Department of Biomedical Engineering

BIO-FLUIDS AND MEHANICS

III B.Tech -I Sem

B.Shweta
Asst. Professor

J.B.Institute of Engg & Technology

Yenkapally, Moinabad(Mandal)
Himathnagar(post),Hydreabad

Results Target

Total Strength of the Class:

S. No	Class / Division	No. of Students
a.	First Class with Distinction	30
b.	First Class	10
c.	Pass Class	4

Method of Evaluation

a.	Internal Examination	2
b.	Unit Wise Assignments	2
c.	Descriptive Exam	2
d	Objective	2
e.	Final Examination	1

Course Objective

This course will provide graduate students of B.Tech Biomedical Engineering with both broad and in-depth knowledge, and a critical understanding regarding the current research challenges in biological fluid dynamics. First three units will give an introduction to physiologically relevant fluid flow phenomena, underlying physical mechanisms from an engineering perspective. The fourth unit onwards elaborates on the application of fluid mechanics principles to major human organ systems. The focus of the course is on the integration of various fluid mechanics concepts to address relevant problems of the human body's systems

JNTU Syllabus

Unit – I	BIO-FLUID MECHANICS: Newton's laws, Stress, Strain, Elasticity, Hooks-law, viscosity, Newtonian fluid, Non- Newtonian fluid, Viscoelastic fluids, vascular tree, Relationship between diameter, velocity and Pressure of blood flow, Resistance against flow.
Unit – II	FLOW PROPERTIES OF BLOOD: Physical chemical and Rheological properties of blood. Apparent and relative viscosity, Blood viscosity variation: Effect of shear rate, hematocrit, temperature, protein contents of blood. Casson's equation, Problems associated with extracarporeal blood flow.
Unit – III	RHEOLOGY OF BLOOD IN MICROVESSELS: Fahraeus -Lindquist effect and inverse effect, distribution of suspended particles in a narrow rigid tube. Nature of red cells in tightly fitting tubes, hematocrit in very narrow tube
Unit – IV	BIOVISCOELASTIC FLUID: Viscoelasticity, Viscoelastic models Maxwell, Voigt and Kelvin Models, Response to Harmonic variation, Use of viscoelastic models Bio- Viscoelastic fluids: Protoplasm, Mucus, Saliva, Synovial fluids.
Unit – V	CARDIAC MECHANICS: Cardiovascular system. Mechanical properties of blood vessels: arteries, arterioles, capillaries and veins. Blood flow: Laminar and Turbulent, Physics of cardiovascular diseases, Prosthetic heart valves and replacements.
Unit - VI	RESPIRATORY MECHANICS: Alveoli mechanics, Interaction of Blood and Lung P.V curve of Lung. Breathing mechanism, Airway resistance, Physics of Lung diseases.
Unit - VII	SOFT TISSUE MECHANICS: Pseudo elasticity, non-linear stress-strain relationship, Viscoelasticity, Structure, function and mechanical properties of skin, ligaments and tendons.
Unit - VIII	ORTHOPEDIC MECHANICS: Mechanical properties of cartilage, diffusion properties of Articular cartilage, mechanical properties of bone, kinetics and kinematics of joints, lubrication of joints.

Guidelines to Students

Where will this subject help?

By the end of the course it is expected that students will be able to:

- Understand the physiology and anatomy of the studied systems.
- Integrate fluid dynamics engineering concepts to examine and to model the biological flow in human body.
- Identify specific diseases and how they are related to fluid dynamics.
- Develop a critical thinking regarding the current research challenges in biological fluid dynamics.

Books / Material

Text Books
1. Y.C Fung, Biomechanics- Mechanical properties of living tissues,2nd ed, Springer-Verlag, 1993. 2. D.O Cooney, Biomedical engineering Principles. Marcel Dekker, INC New York.1976.

Suggested / Reference Books
1. Silver Frederick H. Biomaterials, Medical Devices & Tissue Engineering: Chapman & Hall, London, 1994 2. Biomechanics by Nihanth ozkai 3. D.A Mc Donald, Blood flow in arteries, Edward Arnold ltd, 1998.

