Bhartiya Institute of Engineering & Technology, Sikar

I midterm examination

Subject - Embedded System

6CS5A

Q (I) (a) What is difference between Microprocessor and Microcontroller

Ans

General Purpose Microprocessor	Microcontroller
(i) The CPU is stand-alone memory (RAM and ROM), Timers, I/O ports are on different chips.	The CPU memory (RAM and ROM), Timers I/O ports are all on a single chip.
(ii) Different kinds of software application can be loaded.	Single software application is generally used.
(iii) Due to use of different ICs, the memory size number of ports can be configured. hence designer can decide on amount of ROM, RAM and I/O ports	Amount of memory number of ports is limited by the microcontroller used, hence fix amount of on chip ROM, RAM, I/O ports
(iv) Different chips occupy more space, hence more power consumption and more cost	Single chip hence less space, less power and less cost.
(v) Clock rates are fast (upto GHz) microprocessor have	Clock rates are comparably slow (limited to tens of MHz)

(vi) A large instruction-set	Comparatively less number of instruction.
(viii) Expensive and versatile hence can be used for all general purpose applications like Computers	Non expensive and hence can be used for single purpose specific application like Camera, cell phones.

* Classification of MicroController. ⇒

Knowing all the type of microcontroller a microcontroller can be classified according to the following on the chip feauter.

(i) Processor width 8 bit or 16 bit or 32 bit processor.

(ii) Program storage hardware architecture harvard and or Von-neumann (Princeton).

(iii) Size of internal or external memories (upto 64 Kb or more)

(iv) Type of memory used (RAM and ROM).

(v) Type of processor used (RISC or CISC).

(vi) Number of available on chip component like ADC/DAC, precision comparator watchdog timer etc

(vii) Crystal Oscillator used (to determine the maximum operating feauency).

(viii) Crystal Oscillator used (to determine the maximum operating feauency.

(ix) Size & Pin layout of the ICs

(x) Power requirement and power dissipation (minimum to maximum)

* Application (example of Embedded System)

As devices using micro controllers are capable of performing specific task repeatedly and with good accuracy, they have application in numerous field, few of which include.

(a) Home application like intercom, telephones, security system, garage door openers, answering machines TV, Cable TV Tuner, VCR camcorder, remote control, video game, exercise equipment.

(b) biomedical instrument like ECG display and recorder, patient, monitoring system blood cell analyzer.

(c) Communication system like numeric pagers, cellular phones, Cable TV terminal, Fax machines.

(d) Instrument in industrial process control like electronic weighing machine. with display one machine.

(e) instrument in industrial process control engine speed and fuel control.

(f) Automative application like dynamic ride control anti clock breaking system controller.

Q.1(b) Explain the HARDWARE ARCHITECTURE ?.

Ans:⇒

Along with a CPU the hardware also includes any components that facilitate the user - application interaction such as display units Keypads etc. figure 1.5 shows various fuctional blocks of the hardware architecture of an embedded system this is a general architecture applicable to both microprocessor and microcontrollers.

