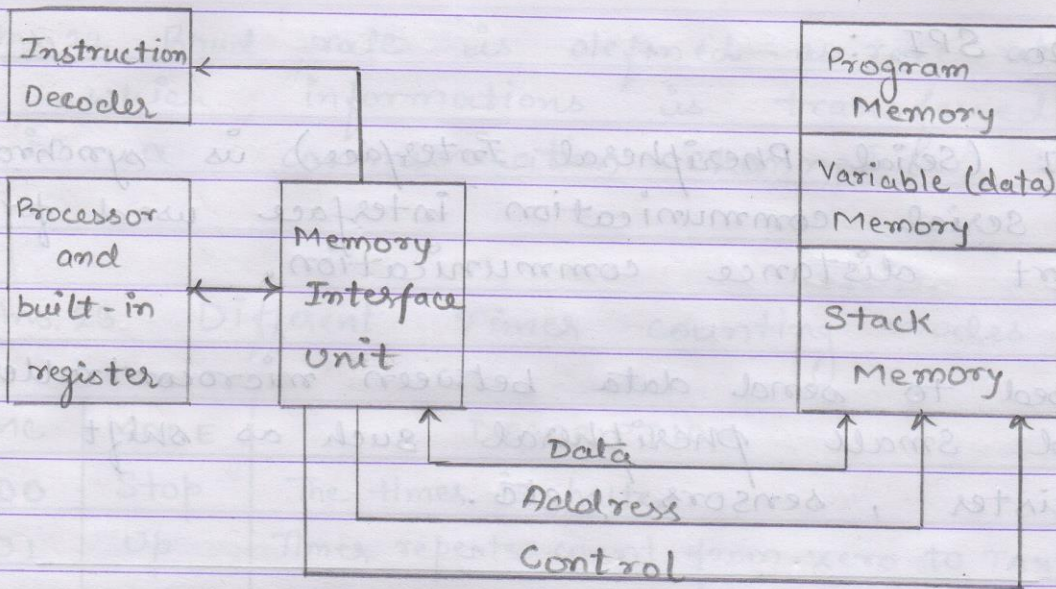
Ans. 16 The features of MSP430 GPIO ports are -

- MSP430 consists of total of 59 GPIO pins distributed among four ports.
- Four ports i.e., PA, PB, PC having 16-bit I/O pins and PD has 11-bit I/O pins.
- These pins are individually programmable it means that each pin can be accessed as Input - Output pins.

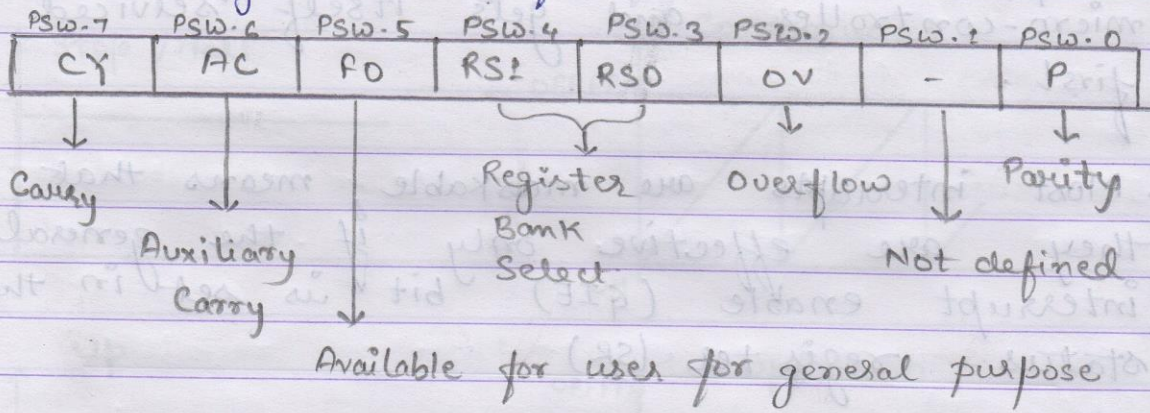
Ans. 17 I2C :

- A serial protocol for two-wire interface to connect low-speed devices like micro-controller, A/D, etc in embedded system.
- I2C bus is popular because it is simple to use, there can be more than one master.

Ans. 18 Princeton Architecture :



Ans. 19 Flag Format of 8051 Microcontroller.



Register Bank Select :

RS1	RS0	Register Bank	Address
0	0	0	00H - 07H
0	1	1	08 - 0FH
1	0	2	10H - 17H
1	1	3	18 - 1FH

Ans. 20 SPI :

- SPI (Serial Peripheral Interface) is synchronous serial communication interface used for short distance communication.
 - Used to send data between microcontroller and small peripheral such as shift register, sensors, etc.
-

Ans. 21 • Interrupt is a mechanism by which it suspend the normal execution of the micro-controller and gets itself serviced first.

- Most interrupts are maskable, means that they are effective only if the general interrupt enable (GIE) bit is set in the status register (SR).
- The MSP430 uses vectored interrupts, which means that the address of each ISR - its vector is stored in vector table at defined address in memory.

490 - 80

491 - 81

492 - 82

Ans. 22 Baud rate is defined as rate at which information is transferred in a communication channel.

Ans. 23 Different Timer counting modes are-

MC	MODE	DESCRIPTION
00	Stop	The timer is halted.
01	Up	Timer repeats count from zero to $TAXCCR0$
10	Continuous	Timer repeats count from zero to $OFFFPH$.
11	Up/Down	The timer repeatedly counts from zero up to value of $TAXCCR0$ and back to zero.