Course Schedule

Number of Hours / lectures available in this Semester / Year **65**

Distribution of Hours Unit – Wise

Unit	Topic	Total No. of Hours
I	BIO-FLUID MECHANICS	8
II	FLOW PROPERTIES OF BLOOD	9
III	RHEOLOGY OF BLOOD IN MICROVESSELS	6
IV	BIOVISCOELASTIC FLUID	8
V	CARDIAC MECHANICS	8
VI	RESPIRATORY MECHANICS	7
VII	SOFT TISSUE MECHANICS	7
VIII	ORTHOPEDIC MECHANICS	7
	Total	60

Topic wise Coverage:

Subject Plan *Academic year: 2011-2012*

Lecture No.	Unit No	Topic	Chapter nos. from Text Books and References
1.	1	Bio fluid and mechanics introduction	Hand out –1
2.	1	Newton's laws, Stress, Strain, Elasticity, Hooks-law, viscosity	
3.	1	Newtonian fluid, Non- Newtonian fluid	
4.	1	Viscoelastic fluids	
5.	1	vascular tree	
6.	1	Relationship between diameter, velocity and Pressure of blood flow	
7.	1	Resistance against flow	
8.	1	Assignment	
9	2	Properties of blood introduction	Hand out –2
10.	2	Physical and chemical and rheological properties of blood	
11.	2	Apparent and relative viscosity	
12.	2	Blood viscosity variation	
13.	2	Effect of shear rate, hematocrit	
14	2	Effect of temperature, protein contents of blood	
15.	2	Casson's equation	
16.	2	Problems associated with extracarporeal blood flow.	
17.	2	Assignment	
18.	3	Rheology of blood in microvessels introduction	Hand out –3
19.	3	Fahraeus -Lindquist effectand inverse effect	
20	3	Distribution of suspended particles in a narrow rigid tube	
21.	3	Nature of red cells in tightly fitting tubes	
22.	3	hematocrit in very narrow tube	
23.	3	Assignment	
24.	3	Bio viscoelastic fluid introduciton	Hand out –4
25.	4	Viscoelasticity, Viscoelastic model Maxwell	
26	4	Viscoelastic model Voigt	
27.	4	Viscoelastic model Kelvin	
28.	4	Response to Harmonic variation	
29.	4	Use of viscoelastic models	
30.	4	Bio- Viscoelastic fluids: protoplasm, mucus, saliva, synovial fluid	
31.	4	Assignment	
32.	4	Cardiac mechanics introduction	Hand out –5
33.	5	Cardiovascular system	

34	5	Mechanical properties of blood vessels	
35.	5	Mechanical properties of arteries, arteriols,capillaries,veins	
36.	5	Laminar and turbulent Blood Flow	
37.	5	Physics of cardiovascular diseases	
38.	5	Prosthetic heart valves and replacement	
39.	5	Assignment	
40.	6	Respiratoiry mechanics introduction	Hand out –6
41.	6	Alveoli mechanics	
42.	6	Interaction of Blood and Lung P.V curve of Lung	
43.	6	Breathing mechanism	
44.	6	Airway resistance	
45.	6	Physics of Lung diseases.	
46	6	Assignment	
47.	7	Soft tissue mechanics introduction	Hand out –7
48.	7	Pseudo elasticity, viscoelasticity	
49.	7	non-linear stress-strain relationship	
50.	7	Structure, function and mechanical properties of skin	
51.	7	Structure, function and mechanical properties of ligaments	
52.	7	Structure, function and mechanical properties of tendons	
53.	7	Assignment	
54.	8	Orthopedic mechanics introduction	Hand out –8
55.	8	Mechanical properties of cartilage	
56.	8	diffusion properties of Articular cartilage	
57	8	mechanical properties of bone	
58.	8	kinetics and kinematics of joints	
59.	8	lubrication of joints	
60	8	Assignment	

DEPARTMENT OF BIOMEDICAL ENGINEERING
III B.Tech -2009- Batch/ I SEM

INDIVIDUAL TIME TABLE

NAME OF THE FACULTY: Mrs.B.SHWETA

Period	1	2	3	4		5	6	7
Day/Time	9.10-10.00	10.00-10.50	10.50-11.40	11.40-12.30		1.00-1.50	1.50-2.40	2.40-3.30
MON					L	**BFM**		
TUE	**BFM**				U			
WED					N	**BFM**		
THU					C			
FRI					H		**BFM**	
SAT							**BFM**	

