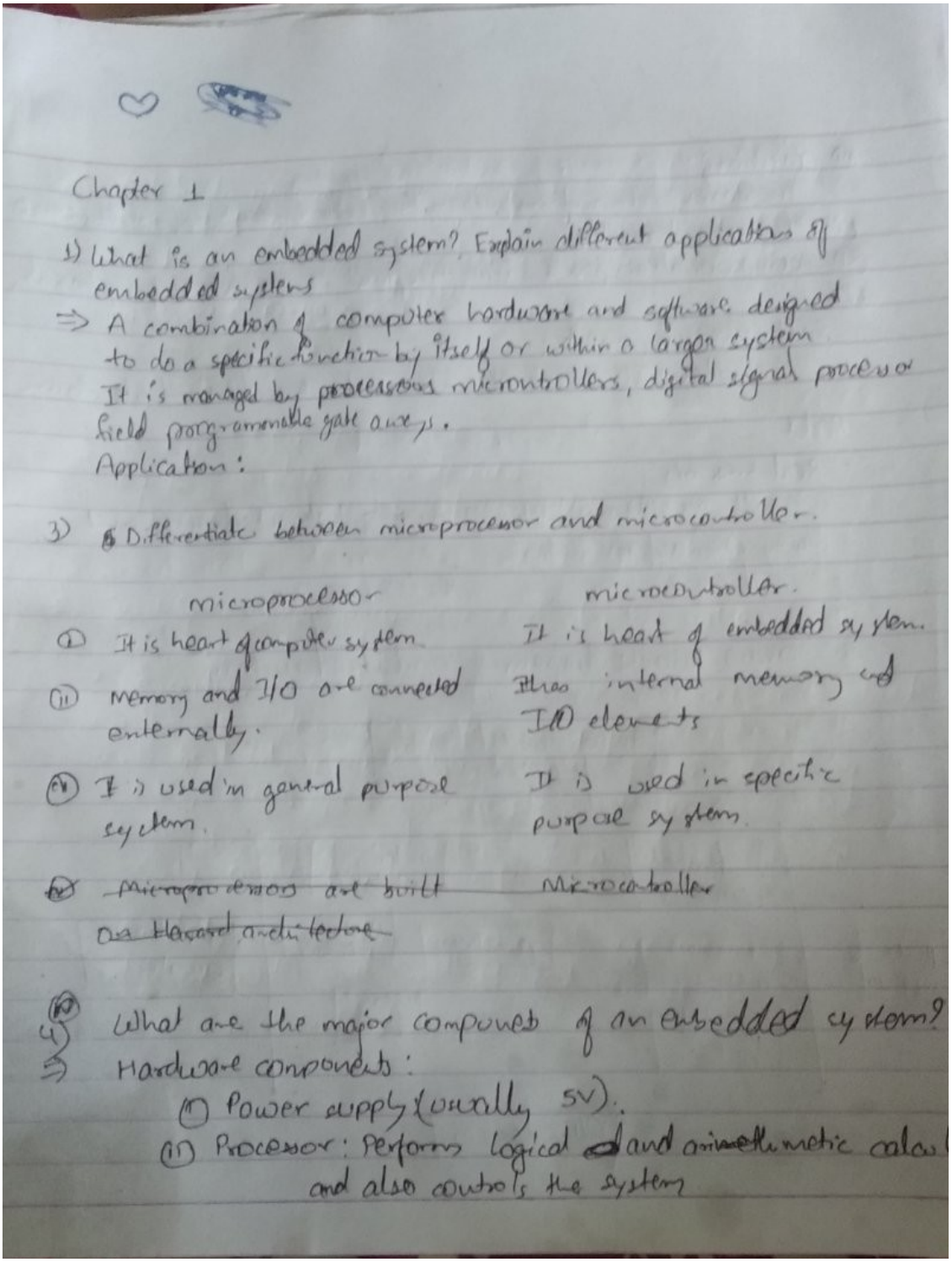
074BCT502
Abiral Neupane



Chapter 1

1) What is an embedded system? Explain different applications of embedded systems

⇒ A combination of computer hardware and software designed to do a specific function by itself or within a larger system. It is managed by processors, microcontrollers, digital signal processor or field programmable gate arrays.

Application:

3) Differentiate between microprocessor and microcontroller.

	microprocessor	microcontroller
(i)	It is heart of computer system	It is heart of embedded system.
(ii)	Memory and I/O are connected externally.	It has internal memory and I/O elements
(iii)	It is used in general purpose system.	It is used in specific purpose systems.
(iv)	~~Microprocessors are built on Harvard architecture~~	Microcontroller

4) What are the major components of an embedded system?

