



**K.S. INSTITUTE OF TECHNOLOGY, BANGALORE**  
**DEPARTMENT OF TELECOMMUNICATION ENGINEERING**

**NAME OF THE STAFF** : Satish Kumar B  
**SUBJECT CODE/NAME** : 18ES51/ TECHNOLOGICAL INNOVATION MANAGEMENT AND ENTREPRENEURSHIP  
**SEMESTER/YEAR** : V / III  
**ACADEMIC YEAR** : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1: Management, Planning</b>						
1	Nature and Functions of Management	L+D	LCD	1	1	02-09-2020
2	Importance, Definition, Management Functions,	L+D	LCD	1	2	03-09-2020
3	Roles of Manager, Levels of Management	L+D	LCD	1	3	04-09-2020
4	Management & Administration	L+D	LCD	1	4	07-09-2020
5	Steps of Planning, Limitations of Planning	L+D	LCD	1	5	09-09-2020
6	Nature, Importance of Planning	L+D	LCD	1	6	10-09-2020
7	Managerial Skills	L+D	LCD	1	7	11-09-2020
8	Types of Planning	L+D	LCD	1	8	14-09-2020

9	Management as a Science, Art & Profession	L+D	LCD	1	9	16-09-2020
10	Decision Making – Meaning and Types	L+D	LCD	1	10	18-09-2020
11	Steps in Decision Making	L+D	LCD	1	11	21-09-2020
<b>MODULE 2: Organizing, Staffing and Motivating, Directing and Controlling</b>						
12	Organization - Meaning, Characteristics and Process of Organizing	L+D	LCD	1	12	23-09-2020
13	Principles of Organizing, Span of Management	L+D	LCD	1	13	24-09-2020
14	Departmentalization, Committees – meaning, Types of Committees	L+D	LCD	1	14	25-09-2020
15	Centralization Vs Decentralization, Staffing: Need and Importance, Selection and Recruitment Process	L+D	LCD	1	15	01-10-2020
16	Meaning and Requirement of Effective Direction, Giving Orders. Motivation: Nature of Motivation	L+D	LCD	1	16	05-10-2020
17	Motivation Theories, Communication – Meaning, Importance and Purposes of Communication	L+D	LCD	1	17	07-10-2020
18	Leadership – Meaning, Characteristics	L+D	LCD	1	18	08-10-2020
19	Behavioral Approach of Leadership. Coordination- Meaning and Importance	L+D	LCD	1	19	09-10-2020
20	Techniques of Coordination. Controlling – Meaning, Need for Control System	L+D	LCD	1	20	12-10-2020
21	Benefits of Control, Essentials of Effective Control System, Steps in Control Process	L+D	LCD	1	21	14-10-2020

**MODULE 3: Social Responsibility and Entrepreneurship**

22	Meaning of Social Responsibility, Social Responsibilities of Business towards Different Groups	L+D	LCD	1	22	15-10-2020
23	Social Audit, Business Ethics and Corporate Governance	L+D	LCD	1	23	16-10-2020
24	Definition of Entrepreneur, Importance of Entrepreneurship	L+D	LCD	1	24	19-10-2020
25	Concepts of Entrepreneurship, Characteristics of successful Entrepreneur	L+D	LCD	1	25	21-10-2020
26	Classification of Entrepreneurs	L+D	LCD	1	26	22-10-2020
27	Myths of Entrepreneurship	L+D	LCD	1	27	23-10-2020
28	Entrepreneurial Development models	L+D	LCD	1	28	28-10-2020
29	Entrepreneurial development cycle	L+D	LCD	1	29	29-10-2020
30	Problems faced by Entrepreneurs	L+D	LCD	1	30	02-11-2020
31	capacity building for Entrepreneurship	L+D	LCD	1	31	04-11-2020

**MODULE 4: Family Business, Idea Generation and Feasibility Analysis**

32	Role and Importance of Family Business	L+D	LCD	1	32	05-11-2020
33	Contributions of Family Business in India	L+D	LCD	1	33	06-11-2020
34	Stages of Development of a Family Business	L+D	LCD	1	34	12-11-2020
35	Characteristics of a Family-owned Business in	L+D	LCD	1	35	13-11-2020

	India					
36	Various types of family businesses	L+D	LCD	1	36	18-11-2020
37	Idea Generation	L+D	LCD	1	37	19-11-2020
38	Creativity and Innovation	L+D	LCD	1	38	20-11-2020
39	Identification of Business Opportunities	L+D	LCD	1	39	23-11-2020
40	Market Entry Strategies	L+D	LCD	1	40	25-11-2020
41	Financial Feasibilities; Political Feasibilitie	L+D	LCD	1	41	26-11-2020
42	Economic Feasibility; Social and Legal Feasibilities	L+D	LCD	1	42	27-11-2020
43	Technical Feasibilities; Managerial Feasibility	L+D	LCD	1	43	30-11-2020
44	Location and Other Utilities Feasibilities	L+D	LCD	1	44	01-12-2020
<b>MODULE 5: Business model, Financing and How to start a Business, Project Design and Network Analysis</b>						
45	Meaning, designing, analyzing and improvising	L+D	LCD	1	45	04-12-2020
46	Business Plan – Meaning, Scope and Need; Financial, Marketing	L+D	LCD	1	46	07-12-2020
47	Human Resource and Production/Service Plan	L+D	LCD	1	47	09-12-2020
48	Business plan Formats; Project report preparation and presentation	L+D	LCD	1	48	10-12-2020
49	Why some Business Plan fails?	L+D	LCD	1	49	11-12-2020

50	Financial opportunity identification	L+D	LCD	1	50	14-12-2020
51	Banking sources; Nonbanking Institutions and Agencies	L+D	LCD	1	51	16-12-2020
52	Venture Capital – Meaning and Role in Entrepreneurship	L+D	LCD	1	52	17-12-2020
53	Government Schemes for funding business; Pre launch, Launch and Post launch requirements	L+D	LCD	1	53	18-12-2020
54	Procedure for getting License and Registration	L+D	LCD	1	54	21-12-2020
55	Challenges and Difficulties in Starting an Enterprise	L+D	LCD	1	55	23-12-2020
56	Introduction, Importance of Network Analysis	L+D	LCD	1	56	24-12-2020
57	Origin of PERT and CPM	L+D	LCD	1	57	28-12-2020
58	Network, Network Techniques	L+D	LCD	1	58	30-12-2020
59	Need for Network Techniques, Steps in PERT	L+D	LCD	1	59	31-12-2020
60	CPM, Advantages, Limitations and Differences	L+D	LCD	1	60	01-01-2021
61	Revision-1	L+D	LCD	1	61	08-01-2021
62	Revision-2	L+D	LCD	1	62	15-01-2021



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Course In charge



**K.S. INSTITUTE OF TECHNOLOGY ,BENGALURU - 560109**  
**DEPARTMENT OF TELECOMMUNICATION ENGINEERING**  
**SESSION: 2020-2021 (ODD SEMESTER)**  
**LESSON PLAN**

**NAME OF THE STAFF** : DINESH KUMAR D S  
**COURSE CODE/TITLE** : 18EC52/DIGITAL SIGNAL PROCESSING  
**SEMESTER/YEAR** : V / III

Sl. No	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE-1- Discrete Fourier Transforms (DFT)</b>						
1	DFT –Sampling and reconstruction of the discrete time signal	L+D	BB+LCD	1	1	1/9/2020
2	DFT as linear transformation	L+D+PS	BB+LCD	1	2	2/9/2020
3	DFT Properties- Linearity,Periodicity with problems	L+D+PS	BB+LCD	1	3	3/9/2020
4	DFT Properties- Circular symmetry	L+D+PS	BB+LCD	1	4	7/9/2020
5	DFT Properties- Circular time shift with problems	L+D+PS	BB+LCD	1	5	8/9/2020
6	DFT Properties- Circularfrequency shift	L+D+PS	BB+LCD	1	6	9/9/2020
7	DFT Properties- Circular folding with problems	L+D+PS	BB+LCD	1	7	10/9/2020
8	Circular Convolution, Multiplication in frequency	L+D+PS	BB+LCD	1	8	14/9/2020
9	Multiplication in Time, correlation	L+D+PS	BB+LCD	1	9	15/9/2020
10	2N point DFT using single N point DFT	L+D+PS	BB+LCD	1	10	16/9/2020
11	Problems on linear convolution	L+D+PS	BB	1	11	21/9/2020
12	Problems on circular convolution	L+D+PS	BB	1	12	22/9/2020

**MODULE-2- Linear filtering methods based on the DFT**

13	Linear filtering of long data sequence: Overlap add method with problems	L+D	BB+LCD	1	13	23/9/2020
14	Linear filtering of long data sequence : Overlap save method with problems	L+D	BB	1	14	24/9/2020
15	Problems on Linear filtering Techniques	L+D+PS	BB	1	15	1/10/2020
16	Efficient computation of the DFT (FFT algorithms).	L+D+PS	BB+LCD	1	16	5/10/2020
17	Radix-2 FFT algorithm DIT	L+D	BB+LCD	1	17	6/10/2020
18	DIT- FFT Problems	L+D+PS	BB	1	18	7/10/2020
19	Radix-2 FFT algorithm DIF	L+D	BB+LCD	1	19	8/10/2020
20	DIF- FFT Problems	L+D+PS	BB	1	20	12/10/2020
21	DIT/DIF - FFT Problems (convolution)	L+D+PS	BB+LCD	1	21	13/10/2020
22	Linear filtering DFT: Goertzel Algorithm, chirp Z Algorithm	L+D+PS	BB+LCD	1	22	14/10/2020
23	Problems of 8 point DIT-FFT	L+D	BB	1	23	15/10/2020
24	Problems on 8 point DIF-FFT	L+D	BB	1	24	19/10/2020