Subject: BIO FLUIDS AND MECHANICS

Total no of theory classes : 05
Total no of classes : 05

Assignment Questions

1. Explain the effect of shear rate and temperature on blood viscosity?
2. Explain the viscoelastic nature of any two bioviscoelastic fluids?
3. Explain briefly the distribution of RBC in narrow tubes?
4. Write briefly about kinetics of joints?
5. Write a short note on mechanical heart valves?
6. What are the lung mechanical parameters? Differentiate normal breathing mechanism?
7. Write a short note on the terms viscoelasticity and pseudo-elasticity critically?
8. Explain the inverse of fahraeus-Lindquist effect?
9. Describe briefly about the viscoelsaticity of soft tissues?
10. What are the lung parameters? Differnetiate normal and abnormal respiratory states?
11. Expalin the chemical and physical properties of blood and explain the effect of shear stress and hematocrit value on the viscosity of blood?
12. Write short notes on :
    (a) Arthrities
    (b) Avascular necrosis
    (c) Osteoporosis
13. Write a short note on steady and unsteady flow?
14. Explain in detail the laminar and turbulent flow propeties of blood in blood vessels?
15. Discuss about the inversion of the fahraeus-lindquist effect in very narrow tubes?
16. Discuss the mechanical properties of trabecular bone tissue?
17. Mentiont the advantages and disadvantages of a couette viscometer?
18. Write a short note on the structure of articular cartilage and meniscus?
19. Describe the construction and working of capillary viscometer?
20. Using spring and dashpot draw maxwell model and derive its basic governing equation?

Model Question paper:

J. B.Institue of Engineering & Techology
Department of BioMedical Engineering

SUB: BIO FLUIDS AND MECHANICS

TIME: 60 MINUTES **Marks: 10**

Answer any two of the following: **(2x5=10M)**

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1. Write Short notes on:
   (a) Hookes Law
   (b) Newtonian and Non Newtonian Fluids
   (c) Resistance against flow
2. What are the factors on which blood viscosity depends? Explain them with necessray Graphs?
3. Explain Fahraeus-Lindquist effect
4. Derive the expressions for stress-relaxation and creep of a voight model?

Model Question paper:

J. B.Institue of Engineering & Techology
Department of BioMedical Engineering

SUB: BIO FLUIDS AND MECHANICS

TIME: 60 MINUTES **Marks: 10**

Answer any two of the following: **(2x5=10M)**

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1. Discuss the flow behaviour of blood as it flows through aorta to venecava?
2. With a help of P-V curve of a lung, explain the normal breathing mechanism?
3. Discuss about the composition and mechanical properties of ligaments?
4. (a)Describe the role of rheology in joint motion and lubrication
   (b) Write briefly about kinetics of joints?

Marks for Internal Theory Examination

ROLL.NO	NAME OF THE STUDENT	I MID (Des+Obj+Assign))	II MID Des+Obj+Assign))

Department of Biomedical Engineering

DIGITAL SIGNAL PROCESSING

III B.Tech -I Sem

B.Sowjanya
Asst. Professor

J.B.Institute of Engg & Technology
Yenkapally, Moinabad(Mandal)
Himathnagar(post),Hydreabad

Results Target

Total Strength of the Class: 44

S. No	Class / Division	No. of Students
a.	First Class with Distinction	25
b.	First Class	15
c.	Pass Class	4

Method of Evaluation

a.	Internal Examination	2
b.	Unit Wise Assignments	2
c.	Descriptive Exam	2
d	Objective	2
e.	Final Examination	1

Course Objective

This course provides the Btech graduates with an introduction to DSP concepts and implementation. It starts by explaining the need for digital signal processing and DSP systems. A complete model of a DSP system is examined from the input transducer, through all the stages including: signal conditioning, anti-aliasing filter, analog-to-digital and digital-to-analog conversion, output smoothing filter, and output transducers. Real life examples will be used to illustrate the use and need for each part of a DSP system. Sampling theory, sample resolution and anti-aliasing filters are explored with real examples to illustrate this important area of DSP. Application examples are examined to give the student a good understanding of what's needed to apply DSP techniques to new areas. DSP tools are demonstrated to illustrate the tools available needed to apply DSP techniques. The subject covers the how, where, why and when of DSP applications are used. Electronics are rapidly changing the way DSP is applied and the techniques used to solve problems.