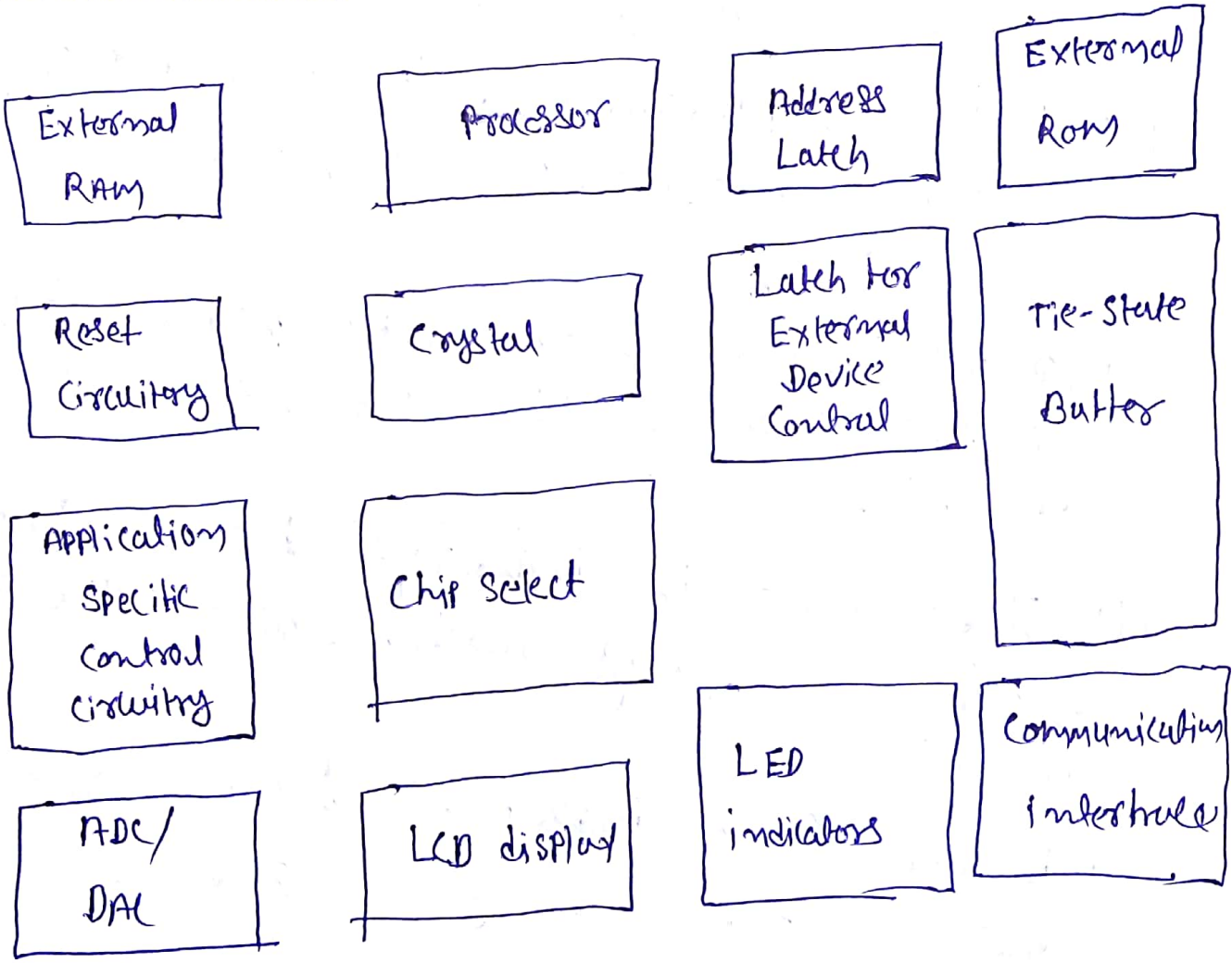


fig:- fuactional blocks of the hardware architecture of an embedded system

(a) Processor :-

In general the processor used in embedded systems can be of three types microprocessor, microcontroller and Digital signal processor

(i) Processor width 8 bit or 16 bit or 32-bit processor

(ii) Program storage hardware architecture Harvard and or

(b) memory :⇒

The memory used in embedded is found in the Some applications if this memory is sufficient there is no need to use external memory.

Internal Memory :⇒

Internal memory is found in the Same Silicon as the Processor It is accessible to the processor without any use of input and output It the capality.