**MODULE-3- Design of FIR Filters**

25	Structure for FIR Systems: Direct form,	L+D+PS	BB+LCD	1	25	20/10/2020
26	DF-II structure	L+D+PS	BB+LCD	1	26	21/10/2020
27	Cascade structure	L+D+PS	BB+LCD	1	27	22/10/2020
28	DF to Lattice Structure- problems	L+D+PS	BB+LCD	1	28	27/10/2020
29	Lattice Structure to DF- problems	L+D+PS	BB+LCD	1	29	28/10/2020
30	Characteristics of practical frequency –selective filters,	L+D+PS	BB+LCD	1	30	29/10/2020
31	Symmetric and Antisymmetric FIR filters,	L+D	BB+LCD	1	31	2/11/2020
32	Design of Linear-phase FIR filters using windows	L+D+PS	BB	1	32	3/11/2020
33	Rectangular, Hamming, Hanning, Bartlett windows.	L+D+PS	BB+LCD	1	33	4/11/2020
34	Design of FIR filters using frequency sampling method.	L+D+PS	BB	1	34	5/11/2020
35	Problems on rectangular window	L+D	BB	1	35	5/11/2020
36	Problems on hamming window	L+D	BB	1	36	9/11/2020

### MODULE-4- IIR Filter Design

37	IIR Filter Design: Infinite Impulse response Filter Format,	L+D	BB	1	37	10/11/2020
38	Bilinear Transformation Design Method,	L+D	BB	1	38	11/11/2020
39	Analog Filters using Lowpass prototype transformation,	L+D	BB	1	39	12/11/2020
40	Analog Filter Design	L+D+PS	BB	1	40	23/11/2020
41	Normalized Butterworth Functions, Bilinear Transformation and Frequency Warping,	L+D+PS	BB+LCD	1	41	24/11/2020
42	Bilinear Transformation Design Procedure	L+D+PS	BB	1	42	25/11/2020
43	Digital Butterworth Filter Design using BLT.	L+D+PS	BB	1	43	26/11/2020
44	Digital Butterworth Filter Design using BLT.	L+D+PS	BB+LCD	1	44	30/11/2020
45	Realization of IIR Filters in Direct form I and II.	L+D+PS	BB+LCD	1	45	1/12/2020
46	Realization of IIR Filters in Direct form I and II.	L+D+PS	BB+LCD	1	46	2/12/2020

### MODULE-5- Digital Signal Processors

47	Digital Signal Processors: DSP Architecture,	L+D	BB+LCD	1	47	7/12/2020
48	DSP Hardware Units	L+D+PS	BB+LCD	1	48	8/12/2020
49	Fixed point format	L+D	BB+LCD	1	49	9/12/2020
50	Fixed point format	L+D+PS	BB+LCD	1	50	10/12/2020
51	Floating point Format	L+D+PS	BB+LCD	1	51	14/12/2020
52	IEEE Floating point formats	L+D	BB+LCD	1	52	15/12/2020
53	Fixed point digital signal processors,	L+D	BB+LCD	1	53	16/12/2020
54	Floating point processors	L+D	BB+LCD	1	54	17/12/2020
55	FIR and IIR filter implementations in Fixed point systems	L+D	BB+LCD	1	55	21/12/2020
56	FIR and IIR filter implementations in Fixed point systems	L+D	BB+LCD	1	56	22/12/2020
57	Tutorial hour	L+D	BB+LCD		57	24/10/2020
58	Tutorial hour	L+D	BB+LCD		58	7/11/2020
59	Tutorial hour	L+D	BB+LCD		59	5/12/2020
60	Tutorial hour	L+D	BB+LCD		60	19/12/2020
61	Revision of vtu question papers	L+D	BB			23/12/2020



62	Revision of vtu question papers	L+D	BB			25/12/2020
63	Revision of vtu question papers	L+D	BB			28/12/2020

**Total No. of Lecture Hours = 56**

**Total No. of Tutorial Hours = 04**

**Total No. of Revision Hours =03**

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**Course In charge**

*(P) [Signature]*

**Head of the Department**



## K S INSTITUTE OF TECHNOLOGY, BANGALORE

### DEPARTMENT OF TELECOMMUNICATION ENGINEERING

NAME OF THE STAFF : Ms DEVIKA.B

SUBJECT CODE/NAME : 18EC53/ Principles of Communication Systems

SEMESTER/YEAR : V/ III

ACADEMIC YEAR : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1: AMPLITUDE MODULATION</b>						
1	<b>AMPLITUDE MODULATION:</b> Introduction, Amplitude Modulation	online	Zoom platform	1	1	1/9/2020
2	Time & Frequency Domain description, Switching modulator, Envelop detector. <b>(3.1 – 3.2 in Text)</b>	online	Zoom platform	1	2	2/9/2020
3	<b>DOUBLE SIDE BAND-SUPPRESSED CARRIER MODULATION:</b> Time and Frequency Domain description,	online	Zoom platform	1	3	4/9/2020
4	Ring modulator, Coherent detection, Costas Receiver, Quadrature Carrier Multiplexing. <b>(3.3 – 3.4 in Text)</b>	online	Zoom platform	1	4	5/9/2020
5	<b>SINGLE SIDE-BAND AND VESTIGIAL SIDEBAND METHODS OF MODULATION:</b> SSB Modulation,	online	Zoom platform	1	5	8/9/2020

6	VSB Modulation, Frequency Translation, Frequency-Division	online	Zoom platform	1	6	9/9/2020
7	Multiplexing, Theme Example:	online	Zoom platform	2	8	11/9/2020,12/9/2020
8	VSB Transmission of Analog and Digital Television. (3.5 – 3.8 in Text),	online	Zoom platform	2	10	15/9/2020,16/9/2020
<b>MODULE 2: ANGLE MODULATION</b>						
7	<b>ANGLE MODULATION:</b> Basic definitions, Frequency Modulation:	online	Zoom platform	1	11	18/9/2020
8	Narrow Band FM, Wide Band FM,	online	Zoom platform	1	12	19/9/2020
9	Transmission bandwidth of FM Signals,	online	Zoom platform	2	14	21/9/2020,22/9/2020
10	Generation of FM Signals, Demodulation of FM Signals,	online	Zoom platform	1	15	25/9/2020
11	FM Stereo Multiplexing, Phase–Locked Loop:	online	Zoom platform	1	16	26/9/2020
12	Nonlinear model of PLL, Linear model of PLL,	L+D	BB	2	18	3/10/2020,6/10/2020
13	Nonlinear Effects in FM Systems.	L+D	BB	1	18	7/10/2020
14	The Superheterodyne Receiver (4.1 – 4.6 of Text)	L+D, LW	BB	1	2020	9/10/2020
<b>MODULE 3: NOISE</b>						
15	<b>NOISE</b> - Shot Noise, Thermal noise, White Noise,	L+D	BB+LCD	1	2020	10/10/2020
16	Noise Equivalent Bandwidth (5.10 in Text)	L+D	BB+LCD	2	23	13/10/2020,14/10/2020

17	<b>NOISE IN ANALOG MODULATION:</b> Introduction,	L+D	BB	1	24	16/10/2020
18	Receiver Model, Noise in DSB-SC receivers.	L+D	BB+LCD	1	25	17/10/2020
19	Noise in AM receivers, Threshold effect, Noise in FM receivers,	L+D	BB+LCD	1	26	20/10/2020
20	Capture effect, FM threshold effect,	L+D	BB	2	28	21/10/2020,23/10/2020
20	FM threshold reduction, Pre-emphasis and De-emphasis in FM <b>(6.1 – 6.6 in Text)</b>	L+D	BB+LCD	2	30	27/10/2020,28/10/2020
<b>MODULE 4: SAMPLING AND QUANTIZATION</b>						
21	<b>SAMPLING AND QUANTIZATION:</b> Introduction, Why Digitize Analog Sources?,	L+D	LCD	2	32	6/11/2020,7/11/2020
22	The Low pass Sampling process	L+D	BB+LCD	2	34	10/11/2020,11/11/2020
23	Time Division Multiplexing,	L+D	BB	1	35	13/10/2020
24	Pulse-Position Modulation,	L+D	BB	2	37	14/10/2020,5/11/2020
25	Generation of PPM Waves,	PS	BB	1	38	17/11/2020
26	Detection of PPM Waves. <b>(7.1 – 7.7 in Text)</b>	L+D	BB	1	39	18/11/2020
27	Pulse Amplitude Modulation.	L+D, PS	BB	1	40	20/11/2020
<b>MODULE 5: SAMPLING AND QUANTIZATION</b>						
28	<b>SAMPLING AND QUANTIZATION (Contd):</b> The Quantization Random Process,	L+D	BB	2	42	21/11/2020,24/11/2020
29	Quantization Noise, Pulse–Code Modulation: Sampling, Quantization,	L+D	BB	2	44	25/11/2020,27/11/2020
30	Encoding, Regeneration, Decoding, Filtering, Multiplexing;	L+D	BB	1	45	28/11/2020
31	Delta Modulation <b>(7.8 – 7.10 in Text)</b> ,	L+D	BB	2	47	1/12/2020,2/12/2020

