SUBJECT: DIGITAL SYSTEM DESIGN

INTRODUCTION TO DIGITAL SYSTEM.

→ All of us are familiar with the impact of modern digital computers communication systems, digital displays, internet, email etc. on society.

→ One of the main causes of this revolution is the advent of integrated circuits (IC's) which became possible because of tremendous progress in semiconductor technology in recent years.

→ Many of us may not be familiar with the principles of working of computers, communicn systems, internet, email etc. even though these have become an important part of our daily life.

→ The oper^{n} of these systems and many other systems is based on principles of digital techniques and these systems are referred to as digital systems.

→ Signals are used to carry inform from one device to another.

→ Analog and Digital are the different forms of signal

ANALOG S/G	DIGITAL S/G
i) An analog s/g is a continuous wave that changes over a time period.	i) A digital s/g is a discrete wave that carries inform in binary form
ii) It is represented by a sinewave	ii) It is represented by a square wave
iii) These s/g's are described by amplitude, period or freq and phase.	iii) These s/g's are described by bit rate and bit intervals.
iv) These s/g's has no fixed range	iv) Digital s/g has o finite no. i.e 0 and 1.
v) More prone to distortion	vi) Less prone to distortion.
vi) Human voice is an analog s/g	vi) s/g used for Tx in computer are digital s/g's

PRINCIPAL REASONS FOR WIDESPREAD USE OF DIGITAL TECHNIQUES & SYSTEMS

i) Devices used in digital ckts generally operate in one of the 2 states known as ON and OFF resulting in a very simple oper^n.

ii) There are only a few basic oper^n in digital circuits which are very easy to understand.

iii) Digital techniques require Boolean algebra which is very simple and can easily be learnt.

iv) Digital ckts require basic concepts of electric network analysis whereas analog ckts and system involve frequency and time domain concepts, complicated ckt analysis which makes understanding of analog ckts more difficult than digital ckts.

v) A large number of IC's are available for performing various operations.

vi) Various IC's are available in a logic family with similar electrical characteristics which makes the design and development of digital systems very simple.

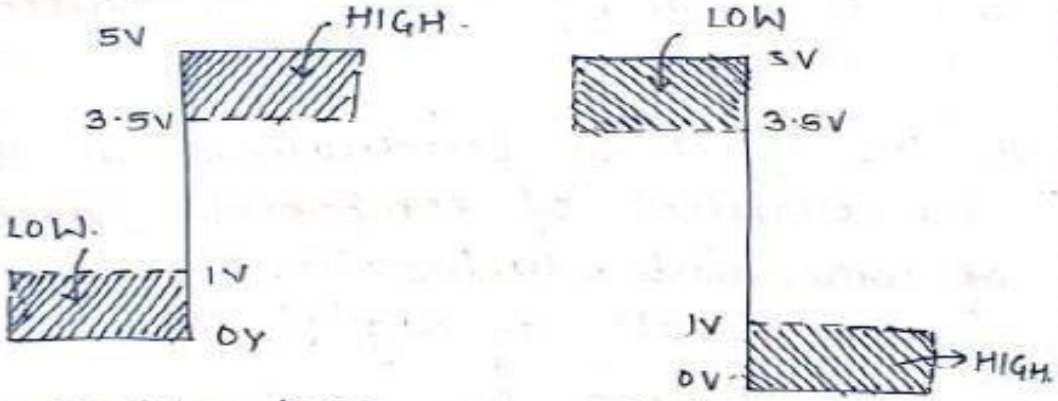
vii) The effect of fluctuations in the characteristics of components, ageing of components, temperature, noise etc is very small in digital ckts.

viii) Digital ckts have capability of memory which makes these ckts highly suitable for computers, calculators, watches, telephones etc.

ix) Display of data and other inform? is very convenient, accurate and elegant using digital techniques.

DIGITAL SIGNALS

→ A digital s/g has 2 discrete levels or values.



a) Positive logic b) Negative Logic

→ As long as the voltage belongs to a level it will be taken as that level and the exact value of the voltage is immaterial.

→ For eg: any voltage in range of 3.5V to 5V will be considered as HIGH level is positive logic system and LOW level in negative logic system.

→ Similarly, any voltage in the range of 0 to 1V will be considered as LOW level in positive logic system and HIGH level in negative logic system

→ Mostly we will be dealing with positive logic system unless otherwise specified.

→ The 2 discrete s/g levels HIGH & LOW can also be represented as binary digits 1 and 0 respectively.

→ A binary digit (0 or 1) is referred to as bit.

→ Since digital s/g can have only one of two possible levels 1 or 0, binary system can be used for analysis and design of digital system

→ The 2 levels (or states) can also be designated as ON and OFF or TRUE and FALSE.