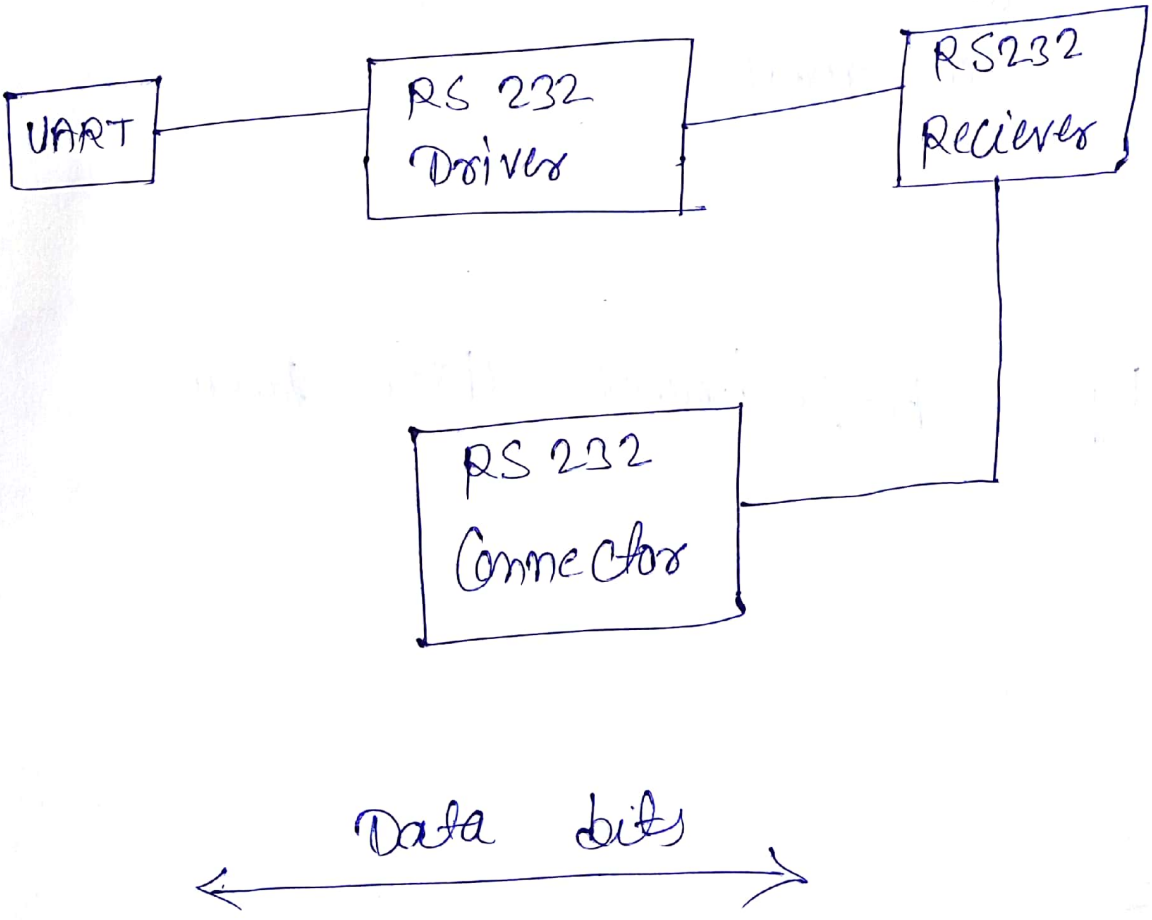
Q (2) (a) Explain Communication Interface: UART.

To interface an embedded system with the external world, a number of interfaces are used. Such as serial interface, the internet interface, the Ethernet interface, USB interface, Bluetooth, IrDA (Infra Red data Association) All these interface provide different functionaly and different data transmission rates.

The standard RS232 specified by the Electronic Industries Association (EIA) specifies the necessary protocols to achieve serial communication accurately RS232 is a physicaly standard, hence it specifies and serial electrical interface requirement.