32	Application examples - (a) Video + MPEG (7.11 in Text) and	L+D	BB	2	49	4/12/2020,5/12/2020
33	(b) Vocoders(refer Section 6.8 of Reference Book 1).		BB	1	50	4/12/2020
34	Revision	L+D	BB	2	52	15/12/2020,16/12/2020
35	Revision	L+D	BB	1	53	15/12/2020
36	Revision	L+D	BB	1	54	16/12/2020



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**K.S. INSTITUTE OF TECHNOLOGY, BANGALORE**  
**DEPARTMENT OF TELECOMMUNICATION**  
**ENGINEERING**

**NAME OF THE STAFF** : Dr. CHANDA V. REDDY  
**SUBJECT CODE/NAME** : 18EC54/ INFORMATION THEORY AND CODING  
**SEMESTER/YEAR** : V / III  
**ACADEMIC YEAR** : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1:</b>						
1	<b>Module-1:</b> <b>Information Theory:</b> Introduction	L+D	ONLINE – ZOOM PLATFORM	1	1	02– 09– 2020
2	Measure of information, Information content of message	L+D	ONLINE – ZOOM PLATFORM	1	2	03– 09 – 2020
3	Average Information content of symbols in Long Independent sequences - Problems	L+D	ONLINE – ZOOM PLATFORM	1	3	05– 09 – 2020
4	Problems continued	L+D	ONLINE – ZOOM PLATFORM	1	4	07– 09 – 2020
5	Average Information content of symbols in Long dependent sequences - Problems	L+D	ONLINE – ZOOM PLATFORM	1	5	09– 09 – 2020
6	Problems continued	L+D	ONLINE – ZOOM PLATFORM	1	6	10– 09 – 2020
7	Markov Statistical Model for Information Sources	L+D	ONLINE – ZOOM PLATFORM	1	7	12– 09 – 2020
8	Entropy and Information rate of Markoff Sources - problems	L+D	ONLINE – ZOOM PLATFORM	1	8	14– 09 – 2020
9	Problems continued	L+D	ONLINE – ZOOM PLATFORM	1	9	16– 09 – 2020
10	<b>Module-2:</b> <b>Source Coding:</b> Encoding of the Source Output	L+D	ONLINE – ZOOM PLATFORM	1	10	19– 09 – 2020
11	Shannon's Encoding Algorithm - Problems	L+D	ONLINE – ZOOM PLATFORM	3	11	21– 09 – 2020
12	Problems continued	L+D	ONLINE – ZOOM PLATFORM	1	12	23– 09 – 2020
13	Source coding theorem	L+D	ONLINE – ZOOM PLATFORM	1	13	24– 09 – 2020

14	Shannon Fano Encoding Algorithm - Problems	L+D	ONLINE – ZOOM PLATFORM	1	14	26-09-2020
15	Problems continued	L+D	LCD, BB	1	15	01-10-2020
16	Huffman codes - problems	L+D	BB	1	16	03-10-2020
17	Problems continued	L+D	BB	1	17	05-10-2020
18	Prefix Codes	L+D	LCD, BB	1	18	07-10-2020
19	Kraft McMillan Inequality property – KMI	L+D	LCD, BB	1	19	08-10-2020
20	<b>Module-3:</b> <b>Information Channels:</b> Communication Channels, Discrete Communication channels Channel Matrix	L+D	LCD, BB	1	20	10-10-2020
21	Joint probability Matrix - problems	L+D	BB	1	21	12-10-2020
22	Problems continued	L+D	LCD, BB	1	22	14-10-2020
23	Binary Symmetric Channel	L+D	BB	1	23	15-10-2020
24	System Entropies	L+D	BB	1	24	17-10-2020
25	Mutual Information – and properties	L+D	LCD, BB	1	25	19-10-2020
26	Channel Capacity	L+D	LCD, BB	1	26	21-10-2020
27	Channel Capacity of Binary Symmetric Channel	L+D	LCD, BB	1	27	22-10-2020
28	Binary Erasure Channel	L+D	LCD, BB	1	28	24-10-2020
29	Muroga,s Theorem	L+D	LCD, BB	1	29	28-10-2020
30	<b>Module-4:</b> <b>Error Control Coding:</b> Introduction, Examples of Error control coding, methods of Controlling Errors, Types of Errors	L+D	LCD, BB	1	30	29-10-2020
31	types of Codes, Linear Block Codes: matrix description of Linear Block Codes	L+D	LCD, BB	1	31	05-11-2020
32	Error detection & Correction capabilities of Linear Block Codes	L+D	LCD, BB	1	32	07-11-2020

33	Single error correction Hamming code	L+D	LCD, BB	1	33	09-11 - 2020
34	Table lookup Decoding using Standard Array	L+D	BB	1	34	11-11 - 2020
35	<b>Binary Cyclic Codes:</b> Algebraic Structure of Cyclic Codes,	L+D	BB	1	35	12-11 - 2020
36	Encoding using an (n-k) Bit Shift register,	L+D	LCD, BB	1	36	14-11 - 2020
37	Syndrome Calculation, Error Detection and Correction	L+D	LCD, BB	1	37	18-11 - 2020
38	Error Detection and Correction	L+D	LCD, BB	1	38	19-11 - 2020
39	<b>Module-5:</b> <b>Convolution Codes:</b> Convolution Encoder,	L+D	LCD, BB	1	39	21-11 - 2020
40	Time domain approach	L+D	LCD, BB	1	40	23-11 - 2020
41	Transform domain approach	L+D	LCD, BB	1	41	25-11 - 2020
42	Code Tree	L+D	LCD, BB	1	42	26-11 - 2020
43	Trellis and State Diagram	L+D	BB	1	43	28-11 - 2020
44	Problems	L+D	BB	1	44	30-11 - 2020
45	The Viterbi Algorithm	L+D	LCD, BB	1	45	02-12 - 2020
46	Problems	L+D	LCD, BB	1	46	05-12 - 2020



**Course Incharge**



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**K.S. INSTITUTE OF TECHNOLOGY, BANGALORE**  
**DEPARTMENT OF TELECOMMUNICATION ENGINEERING**



**NAME OF THE STAFF : DILEEP J**

**SUBJECT CODE/NAME : 18EC55/ELECTROMAGNETIC WAVES**

**SEMESTER/YEAR : V / III**

**ACADEMIC YEAR : 2020-2021**

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1: Coulomb's Law, Electric Field Intensity and Flux density</b>						
1	Introduction to vectors and Co-ordinate systems	L+D	LCD	1	1	1-9-2020
2	Experimental law of Coulomb	L+D	BB	1	2	3-9-2020
3	Coulombs law	L+D	BB	1	3	5-9-2020
4	Electric Field intensity	L+D	BB	1	4	7-9-2020
5	Field due to continuous volume charge distribution,	L+D	BB	1	5	8-9-2020
6	Field of a line charge,	L+D	BB	1	6	10-9-2020
7	Electric flux density	L+D	BB	1	7	12-9-2020
8	Problems on Electric field intensity	L+PS	BB	1	8	14-9-2020
9	Problems on volume integral	L+PS	BB	1	9	15-9-2020

10	Electric Flux density	L+D	BB	1	10	19-9-2020
11	Problems on Flux density	L+PS	BB	1	11	21-9-2020

**MODULE 2: Gauss's law and Divergence**

12	Gauss's law and Divergence Theorem	L+D	BB	1	12	22-9-2020
13	Maxwell's First equation (Electrostatics),	L+D	BB	1	13	24-9-2020
14	Vector Operator and divergence theorem.	L+D	BB	1	14	26-9-2020
15	Energy expended in moving a point charge in an electric field, The line integral	L+D	BB	1	15	1-10-2020
16	Definition of potential difference and potential	L+D	BB	1	16	3-10-2020
17	The potential field of point charge	L+D	BB	1	17	5-10-2020
18	Current and Current density	L+D	BB	1	18	6-10-2020
19	Continuity of current.	L+D	BB	1	19	8-10-2020
20	Problems on Maxwell's equations	L+PS	BB	1	20	10-10-2020
21	Problems on energy	L+DPS	BB	1	21	12-10-2020

**MODULE 3: Poisson's and Laplace Equation, Steady Magnetic Field**

22	Derivation of Poisson's and Laplace's Equations,	L+D	BB	1	22	13-10-2020
23	Uniqueness theorem.	L+D	BB	1	23	15-10-2020
24	Examples of the solution of Laplace's equation.	L+D	BB	1	24	17-10-2020
25	Biot-Savart Law	L+D	BB	1	25	19-10-2020

26	Ampere's circuital law	L+D	BB	1	26	20-10-2020
27	Curl, Stokes' theorem	L+D	BB	1	27	22-10-2020
28	Magnetic flux and magnetic flux density	L+D	BB	1	28	24-10-2020
29	Scalar and Vector Magnetic Potentials.	L+D	BB	1	29	27-10-2020
30	Problems on poisson's equation	L+PS	BB	1	30	29-10-2020
31	Problems on Laplace equations	L+PS	BB	1	31	5-11-2020