JNTU Syllabus

Unit – I	INTRODUCTION: Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.
Unit – II	DISCRETE FOURIER SERIES: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT. Relation between Z-transform and DFS
Unit – III	FAST FOURIER TRANSFORMS: Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT for composite N
Unit – IV	REALIZATION OF DIGITAL FILTERS: Review of Z-transforms, Applications of Z – transforms, solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function,
Unit – V	IIR DIGITAL FILTERS: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples: Analog-Digital transformations
Unit - VI	FIR DIGITAL FILTERS : Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.
Unit - VII	MULTIRATE DIGITAL SIGNAL PROCESSING: Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.
Unit - VIII	INTRODUCTION TO DSP PROCESSORS: Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, multiport memory, VLSI Architecture, Pipelining, Special addressing modes,

	On-Chip Peripherals. Architecture of TMS 320C5X- Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Registrar, Index Registrar, Auxiliary Registger Compare Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, Some flags in the status registers, On-chip peripherals

Guidelines to Students

Where will this subject help?

- Understand how digital to analog (D/A) and analog to digital (A/D) converters operate on a signal and be able to model these operations mathematically.
- Use Z transforms and discrete time Fourier transforms to analyze a digital system.

Books / Material

Text Books
Digital signal processing by Ramesh Babu.

Suggested / Reference Books
1 • ***Theory and Application of Digital Signal Processing*** by Rabiner and Gold. A comprehensive, industrial-strength DSP reference book. • ***Digital Signal Processing*** by Alan V. Oppenheim and Ronald W. Schafer. Another industrial-strength reference. (Replaced by the authors' *Disrete-Time Signal Processing)*

Course Schedule

Number of Hours / lectures available in this Semester / Year 65

Distribution of Hours Unit – Wise

Unit	Topic	Total No. of Hours
I	INTRODUCTION	**6**
II	DISCRETE FOURIER SERIES	**6**
III	FAST FOURIER TRANSFORMS	**5**
IV	REALIZATION OF DIGITAL FILTERS	**8**
V	IIR DIGITAL FILTERS	**4**
VI	FIR DIGITAL FILTERS	**4**
VII	MULTIRATE DIGITAL SIGNAL PROCESSING	**4**
VIII	INTRODUCTION TO DSP PROCESSORS	**23**
	Total	**60**

Topic wise Coverage:

Subject Plan *Academic year: 2011-2012*

Lecture No.	Unit No	Topic	Chapter nos. from Text Books and References
1.	1	Discrete time signals & sequences	Ramesh babu,chapter-1
2.	1	linear shift invariant systems	
3.	1	stability, and causality	
4.	1	Linear constant coefficient difference equations.	
5.	1	Frequency domain representation of discrete time signals and systems.	
6.	1	Assignment	

7.	2	Properties of discrete Fourier series	Ramesh babu,chapter-3
8.	2	DFS representation of periodic sequences	
9	2	Discrete Fourier transforms: Properties of DFT	
10.	2	linear convolution of sequences using DFT,	
11.	2	Computation of DFT	
12.	2	Assignment	
13.	3	Relation between Z-transform and DFS	Ramesh babu,chapter-4
14	3	Fast Fourier transforms (FFT)	
15.	3	- Radix-2 decimation in time	
16.	3	decimation in frequency FFT Algorithms	
17.	3	Assignment	
18.	4	Inverse FFT	Ramesh babu,chapter-2
19.	4	FFT for composite N	
20	4	Review of Z-transforms	
21.	4	Applications of Z – transforms, solution of difference equations of digital filters	
22.	4	solution of difference equations of digital filters	
23.	4	Block diagram representation of linear constant-coefficient difference equations	
24.	4	Basic structures of IIR systems	
25.	4	Assignment	
26	5	Transposed forms	Ramesh babu,chapter-5
27.	5	Basic structures of FIR systems	
28.	5	System function	
29.	5	Assignment	
30.	6	Analog filter approximations, Butter worth and Chebyshev	Ramesh babu,chapter-6
31.	6	Design of IIR Digital filters from analog filters	
32.	6	Design Examples: Analog-Digital transformations	
33.	6	Assignment	
34	7	Characteristics of FIR Digital Filters	Ramesh babu,chapter-8
35.	7	Frequency response.	
36.	7	Design of FIR Digital Filters using Window Techniques	
37.	7	Assignment	
38.	8	Frequency Sampling technique ,Comparison of IIR & FIR filters	Ramesh babu,chapters-11
39.	8	Decimation, interpolation	