5) Hardware components:

(i) Power supply (usually 5V).

(ii) Processor: Performs logical and arithmetic calculations and also controls the system

3) What are purposes of embedded systems?
=> Three major purposes of embedded systems are:
a) Recieving data:
It has sensors and input ports to recieve data.
b) Processing data:
Different arithmetic and logical operations are done on the recieved data.
c) Output data:
The data is displayed or stored for further use.

4) What is a design metric? Write its importance
=> It is measurement system to measure physical capabilities of an embedded system.
Eg:- Unit cost, NRE cost, size, speed, memory, flexibility, maintainability etc.
Its importance are:
(i) It gives positive impact on development process
(ii) Market can be easily identified & reduced
(iii) It ensures reliability of system.
(iv) It helps in fulfilling client specific requirements.

6) What do you mean by core of an embedded system?
⇒ Embedded system are domain and application specific and are built around central core of the system may be one of the following
a) General purpose and domain specific processor.
   (i) microprocessor
   (ii) micro controller
   (iii) Digital signal processor.
b) Application specific IC.
c) Programmable logic devices.
d) Commercial off the self components.

8) Justify weather pacemaker and digital maker are examples of embedded system.
⇒ The cardiac pacemaker is an example of a complex embedded real time system. It is designed to perform a specific function. It controlles heart-rhythm through sensing and pacing operations. It has several operating modes which can be selected by doctors. Sensors and actuators share realtime information. Only embedded system can perform such function.

similarly camera has an OS, storage, memory, and different modes and settings and sensors. Hence, it is also an embedded system

(1) Memory:
Stores data and instruction for execution.

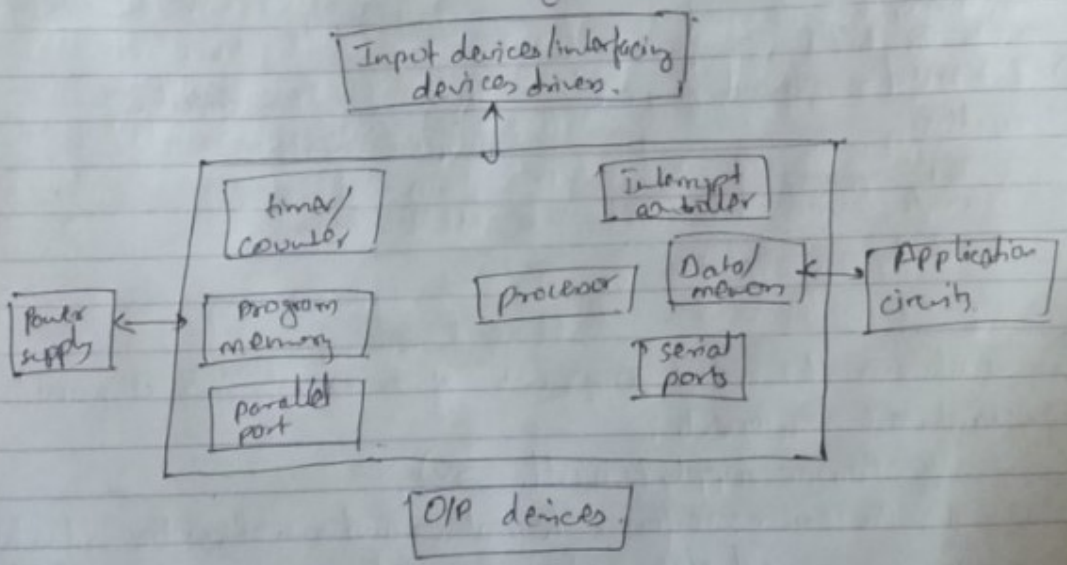
(2) Timers and counters:

(3) Communication ports: Interface used to connect to peripherals.

Software components:
Compiler: It converts code into machine understandable form.

Real-time OS:
It manages multiprocessing, task scheduling and many controlling functions.

5. Draw block diagram of embedded system.



16. Elaborate on design challenges while designing embedded system
=) a) Lack of necessary flexibility for running application over embedded system
b) Security issues in embedded system design
c) High power dissipation
d) Testing and debugging is difficult.
e) Increased cost and time to market

18. Key technologies used in embedded system design.
=) Low power design:
Power consumption of an embedded system must be as low as possible and well managed as power failure is a major issue of embedded system.

Machine learning: Machine learning is a growing technology that makes the embedded system improve its efficiency over time.

Embedded security: Security is always important. Part of system as it system is always prone to destruction, hacking and other problems.