**MODULE 4: Magnetic Forces, Magnetic Materials**

32	Force on a moving charge	L+D	BB	1	32	7-11-2020
33	differential current elements	L+D	BB	1	33	9-11-2020
34	Force between differential current elements	L+D	BB	1	34	10-11-2020
35	Magnetization and permeability	L+D	BB	1	35	14-11-2020
36	Magnetic boundary conditions	L+D	BB	1	36	17-11-2020
37	Magnetic circuits	L+D	BB	1	37	19-11-2020
38	Potential Energy and forces on magnetic materials	L+D	BB	1	38	21-11-2020
39	Problems on Magnetic boundary conditions, Magnetic circuits	L+PS	BB	1	39	23-11-2020

**MODULE 5: Time-varying fields and Maxwell's equations, Uniform Plane Wave**

40	Introduction	L+AV	BB	1	40	24-11-2020
41	Faraday's law, displacement current,	L+D	BB	1	41	26-11-2020

42	Maxwell's equations in point form, Maxwell's equations in integral form.	L+D	BB	1	42	28-11-2020
43	Wave propagation in free space	L+D	BB	1	43	30-11-2020
44	Wave propagation in good conductors	L+D	BB	1	44	1-12-2020
45	Poynting's theorem and wave power	L+D	BB	1	45	5-12-2020
46	Skin Effect	L+D	BB	1	46	14-12-2020
47	Problems on Poynting's theorem	L+D	BB	1	47	15-12-2020
48	Problems on wave power	L+D	BB	1	48	17-12-2020



Course In charge



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 Dept. of Telecommunication Engg  
 N. S. Institute of Technology  
 Bengaluru - 560 109



# K. S. INSTITUTE OF TECHNOLOGY

#14, Raghuvanahalli, Kanakapura Main Road, Bengaluru-5600109

## DEPARTMENT OF TELECOMMUNICATION ENGINEERING

Date: 17-04-2021

### COURSE PLAN

Academic Year	2020-2021						
Batch	2017-2021						
Year/Semester/section	III/VI						
Course Component	Professional core						
Subject Code-Title	18EC61-DIGITAL COMMUNICATION						
No. of Students	23						
Schedule	L	3	T	2	P	-	
Name of the Instructor	Dr. DEVIKA.B					Dept	TCE

Prerequisite Courses	<ul style="list-style-type: none"> <li>Basic knowledge of Communication</li> </ul>	
Course Objectives	The course objective is to make students of the Telecommunication Engineering to understand the concepts and digital communication.	
<b>Course Outcomes</b> (Min 4 Max 6. Out of which one for content beyond syllabus)	CO1	Inspect the various bandpass signals and analyze its characteristics with detail study of lines codes.
	CO2	Apply Gram Schmidt procedure and utilize optimum receivers using coherent detection
	CO3	Build the various Digital Modulation and demodulation techniques and to study its various parameters.
	CO4	Organize Communication through Band limited channels to model the correlative coding for Band pass signals.
	CO5	Illustrate the principles of spread spectrum techniques and coherent detection of receivers.

<b>Assessment pattern</b>	<ul style="list-style-type: none"><li>• Internal Assessment1, Internal Assessment2 &amp; Internal Assessment3 for 60 marks</li><li>• Assignment for 20 marks</li></ul> Portions Covered: <ul style="list-style-type: none"><li>• Internal Test1- Module 1 &amp; First Half of Module2.</li><li>• Internal Test2- Second Half of Module2 &amp; 3<sup>rd</sup> Module.</li><li>• Internal Test3- 4<sup>th</sup> Module and First Half of 5th Module.</li></ul>
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Sl.No	Topic to be covered	Text/Ref Book Page No.	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>UNIT 1: BANDPASS SIGNAL TO EQUIVALENT LOW PASS</b>							
1	Bandpass signal to equivalent low pass: Hilbert Transform, Pre-envelopes,	T1(42-45)R1(160)(W1)	L+D	BB+LCD	1	1	19/4/21
2	Complex envelopes	T1(47)	L+ D	BB	1	2	21/4/21
3	Canonical representation of bandpass signals	T1(49)	L+ D	BB	1	3	22/4/21
4	Complex low pass representation of band-pass signals and systems.	T1(52)	L+D	BB	1	4	23/4/21
5	Complex low pass representation of band-pass signals and systems.	T1(52)	L+D	BB	1	5	26/4/21
6	Line codes: Unipolar, Polar, Bipolar (AMI) and	T1(309-312)	L+D	BB	1	6	28/4/21
7	Line codes: Polar, Bipolar (AMI) and	T1(309-312)	L+D	BB	1	7	30/4/20
8	Manchester code.	T1(309-312)	L+D	BB	1	8	3/5/21
9	Manchester code and their power spectral densities.	T1(309-312)	L+D	BB	1	9	5/5/21
10	Overview of HDB3, B3ZS, B6ZS	R1(342-343)	L+D	BB	1	10	6/5/21
<b>UNIT 2: SIGNALLING OVER AWGN CHANNELS</b>							
11	Detection and Estimation Introduction	T1(324-344)	L+ D	BB	1	11	7/5/21
12	Geometric representation of signals	T1(325)	L+D	BB	1	12	8/5/21

13	Gram-Schmidt Orthogonalization procedure	T1(330)	L+D	BB	1	13	10/5/21
14	Gram-Schmidt Orthogonalization procedure	T1(330)W2	L+D	LCD	1	14	12/5/21
15	Conversion of	T1(332)	L+D	BB	1	15	17/5/21
16	Optimum receivers	T1(337)	L+D	BB	1	16	19/5/21
17	ML Decoding	T1 (337-340)	L+D	BB	1	17	20/5/21
18	Correlation receiver	T1(340)	L+D	BB	1	18	21/5/21
19	Correlation receiver	T1(340)	L+D	BB	1	19	27/5/21
20	Matched filter receiver	T1(342)	L+D	BB	1	20	28/5/21
<b>UNIT 3: DIGITAL MODULATION TECHNIQUES</b>							
21	Digital Modulation Techniques: Digital modulation formats,	T1 (352-369)	L+D	BB	1	21	31/5/21
22	Phase shift Keying techniques using coherent detection:	T1 (352-369)	L+D	BB	1	22	2/6/21
23	BPSK,	T1 (352-369)	L+D	BB	1	23	3/6/21
24	QPSK generation, detection and error probabilities	T1 (352-369)	L+D	BB	1	24	4/6/21
25	M-ary PSK, M-ary QAM	T1 (370-374)	L+D	BB	1	25	5/6/21
26	Frequency shift keying techniques using Coherent detection: BFSK generation, detection and error probability.	T1 (375-396)	L+D	BB	1	26	7/6/21
27	Non coherent orthogonal modulation techniques: BFSK	T1(404-411)	L+D	BB	1	27	9/6/21



28	DPSK Symbol representation	T1(404-411)	L+D	BB	1	28	10/6/21
29	Block diagrams treatment of Transmitter and Receiver	T1(404-411)	L+D	BB	1	29	11/6/21
30	Probability of error(without derivation)	T1(404-411)	L+D	BB	1	30	14/6/21
<b>MODULE 4: COMMUNICATION THROUGH BANDLIMITED CHANNELS</b>							
31	Communication through Band Limited Channels: Digital Transmission through Band limited channels	T2 (482-502)	L+D	BB	1	31	16/6/21
32	Inter Symbol Interference, eye diagrams	T2 (482-502)	L+D	BB	1	32	17/6/21
33	Band limited ideal channel with zero ISI – Nyquist Criterion (statement only)	T2 (482-502)	L+D	BB	1	33	18/6/21
34	Sinc and Raised pulse shaping	T2 (482-502)	L+D	BB	1	34	21/6/21
35	Signal design for Band limited channel with controlled ISI	T2 (482-502)	L+D	BB	1	35	23/6/21
36	Signal design for Band limited channel with controlled ISI	R2(343)	L+D	BB	1	36	24/6/21
37	Correlative coding, DB and MDB, Precoding.	R2(350-359)	L+D	BB	1	37	25/4/21
38	Basic Concepts of Equalization for non ideal channels – ZFE, MMSE, (without derivations),	R2(360-363)	L+D	BB	1	38	1/7/21
39	ZFE, MMSE Adaptive Equalizers (Block	R2(471-475)	L+D	BB	1	39	2/7/21

	diagram only)						
40	ZFE, MMSE Adaptive Equalizers (Block diagram only)	R2(471-475)	L+D	BB	1	40	3/7/21
<b>UNIT 5: PRINCIPLES OF SPREAD SPECTRUM</b>							
41	Principles of Spread Spectrum: Concept of Spread Spectrum,	T2(652-673)	L+D	BB	1	41	5/7/21
42	Direct Sequence/SS,	T2(652-654)	L+D	BB	1	42	7/7/21
43	Frequency Hopped SS, Processing Gain,	T2(654-657)	L+D	BB	1	43	8/7/21
44	Interference and probability of error	T2(657-660)	L+D	BB	1	44	9/7/21
45	PN sequences for Spread Spectrum – M-sequences with Properties; Gold, Kasamisequences with basic properties.	T2(660-667)	L+D	LCD	1	45	12/7/21
46	Direct sequence spread spectrum system concepts,	T2(654-667)	L+D	BB	1	46	14/7/21
47	Frequency Hopped Spread spectrum	T2(667-673)	L+D	BB	1	47	15/7/21
48	Frequency Hopped Spread spectrum	T2(667-673)W3	L+D	LCD	1	48	16/7/21
49	Spread Spectrum Synchronization (block diagram treatment) - Code Acquisition and Tracking	T2(667-673)	L+D	BB	1	49	17/7/21
50	Spread Spectrum Synchronization (block diagram treatment) - Code Acquisition and Tracking	T2(667-673)	L+D	BB	1	50	19/7/21
51	Spread Spectrum Synchronization (block	T2(667-673)	L+D	BB	1	51	22/7/19

	diagram treatment) -						
52	Code Acquisition and Tracking	T2(667-673)	L+D	BB	1	52	23/7/21,1/6/21
53	Spread Spectrum Synchronization	T2(667-673)	L+D	BB		53	26/7/21
54	(block diagram treatment) - Code Acquisition and Tracking	T2(667-673)	L+D	BB		54	28/7/21
55	Code Acquisition and Tracking	T2(667-673)	L+D	BB		55	6/8/21
56	Revision		L+D	BB		56	7/8/21