40.	8	sampling rate conversion	
41.	8	Implementation of sampling rate conversion	
42.	8	Introduction to programmable DSPs	
43.	8	Multiplier and Multiplier Accumulator (MAC)	
44.	8	Modified Bus Structures and Memory Access schemes in DSPs	
45.	8	Multiple access memory, multiport memory	
46	8	VLSI Architecture	
47.	8	Pipelining, Special addressing modes	
48.	8	On-Chip Peripherals.	
49.	8	Architecture of TMS 320C5Xs	
50.	8	Bus Structure	
51.	8	Central Arithmetic Logic Unit	
52.	8	Auxiliary Registrar	
53.	8	Index Registrar, Auxiliary Registger Compare Register	
54.	8	Block Move Address Register	
55.	8	Parallel Logic Unit,	
56.	8	Memory mapped registers,	
57	8	program controller	
58.	8	Some flags in the status registers	
59.	8	On- chip registers, On-chip peripherals	
60	8	Assignment	

DEPARTMENT OF BIOMEDICAL ENGINEERING
III B.Tech -2007- Batch/ I SEM

INDIVIDUAL TIME TABLE

NAME OF THE FACULTY: Ms.B.SOWJANYA

Period	1	2	3	4		5	6	7
Day/Time	9.10-10.00	10.00-10.50	10.50-11.40	11.40-12.30		1.00-1.50	1.50-2.40	2.40-3.30
MON					L		**DSP**	
TUE					U			
WED				**DSP**	N			
THU					C			
FRI		**DSP**		**DSP**	H			
SAT	**DSP**							

Subject: DIGITAL SIGNAL PROCESSING

Total no of theory classes : 05
Total no of classes : 05

Model Question paper:

J. B.Institue of Engineering & Techology
Department of Electronics and Communication

III B.Tech -I SEM

SUB: DIGITAL SIGNAL PROCESSING

TIME: 60 MINUTES **Marks: 10**

Answer any two of the following: **(2x5=10M)**

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1. Write Short notes on:
   a)discrete time signals
   b)classification of discrete time signals
2. Find the circular convolution of two finite duration sequences x1(n)={1,-1,-2,3,-1}; x2={1,2,3}
3. Determine the output response y(n) if h(n)={1,1,1};x(n)={1,2,3,1} by using linear Convolution.
4. Find the 8-point DFT of given sequence x(n)={0,1,2,3,4,5,6,7} using DIF,radix-2,FFT Algorithm

Model Question paper:

J. B.Institue of Engineering & Techology
Department of Electronics and Communication

III B.Tech -I SEM

SUB: DIGITAL SIGNAL PROCESSING

TIME: 60 MINUTES **Marks: 10**

Answer any two of the following: **(2x5=10M)**

---

1. Determine the system function H(Z) of the lowest order Chebyshev and Butterworth digital fiter with the following specification
   a)3db ripple in passband $0<w<0.2\pi$
   b) 25 db attenuation in stop band $0.45\pi <w< \pi$

2. Write the characteristics of FIR Digital filters.

3. Write the applications of multirate signal processing.

4. Write about MAC.

Marks for Internal Theory Examination

ROLL.NO	NAME OF THE STUDENT	I MID (Des+Obj+Assign))	II MID (Des+Obj+Assign))

JB INSTITUTE OF ENGINEERING AND TECHNOLOGY

COURSE PLAN

CLASS : III B.Tech **SEM: I** **SECTION: A**
BRANCH:BME **SUBJECT: Principles of Comm.** **SUBJECT CODE:**

NAME OF THE FACULTY: Mr. Rajkumar D Bhure Assoc. Prof, ECE Dept**.**

S.NO	Unit	No. of Sessions	Proposed Teaching Aid	Text/Reference Books
1	1	10	Black board, OHP SHEETS Handouts	1. Communication Systems Analog and Digital By R P SINGH and S D SAPRE 2. Principles of Communications by H. TAUB AND SCHILLING 3. Communication Systems Engineering: By. John. Prokis and Masoud Salehi
2	2	11	Black board, OHP SHEETS Handouts	
3	3	07	Black board, OHP SHEETS Handouts	
4	4	06	Black board, OHP SHEETS Handouts	
5	5	07	Black board, OHP SHEETS Handouts	
6	6	05	Black board, OHP SHEETS Handouts	
7	7	07	Black board, OHP SHEETS Handouts	
8	8	06	Black board, OHP SHEETS Handouts	

Assignment questions -Unit wise (At least 5 questions) – *To be given after the completion of unit*

Objective question –Unit wise (At least 15) - *To be given after the completion of unit*