DB-25	Signal	DB-9
1	Chassis ground	Not used
2	Transmit data - TXD	3
3	Recieve data - RXD	2
4	Request to send (RTS)	7
5	Clear to send - (CTS)	8
6	Data set ready - (DSR)	6
7	Signal ground (GND)	5
8	Data Carrier detect (DTR)	1
20		4
22	Ring indicator - RI or RING	9

Signal	Voltage levels
Data input	+3 Volts and above for 0 -3 Volts and below for 1
Data output	+5 Volts and above for 0 -5 Volts and below 0
Control input	+3 Volts and above for 1 (ON) -3 Volts and below for 0 (OFF)
Control output	+5 Volts and above for 1 (ON) -5 Volts and below for 0 (OFF)



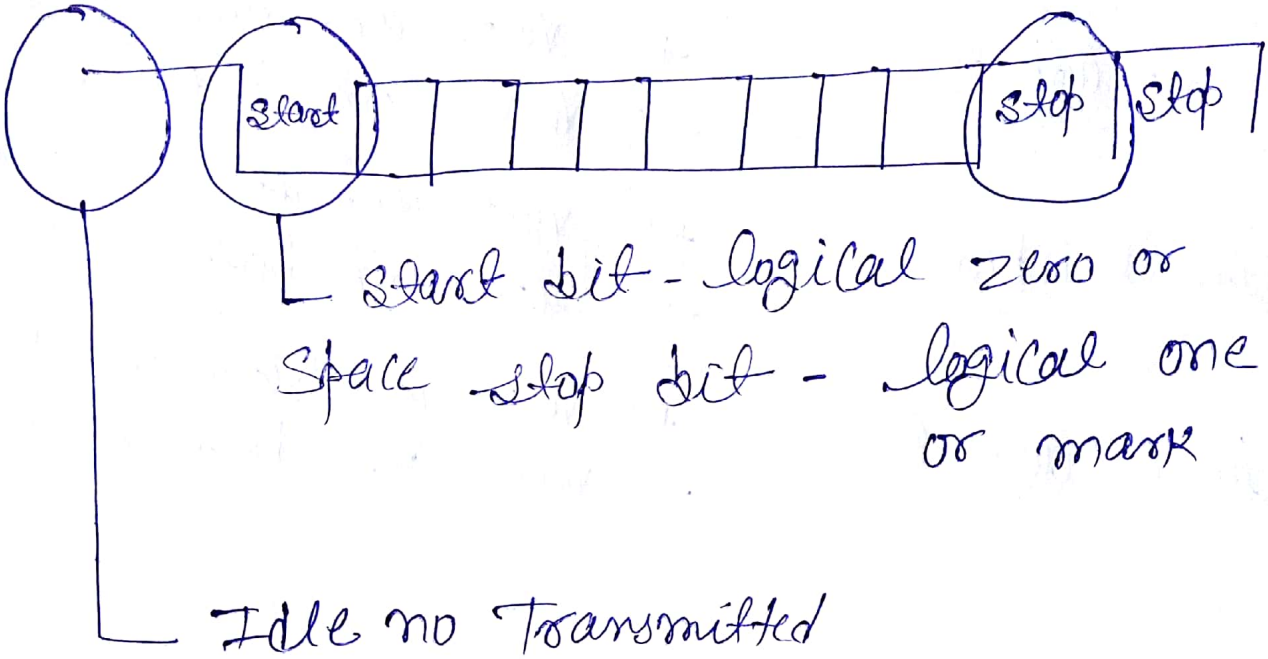


Fig - Asynchronous data Format

(2) (b) What is programmable logic devices?

The design goals of an embedded system are to reduce size, cost, and power consumption and to increase performance and reliability.

The main reason for using programmable logic is to reduce total costs. This is due to a number of reasons.

(i) One important advantages is that design with PLDs is faster and this reduces at time required to bring a product to market.

(ii) Programmable device also reduce to the risks associated with produce development since they allow last minute changes, often without having to redesign circuit boards.

(iii) Since PLDs often replace several other purpose device the design usually has fewer component and this reduces, PCB assembly test and repair cost.

(iv) Using PLDs also means fewer parts needed to be stocked and this reduces inventory cost.

(v) Since more of the logic is integrated into each chip the number of interconnection is decreased and this increase the reliability of the product. Of course there are some advantage to using programable logic such as.

(i) Design with PLDs requires additional development software and hardware which is often very expensive.

(ii) Design staff often needs to be trained to use new design tools.

(iii) In addition, part must be programed before they can be assembled into a final product.