**TEXT BOOKS:**

T1: Simon Haykin, “**Digital Communication Systems**”, John Wiley & sons, First Edition, 2014, ISBN 978-0-471-64735-5.

T2: John G Proakis and MasoudSalehi, “**Fundamentals of Communication Systems**”, 2014 Edition, Pearson Education, ISBN 978-8-131-70573-5.

**REFERENCES:**

R1: B.P.Lathi and Zhi Ding, “**Modern Digital and Analog communication Systems**”, Oxford University Press, 4th Edition, 2010, ISBN: 978-0-198-073802.

R2: Ian A Glover and Peter M Grant, “**Digital Communications**”, Pearson Education, Third Edition, 2010, ISBN 978-0-273-71830-7.

R3: John G Proakis and MasoudSalehi, “**Communication Systems Engineering**”, 2nd Edition, Pearson Education, ISBN 978-93-325-5513-6.

**WEB MATERIALS:**

W1: <https://www.youtube.com/watch?v=NMbNCeKO-jc>

W2: <https://www.khanacademy.org/math/linear-algebra/alternate-bases/orthonormal-basis/v/linear-algebra-the-gram-schmidt-process>  
<https://www.youtube.com/watch?v=X-H2tLesBUQ>, <https://www.youtube.com/watch?v=pIy8xqh9sWs>

W3: <https://www.youtube.com/watch?v=33Cqp6Lduj8>

W4: <https://www.youtube.com/watch?v=0QWOxsyPAgw>



**Staff in charge**



**HOD**



**K. S. INSTITUTE OF TECHNOLOGY BANGALORE**

**DEPARTMENT OF TELECOMMUNICATION ENGINEERING**

NAME OF THE STAFF : DR. CHANDA V REDDY  
 SUBJECT CODE/NAME : 18TE62 / 17TE63 MICROWAVE THEORY AND ANTENNA  
 SEMESTER/YEAR : VI / III  
 ACADEMIC YEAR : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1: Microwave Tubes</b>						
1	Introduction Reflex Klystron oscillator	L+D	BB, PPT	1	1	19-4-2021
2	Mechanism of Oscillations	L+D	BB, PPT	1	2	20-4-2021
3	Modes of Oscillations, Mode Curve (Qualitative Analysis only)	L+D	BB, PPT	1	3	21-4-2021
4	Microwave Transmission Lines: Transmission Line equations and solutions	L+D, PS	BB, PPT	1	4	23-4-2021
5	Reflection Coefficient and Transmission Coefficient	L+D, PS	BB, PPT	1	5	24-4-2021
6	Standing Wave and Standing Wave Ratio,	L+D, PS	BB, PPT	1	6	26-4-2021
7	Smith Chart - problems	L+D	BB, PPT	1	7	27-4-2021
8	Single Stub matching – problems	L+D, PS	BB, PPT	1	8	28-4-2021
<b>MODULE 2: Microwave Network theory</b>						
9	Symmetrical Z and Y-Parameters for Reciprocal Networks	L+D, PS	BB, PPT	1	9	30-4-2021
10	S matrix representation of Multi-Port Networks	L+D	BB, PPT	1	10	4-5-2021
11	Microwave Passive Devices: Coaxial Connectors and Adapters	L+D	BB, PPT		11	5-5-2021
12	Attenuators, Phase Shifters	L+D	BB, PPT	1	12	7-5-2021
13	Waveguide Tees	L+D	BB, PPT	1	13	8-5-2021

15	Magic tees	L+D	BB, PPT	1	15	10-5-2021
16	Circulators(Four port) and Isolators(Faraday Rotation Isolator)	L+D	BB, PPT	1	16	11-5-2021
17	Directional Coupler, Two - Hole Directional coupler	L+D, PS	BB, PPT	1	17	12-5-2021
18	S- Matrix of a Directional Coupler	L+D, PS	BB, PPT	1	18	17-5-2021
<b>Module 3: Strip Lines</b>						
19	Introduction	L+D, PS	BB, PPT	1	19	18-5-2021
20	Micro Strip lines, Parallel strip lines	L+D, PS	BB, PPT	1	20	19-5-2021
21	Coplanar strip lines, Shielded strip Lines	L+D	BB, PPT	1	21	21-5-2021
22	Antenna Basics: Introduction, Basic Antenna Parameters	L+D, PS	BB, PPT	1	22	22-5-2021
23	Patterns, Beam Area, Beam Efficiency	L+D	BB, PPT	1	23	28-5-2021
24	Radiation Intensity	L+D, PS	BB, PPT	1	24	31-5-2021
25	Directivity and Gain, Antenna Apertures	L+D, PS	BB, PPT	1	25	1-6-2021
26	Effective Height	L+D, PS	BB, PPT	1	26	2-6-2021
27	Radio Communication Link	L+D, PS	BB, PPT	1	27	4-6-2021
28	Problems	L+D, PS	BB, PPT		28	5-6-2021
29	Antenna Field Zones & Polarization	L+D, PS	BB, PPT	2	29	7-6-2021
<b>Module 4: Point Sources and Arrays</b>						
30	Introduction, Point Sources	L+D	BB, PPT	1	30	8-6-2021
31	Power Patterns, Power Theorem	L+D, PS	BB, PPT	1	31	9-6-2021
32	Radiation Intensity, Field Patterns, Phase Patterns	L+D, PS	BB, PPT	1	32	11-6-2021
33	Arrays of Two Isotropic Point Sources	L+D	BB, PPT	1	33	14-6-2021
34	Pattern Multiplication	L+D, PS	BB, PPT	1	34	15-6-2021
35	Linear Arrays of n Isotropic Point Sources of equal Amplitude and Spacing	L+D, PS	BB, PPT	1	35	16-6-2021
36	Electric Dipoles: Introduction, Short Electric Dipole	L+D	BB, PPT	1	36	18-6-2021
37		L+D, PS	BB, PPT	1	37	19-6-2021
38	Fields of a Short Dipole (General and Far Field Analyses)	L+D	BB, PPT	1	38	21-6-2021
39	Radiation Resistance of a Short Dipole	L+D	BB, PPT	1	39	22-6-2021
40	Thin Linear Antenna (Field Analyses)	L+D, PS	BB, PPT	1	40	23-6-2021
41	Radiation Resistances of $\lambda/2$ Antenna	L+D, PS	BB, PPT	1	41	25-6-2021

Module 5: Loop and Horn Antenna 10-5-2020						
42	Introduction, Small loop	L+D, PS	BB, PPT	1	42	2-7-2021
43	Comparison of Far fields of Small Loop and Short Dipole	L+D	BB, PPT	1	43	5-7-2021
44	The Loop Antenna General Case	L+D	BB, PPT	1	44	6-7-2021
45	Far field Patterns of Circular Loop Antenna with Uniform Current	L+D	BB, PPT	1	45	7-7-2021
46	Radiation Resistance of Loops	L+D, PS	BB, PPT	1	46	9-7-2021
47	Directivity of Circular Loop Antennas with Uniform Current	L+D, PS	BB, PPT	1	47	12-7-2021
48	Horn antennas: Rectangular Horn Antennas	L+D, PS	BB, PPT	1	48	13-7-2021
49	Antenna Types: Helical Antenna	L+D, PS	BB, PPT	1	49	14-7-2021
50	Helical Geometry	L+D, PS	BB, PPT	1	50	16-7-2021
51	Practical Design Considerations of Helical Antenna	L+D, PS	BB, PPT	1	51	17-7-2021
52	Yagi-Uda array	L+D	BB, PPT	1	52	19-7-2021
53	Parabola General Properties	L+D	BB, PPT	1	53	20-7-2021
54	Log Periodic Antenna	L+D	BB, PPT	1	54	23-7-2021
55	Revision Mod 1	D	BB, PPT	1	55	26-7-2021
56	Revision Mod 2	D	BB, PPT	1	56	27-7-2021
57	Revision Mod 3	D	BB, PPT	1	57	28-7-2021
58	Revision Mod 4	D	BB, PPT	1	58	6-8-2021