Previous question papers (at least three years)

Model papers (at least 3)

SIGNATURE OF THE FACULTY **HOD** **PRINCIAL**

JB INSTITUTE OF ENGINEERING AND TECHNOLOGY

LESSON PLAN

CLASS: III B.Tech SEM: I SECTION: A
BRANCH:BME SUBJECT: Principles of comm. SUBJECT CODE:

NAME OF THE FACULTY: Rajkumar D Bhure, Assoc. Prof, ECE Dept**.**

S.NO	UNIT NUMBER	UNIT CONTENTS	Date & Session No	TEACHING AID USED
1	I	Block diagram of Electrical communication system, Radio communication	11/7/11--1 13/7/11--2	**BLACK BOARD** **Handouts**
		Types of communications, Analog, pulse and digital	14/7/11--3 15/7/11--4	**BLACK BOARD** **Handouts**
		Types of signals, Fourier Transform for various signals,	16/7/11--5 18/711--6	**BLACK BOARD** **Handouts**
		Fourier spectrum, Power spectral density	19/7/11--7 20/7/11--8	**BLACK BOARD** **Handouts**
		Autocorrelation, correlation, convolution.	21/7/11--9 22/7/11--10	**BLACK BOARD** **Handouts**
2	II	Amplitude Modulation, Need for madulation, Types of amplitude modulation	23/7/11--11 25/711—12	**BLACK BOARD** **Handouts**
		AM,DSBSC, SSB SC, Power and BW requirements	26/7/11--13 28/7/11—14	**BLACK BOARD** **Handouts**
		Generation of AM,DSB SC,SSB SC,	29/7/11--15 30/7/11—16	**BLACK BOARD** **Handouts**
		Demodulation of AM: Diode detector, product demodulation for DSB SC,SSB SC.	1/8/11--17 3/8/11--18 4/8/11—19 5/8/11--20 6/8/11--21	**BLACK BOARD** **Handouts**
3	III	Angle Modulation: frequency , phase modulations, advantages of FM over AM	8/8/11--22 9/8/11—23	**BLACK BOARD** **Handouts**
		Bandwidth consideration, narrow band and wide band FM	10/8/11--24 11/8/11—25	**BLACK BOARD** **Handouts**
		Comparasion of FM.PM.	12/8/11--26	**BLACK BOARD** **Handouts**
4		Pulse Modulation: sampling	16/8/11--27	**BLACK BOARD**

		. Nyquist rate of sampling , sampling theorem for Band limnited signals,	17/8/11--28	**Handouts**
	IV	PAM, regeneration of base signal, PWM and PPM, Time Division Multiplexing	18/8/11--29 19/8/11--30 20/8/11--31	**BLACK BOARD** **Handouts**
		Frequency Division Multiplexingsynchronous Multiplexing.	22/8/11—32 23/8/11--33	**BLACK BOARD** **Handouts**
5		Digital communication: Advantages, Block diagram of PCM, Quantization effect of quantization	24/8/11--34 25/8/11--35 26/8/11—36	**BLACK BOARD** **Handouts**
	V	Quantization error, base band digital signal	29/8/11---37 30/8/11---38	**BLACK BOARD** **Handouts**
		DM,ADM, ADPCM and comparison.	31/8/11--39 1/9/11—40	**BLACK BOARD** **Handouts**
6		Digital Modulation: ASK, FSK,PSK	2/8/11--41 3/8/11—42	**BLACK BOARD** **Handouts**
	VI	DPSK,QPSKDemodulation, coherent and incoherent reception, modems.	5/9/11--43 6/9/11--44 7/9/11--45	**BLACK BOARD** **Handouts**
7		Information theorem: concept of informaion, rate of information	8/9/11--46 9/9/11--47	**BLACK BOARD** **Handouts**
	VII	entropy source coding for optimum rate of information	12/9/11--48 13/9/11--49	**BLACK BOARD** **Handouts**
		Coding efficiency , shanon Fano and Huffmam coding.	14/9/11--50 15/9/11--51 16/9/11--52	**BLACK BOARD** **Handouts**
8		Error control coding: Introduction, error detection	17/9/11--53 19/9/11—54	**BLACK BOARD** **Handouts**
	VIII	Correction codes block codes convolution codes.	20/9/11--55 22/9/11--56 21/9/11--57	**BLACK BOARD** **Handouts**

Total Number of Sessions: 57