Staff in charge



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**KS INSTITUTE OF TECHNOLOGY BANGALORE**

**DEPARTMENT OF TELECOMMUNICATION ENGINEERING**

NAME OF THE STAFF : Dr. DINESH KUMAR D S

SUBJECT CODE/NAME : 18TE63/ COMPUTER COMMUNICATION NETWORKS

SEMESTER/YEAR : VI/ III

ACADEMIC YEAR : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1: INTRODUCTION TO DATA COMMUNICATION</b>						
1	Module 1: Introduction: Data Communications: Components Representations	L+D	BB	1	1	20/4/2021
2	Data Flow, Networks: Physical Structures, Network Types: LAN, WAN, Switching, Internet.	L+D	BB	1	2	21/4/2021
3	Network Models: Protocol Layering: Scenarios, Principles	L+D	BB	1	3	22/4/2021
4	Logical Connections, TCP/IP Protocol Suite: Layered Architecture					23/4/2021
5	Layers in TCP/IP suite, Description of layers	L+D	BB	1	4	24/4/2021
6	Encapsulation and Decapsulation, Addressing	L+D	BB	1	5	27/4/2021
7	Multiplexing and Demultiplexing	L+D	BB	1	6	28/4/2021
8	The OSI Model: OSI Versus TCP/IP	L+D	BB	1	7	29/4/2021
9	Connecting devices:hubs	L+D	BB	1	8	30/4/2021
10	switches	L+ D	BB	1	10	4/5/2021



**MODULE 2: DATA LINK LAYER**

11	Data Link Control (DLC) services: Framing, Flow and Error Control	L+D	BB	1	11	5/5/2021
12	Data-Link Layer: Introduction: Nodes and Links, Services Categories of link, Sublayers	L+D	BB	1	12	6/5/2021
13	Link Layer addressing: Types of addresses, ARP.	L+D	BB	1	13	7/7/2021
14	Data Link Layer Protocols: Simple Protocol	L+D	BB	1	14	8/5/2021
15	Stop and Wait protocol, Piggybacking	L+D	BB	1	15	11/5/2021
16	Media Access Control: Random Access: ALOHA, CSMA, CSMA/CD CSMA/CA	L+D	BB	1	16	12/5/2021
17	Controlled Access: Reservation, Polling, Token Passing.	L+D	BB	1	17	18/5/2021
18	Wireless LANs: Introduction: IEEE 802.11: Architecture	L+D	BB	1	18	19/5/2021
19	MAC sub layer, Addressing Mechanism,	L+D	BB	1	19	20/5/2021
20	Physical Layer, Bluetooth: Architecture, Layers.	L+D	BB	1	20	21/5/2021
<b>MODULE 3: NETWORK LAYER</b>						
21	Network Layer: Introduction, Network Layer services: Packetizing, Routing and Forwarding, Other services	L+D	BB	1	21	22/5/2021
22	Packet Switching: Datagram Approach, Virtual Circuit Approach	L+D	BB	1	22	27/5/2021
23	IPV4 Addresses: Address Space, Classful Addressing,	L+D	BB	1	23	28/5/2021
24	Classless Addressing, DHCP	L+D	BB	1	24	1/6/2021
25	Network Address Resolution, Forwarding of IP Packets: Based on destination Address and Label.	L+D	BB	1	25	2/6/2021

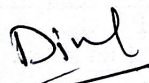
26	Network Layer Protocols: Internet Protocol (IP): Datagram Format	L+D	BB	1	26	3/6/2021
27	ICMPv4: Messages, Debugging Tools	L+D	BB	1	27	4/6/2021
28	Mobile IP: Addressing, Agents, Three Phases	L+D	BB	1	28	5/6/2021
29	Unicast Routing: Introduction, Distance Vector Routing	L+D	BB	1	29	8/6/2021
30	Link State Routing,	L+D	BB	1	30	9/6/2021
31	Path vector routing	L+D	BB	1	31	10/6/2021
32	Border Gateway Protocol Version 4	L+D	BB	1	32	11/6/2021
<b>MODULE-4-TRANSPORT LAYER</b>						
33	Transport Layer: Introduction: Transport Layer Services	L+D	BB	1	33	15/6/2021
34	Connectionless and Connection oriented Protocols	L+D	BB	1	34	16/6/2021
35	Transport Layer Protocols: Simple protocol Stop and wait protocol	L+D	BB	1	35	17/6/2021
36	Go-Back-N Protocol	L+D	BB	1	36	18/6/2021
37	Selective repeat protocol	L+D	BB	1	37	21/6/2021
38	User Datagram Protocol: User Datagram	L+D	BB	1	38	22/6/2021
39	UDP Services, UDP Applications	L+D	BB	1	39	23/6/2021
40	Transmission Control Protocol: TCP Services, TCP Features, Segment	L+D	BB	1	40	24/6/2021
41	Connection, State Transition diagram.	L+D	BB	1	41	25/6/2021
42	Windows in TCP	L+D	BB	1	42	1/7/2021
43	Flow control, Error control	L+D	BB	1	43	2/7/2021
44	TCP congestion control	L+D	BB	1	44	3/7/2021
<b>MODULE 5: QUALITY OF SERVICE</b>						
45	Data flow characteristics: Definitions	L+D	BB	1	45	6/7/2021
46	Flow control to improve QoS: Scheduling	L+D	BB	1	46	7/7/2021
47	Traffic shaping. Application Layer: introduction: providing services	L+D	BB	1	47	8/7/2021
48	Application- layer paradigms	L+D	BB	1	48	9/7/2021

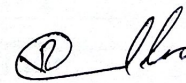
49	Standard Client -Server Protocols: World wide web	L+D	BB	1	49	11/7/2021
50	Hyper Text Transfer Protocol, FTP	L+D	BB	1	50	13/7/2021
51	Electronic Mail: Architecture, Wed Based Mail	L+D	BB	1	51	14/7/2021
52	Telnet: Local versus remote logging	L+D	BB	1	52	15/7/2021
53	Domain Name system: Name space, DNS in internet	L+D	BB	1	53	16/7/2021
54	Resolution, DNS Messages, Registrars, DDNS.	L+D	BB	1	54	17/7/2021
55	Revision	L+D	BB	1	55	20/7/2021
56	Revision	L+D	BB	1	56	22/7/2021
57	Revision	L+D	BB	1	57	23/7/2021
58	Revision	L+D, PS	BB	1	58	27/7/2021
59	Revision	L+D	BB	1	59	28/7/2021

**Total No. of Lecture Hours = 48**

**Total No. of Tutorial Hours = 05**

**Total No. of Revision Hours = 04**

  
Course in charge

  
**HOD (TCE)**



**KS INSTITUTE OF TECHNOLOGY, BANGALORE**

**DEPARTMENT OF TELECOMMUNICATION ENGINEERING**


NAME OF THE STAFF : Mr. Satish Kumar B  
SUBJECT CODE/NAME : 18EC641/ OPERATING SYSTEM  
SEMESTER/YEAR : VI/III  
ACADEMIC YEAR : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1 : Introduction to Operating Systems</b>						
1	Goals of an OS	L+D	BB	1	1	19/04/2021
2	Operation of an OS	L+D	BB	1	2	20/04/2021
3	Computational Structures	L+D	BB	1	3	22/04/2021
4	Resource allocation techniques	L+D	BB	1	4	23/04/2021
5	Efficiency	L+D	BB	1	5	26/04/2021
6	System Performance and User Convenience	L+D	BB	1	6	27/04/2021
7	Classes operating System	L+D	BB	1	7	29/04/2021
8	Batch processing	L+D	BB	1	8	30/04/2021
9	Multi programming	L+D	BB	1	9	03/05/2021
10	Time Sharing Systems	L+D	BB	1	10	04/05/2021
11	Real Time and distributed Operating Systems	L+D	BB	1	11	06/05/2021
<b>MODULE 2 : Process Management</b>						

12	OS View of Processes	L+D	BB	1	12	07/05/2021
13	PCB	L+D	BB	1	13	8/05/2021
14	Fundamental State Transitions	L+D	BB	1	14	10/05/2021
15	Threads	L+D	BB	1	15	11/05/2021
16	Kernel and User level Threads	L+D	BB	1	16	17/05/2021
17	Non-pre-emptive scheduling- FCFS	L+D	BB	1	17	18/05/2021
18	SRN	L+D	BB	1	18	20/05/2021
19	Pre-emptive Scheduling- RR	L+D	BB	1	19	21/05/2021
20	LCN	L+D	BB	1	20	22/05/2021
21	Scheduling in Unix	L+D	BB	1	21	27/05/2021
22	Scheduling in Linux	L+D	BB	1	22	28/05/2021
<b>MODULE 3 : Memory Management</b>						
23	Contiguous Memory allocation	L+D	BB	1	23	31/05/2021
24	Non-Contiguous Memory Allocation	L+D	BB	1	24	01/06/2021
25	Paging	L+D	BB	1	25	3/06/2021
26	Segmentation	L+D	BB	1	26	4/06/2021
27	Segmentation with paging	L+D	BB	1	27	07/06/2021
28	Virtual Memory Management	L+D	BB	1	28	08/06/2021
29	Demand Paging	L+D	BB	1	29	10/06/2021
30	Virtual memory in Unix and Linux	L+D	BB	1	30	11/06/2021
31	VM handler	L+D	BB	1	31	14/06/2021
32	FIFO page replacement policies	L+D	BB	1	32	15/06/2021

33	LRU page replacement policies	L+D	BB	1	33	17/06/2021
<b>MODULE 4 : File Systems</b>						
34	File systems and IOCS	L+D	BB	1	34	18/06/2021
35	IOCS	L+D	BB	1	35	19/06/2021
36	File Operations	L+D	BB	1	36	21/06/2021
37	File Organizations	L+D	BB	1	37	22/06/2021
38	Directory structures	L+D	BB	1	38	24/06/2021
39	File Protection	L+D	BB	1	39	25/06/2021
40	Interface between File system and IOCS	L+D	BB	1	40	01/07/2021
41	Allocation of disk space	L+D	BB	1	41	02/07/2021
42	Implementing file access	L+D	BB	1	42	03/07/2021
43	Problems	L+D	BB	1	43	05/07/2021
<b>MODULE 5 : Message Passing and Deadlocks</b>						
44	Overview of Message Passing	L+D	BB	1	44	06/07/2021
45	Delivery of Inter process Messages	L+D	BB	1	45	08/07/2021
46	Direct and indirect naming	L+D	BB	1	46	09/07/2021
47	Implementing message passing	L+D	BB	1	47	12/07/2021
48	Exceptional Conditions in Message Passing	L+D	BB	1	48	13/07/2021
49	Mailboxes	L+D	BB	1	49	15/07/2021

50	Deadlocks	L+D	BB	1	50	16/07/2021
51	Conditions for resource allocation	L+D	BB	1	51	17/07/2021
52	Deadlocks in resource allocation	L+D	BB	1	52	19/07/2021
53	Resource state modelling	L+D	BB	1	53	20/07/2021
54	Deadlock detection algorithm	L+D	BB	1	54	22/07/2021
55	Deadlock Prevention	L+D	BB	1	55	23/07/2021
56	Revision	L+D	BB	1	56	26/07/2021
57	Revision	L+D	BB	1	57	27/07/2021
58	Revision	L+D	BB	1	58	6/08/2021

  
Course In charge

  
HOD TE



# KS INSTITUTE OF TECHNOLOGY BANGALORE

## DEPARTMENT OF TELECOMMUNICATION ENGINEERING

NAME OF THE STAFF : Mr. SATISH KUMAR. B

SUBJECT CODE/NAME : 17TE71/ CRYPTOGRAPHY AND NETWORK SECURITY

SEMESTER/YEAR : VII/ IV

ACADEMIC YEAR : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1: Basic Concepts of Number Theory and Finite Fields and Foundations</b>						
1	Basic Concepts of Number Theory and Finite Fields : Euclidean algorithm	L+D, PS	BB	1	1	01-09-2020
2	Modular arithmetic	L+D, PS	BB	1	2	02-09-2020
3	Groups, Rings and Fields,	L+D	BB	1	3	03-09-2020
4	Finite fields of the form GF(p)	L+D, PS	BB	1	4	07-09-2020
5	Polynomial arithmetic	L+D, PS	BB	1	5	08-09-2020
6	Finite fields of the form GF(2 <sup>n</sup> )	L+D, PS	BB	1	6	09-09-2020
7	Prime Numbers	L+D, PS	BB	1	7	10-09-2020
8	Fermat's and Euler's theorem	L+D, PS	BB	1	8	14-09-2020
9	discrete logarithm	L+D	BB	1	9	15-09-2020
10	Foundations: Terminology	L+D	BB	1	10	16-09-2020
11	Steganography	L+D	BB	1	11	21-09-2020
12	substitution ciphers	L+D	BB	1	12	22-09-2020
13	transpositions ciphers	L+D	BB	1	13	23-09-2020
14	Simple XOR, One-Time Pads	L+D, PS	BB	1	14	24-09-2020



**MODULE 2: SYMMETRIC CIPHERS and ASYMMETRIC CIPHERS**

15	SYMMETRIC CIPHERS	L+D	BB	1	15	01-10-20
16	Traditional Block Cipher structure	L+D	BB	1	16	05-10-20
17	Symmetric Cryptosystem	L+D, PS	BB	1	17	06-10-20
18	Data encryption standard (DES)-Encryption	L+D, PS, LCD	BB	1	18	07-10-20
19	Data encryption standard (DES)- Decryption	L+D	BB	1	19	08-10-20
20	The AES Cipher-Encryption	L+D	BB	1	20	12-10-20
21	The AES Cipher-Decryption	L+D,PS, LCD	BB	1	21	13-10-20
22	ASYMMETRIC CIPHERS	L+D	BB	1	22	14-10-20
23	Principles of Public-Key Cryptosystems	L+D, PS	BB	1	23	15-10-20
24	The RSA algorithm	L+D	BB	1	24	19-10-20
25	Diffie - Hellman Key Exchange	L+D	BB	1	25	20-10-20
26	Elliptic Curve Arithmetic	L+D	BB	1	26	21-10-20
27	Elliptic Curve Cryptography	L+D	BB	1	27	22-10-20

**MODULE 3: One-Way Hash Functions**

28	One-Way Hash Functions:	L+D, LCD	BB	1	28	24-10-20
29	Background	L+D	BB	1	29	27-10-20
30	Snefru	L+D	BB	1	30	28-10-20
31	Cryptanalysis of Snefru	L+D	BB	1	31	29-10-20
32	N-Hash	L+D	BB	1	32	02-11-20
33	MD4	L+D	BB	1	33	03-11-20
34	MD5	L+D	BB	1	34	04-11-20
35	Secure Hash Algorithm [SHA]	L+D	BB	1	35	05-11-20
36	Security of SHA	L+D	BB	1	36	07-11-20
37	One way hash functions using symmetric block algorithms	L+D, LCD	BB	1	37	12-11-20
38	Using public key algorithms	L+D	BB	1	38	17-11-20
39	Choosing a one-way hash functions	L+D	BB	1	39	18-11-20
40	Message Authentication Codes	L+D	BB	1	40	19-11-20
41	Digital Signature Algorithm	L+D	BB	1	41	23-11-20
42	Discrete Logarithm Signature Scheme	L+D	BB	1	42	24-11-20

<b>MODULE 4: Transport Level Security and Wireless Network Security</b>						
43	Transport Level Security	L+D, LCD	BB	1	43	25-11-20
44	Web Security Considerations	L+D	BB	1	44	26-11-20
45	Secure Sockets Layer	L+D	BB	1	45	30-11-20
46	SSL Architecture	L+D, PS	BB	1	46	01-12-2020
47	SSL Protocol Stack	L+D	BB	1	47	02-12-2020
48	Transport Layer Security	L+D, PS	BB	1	48	07-12-2020
49	HTTPS	L+D, LCD	BB	1	49	08-12-2020
50	Secure Shell (SSH)	L+D	BB	1	50	09-12-2020
51	Wireless Network Security	L+D	BB	1	51	10-12-2020
52	IEEE 802.11i Wireless LAN Security	L+D	BB	1	52	14-12-2020
<b>MODULE 5: E-mail Security and IP Security</b>						
53	E-mail Security	L+D, LCD	BB	1	53	15-12-2020
54	Pretty Good Privacy	L+D	BB	1	54	16-12-2020
55	PGP Cryptographic Functions	L+D, LCD	BB	1	55	17-12-2020
56	S/MIME	L+D	BB	1	56	21-12-2020
57	S/MIME Functionality	L+D	BB	1	57	22-12-2020
58	IP Security Overview	L+D	BB	1	58	23-12-2020
59	IPsec Services	L+D	BB	1	59	24-12-2020
60	IP Security Policy	L+D	BB	1	60	28-12-2020
61	Encapsulation Security Payload (ESP)	L+D	BB	1	61	29-12-2020
62	Transport and Tunnel Modes	L+D	BB	1	62	30-12-2020
63	Combining security Associations Internet Key Exchange	L+D	BB	1	63	31-12-2020
64	Internet Key Exchange	L+D	BB	1	64	02-01-2021
65	Cryptographic Suites	L+D	BB	1	65	15-01-2021



**Course in-Charge**



**HOD**



# K S INSTITUTE OF TECHNOLOGY, BANGALORE

## DEPARTMENT OF TELECOMMUNICATION ENGINEERING

NAME OF THE STAFF : Ms DEVIKA.B

SUBJECT CODE/NAME : 17TE72/ SATELLITE COMMUNICATION AND REMOTE SENSING

SEMESTER/YEAR : VII / IV

ACADEMIC YEAR : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1:Introduction</b>						
1	Introduction	online	Zoom platform	1	1	1/9/2020
2	Historical background	online	Zoom platform	1	2	3/9/2020
3	International space laws,	online	Zoom platform	1	3	4/9/2020
4	Advantages of space based observations,	online	Zoom platform	1	4	5/9/2020
5	Global coverage, Multiscale observation,	online	Zoom platform	1	5	7/9/2020
6	repeat observation immediate transmission and	online	Zoom platform	1	6	8/9/2020
7	digital format	online	Zoom platform	2	8	10/9/2020,11/9/2020
8	Source of information on remote sensing region.	online	Zoom platform	2	10	12/9/2020,14/9/2020

<b>MODULE 2: Principles of remote sensing</b>						
7	Fundamentals of remote sensing signals	online	Zoom platform	1	11	15/9/2020
8	The electromagnetic spectrum, Terms and units of measurements, EM Radiation laws	online	Zoom platform	1	12	18/9/2020
9	Spectral signature in the solar spectrum, vegetation reflectance, soil reflectance, water in the solar spectrum,	online	Zoom platform	2	14	19/9/2020,21/9/2020
10	The thermal infrared domain, characteristics of EM radiation in thermal infrared	online	Zoom platform	1	15	22/9/2020
11	Thermal properties of vegetation, Soils thermal domain	online	Zoom platform	1	16	24/9/2020
12	thermal signature of water and snow	online	Zoom platform	2	18	25/9/2020,26/9/2020
13	The microwave region	L+D	BB	1	18	1/10/2020
14	Atmospheric interaction	L+D, LW	BB	1	2020	3/10/2020
<b>MODULE 3: Sensors and remote sensing satellite</b>						
15	Type of sensors, Resolution of sensor systems, spatial, spectral, radiometric,	L+D	BB+LCD	1	2020	5/10/2020
16	temporal, angular - resolution, passive sensors, photographic cameras, cross and along track - scanners	L+D	BB+LCD	2	23	6/10/2020,8/10/2020
17	active sensors, Radar and Lidar, satellite remote missions, Satellite orbits,	L+D	BB	1	24	9/10/2020
18	Landsat programs, SPOT satellites, IRS program,	L+D	BB+LCD	1	25	12/10/2020
	High resolution commercial satellites,	L+D	BB+LCD	1	26	13/10/2020
	Polar orbiting meteorological satellites, Terra Aqua,	L+D	BB	2	28	15/10/2020,16/10/2020

2020	Geostationary meteorological satellites	L+D	BB+LCD	2	30	17/10/2020,19/10/2020
<b>MODULE 4: Basis for interpretations of remote sensing images</b>						
2020	Constraints in using remote sensing data, types of interpretation,	L+D	LCD	2	32	20/10/2020,22/10/2020
22	Costs of data acquisitions, end-user requirements,	L+D	BB+LCD	2	34	23/10/2020,24/10/2020
23	Thematic classification, Generation of biophysical variables,	L+D	BB	1	35	27/10/2020
24	Change detection,	L+D	BB	2	37	29/10/2020,5/11/2020
25	spatial patterns,	PS	BB	1	38	9/11/2020
26	organization of remote sensing project,	L+D	BB	1	39	10/11/2020
27	interpretation phase, presentation of study cases.	L+D, PS	BB	1	40	13/11/2020
<b>MODULE 5: Characteristic of photographic images</b>						
28	Characteristic of photographic images,	L+D	BB	2	42	14/11/2020,17/11/2020
29	Brightness, color, texture,	L+D	BB	2	44	19/11/2020,20/11/2020
30	spatial contexts, shadows	L+D	BB	1	45	21/11/2020
31	spatial patterns, shape and size, stereoscopic view,	L+D	BB	2	47	26/11/2020,27/11/2020
32	period of acquisition, elements of visual analysis,	L+D	BB	2	49	28/11/2020,1/12/2020
33	Geometric characteristics of satellite image,		BB	1	50	4/12/2020
34	Color composites, Multi-temporal approaches	L+D	BB	2	52	5/12/2020,14/12/2020
35	Revision	L+D	BB	1	53	15/12/2020
36	Revision	L+D	BB	1	54	17/12/2020



**Course in-charge**



**HOD/TE**





**K.S. INSTITUTE OF TECHNOLOGY, BANGALORE**  
**DEPARTMENT OF TELECOMMUNICATION ENGINEERING**

**NAME OF THE STAFF : DILEEP J**

**SUBJECT CODE/NAME : 17TE73/ CMOS VLSI DESIGN**

**SEMESTER/YEAR : VII / IV**

**ACADEMIC YEAR : 2020-2021**

Sl No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1: Introduction and Fabrication</b>						
1	A Brief History, MOS Transistors	L+D	LCD	1	1	01-09-2020
2	MOS Transistor Theory	L+D	LCD	1	2	4-09-2020
3	Ideal I-V Characteristics	L+D	LCD	1	3	5-09-2020
4	Non-ideal I-V Effects	L+D	LCD	1	4	7-09-2020
5	DC Transfer Characteristics	L+D	LCD	1	5	8-09-2020
6	nMOS Fabrication	L+D	LCD	1	6	12-09-2020
7	CMOS Fabrication	L+D	LCD	1	7	14-09-2020

8	P-well process	L+D	LCD	1	8	15-09-2020
9	N-well process	L+D	LCD	1	9	18-09-2020
10	Twin tub process	L+D	LCD	1	10	19-09-2020
11	BiCMOS Technology	L+D	LCD	1	11	21-09-2020
<b>MODULE 2: MOS and BiCMOS Circuit Design Processes</b>						
12	MOS Layers	L+D	LCD	1	12	22-09-2020
13	Stick Diagrams for NAND and NOR Gate	L+D	LCD	1	13	25-09-2020
14	Stick Diagrams for AND and OR Gate	L+D	LCD	1	14	26-09-2020
15	Design Rules and Layout	L+D	LCD	1	15	3-10-2020
16	Sheet Resistance	L+D	LCD	1	16	5-10-2020
17	Area Capacitances of Layers	L+D	LCD	1	17	6-10-2020
18	Standard Unit of Capacitance, Some Area Capacitance Calculations	L+D	LCD	1	18	9-10-2020
19	Delay Unit	L+D	LCD	1	19	10-10-2020
20	Inverter Delays	L+D	LCD	1	20	12-10-2020
21	Driving Large Capacitive Loads	L+D	LCD	1	21	13-10-2020



**MODULE 3: Scaling of MOS Circuits and Subsystem Design Process**

22	Scaling Models	L+D	LCD	1	22	16-10-2020
23	Scaling Factors for Device Parameters	L+D	LCD	1	23	17-10-2020
24	Subsystem Design Processes: Some General considerations	L+D	LCD	1	24	19-10-2020
25	An illustration of Design Processes	L+D	LCD	1	25	20-10-2020
26	Regularity, Design of an ALU Subsystem,	L+D	LCD	1	26	23-10-2020
27	The Manchester Carry-chain	L+D	LCD	1	27	24-10-2020
28	Adder Enhancement Techniques	L+D	LCD	1	28	27-10-2020

**MODULE 4: Subsystem Design and FPGA based systems**

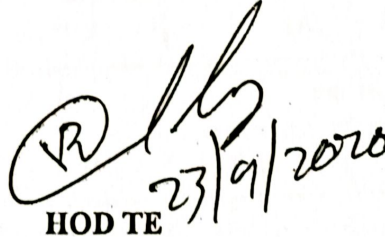
29	Some Architectural Issues	L+D	LCD	1	29	7-11-2020
30	Switch Logic, Gate (restoring) Logic	L+D	LCD	1	30	9-11-2020
31	Parity Generators, Multiplexers	L+D	LCD	1	31	10-11-2020
32	The Programmable Logic Array (PLA).	L+D	LCD	1	32	13-11-2020
33	Introduction to FPGA based systems	L+D	LCD	1	33	14-11-2020
34	Basic concepts of Digital design and FPGA's	L+D	LCD	1	34	17-11-2020
35	FPGA based System design	L+D	LCD	1	35	20-11-2020
36	FPGA architecture	L+D	LCD	1	36	21-11-2020
37	Physical design for FPGA's	L+D	LCD	1	37	23-11-2020

**MODULE 5: Memory, Registers and Aspects of system Timing**

38	System Timing Considerations	L+D	LCD	1	38	24-11-2020
39	Some commonly used Storage/Memory elements	L+D	LCD	1	39	27-11-2020
40	Testing and Verification: Introduction	L+D	LCD	1	40	28-11-2020
41	Logic Verification	L+D	LCD	1	41	30-11-2020
42	Logic Verification Principles	L+D	LCD	1	42	1-12-2020
43	Manufacturing Test Principles	L+D	LCD	1	43	4-12-2020
44	BIST	L+D	LCD	1	44	5-12-2020
45	Design for testability	L+D	LCD	1	45	14-12-2020
46	Revision-1	L+D	LCD	1	46	15-12-2020



Course In charge



HOD TE

**HEAD OF THE DEPARTMENT**  
Dept. of Telecommunication Engg  
K. S. Institute of Technology  
Bengaluru - 560 109



**K S INSTITUTE OF TECHNOLOGY BANGALORE-560109**  
**DEPARTMENT OF TELECOMMUNICATION ENGINEERING**

NAME OF THE STAFF : Mr. DINESH KUMAR D.S  
SUBJECT CODE/ NAME : 17EC741/ MULTIMEDIA COMMUNICATION  
SEMESTER/ YEAR : VII/ IV  
ACADEMIC YEAR : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1:Multimedia Communications</b>						
1	Introduction	L+D	BB	1	1	1-9-2020
2	Multimedia information representation	L+D	BB	1	2	3-9-2020
3	Multimedia networks-Telephone network, data network Broadcast television network	L+D	LCD	1	3	5-9-2020
4	ISDN and Broadband multiservice network		LCD+BB	1	4	7-9-2020
5	Multimedia applications-Interpersonal communication	L+D	LCD	1	5	8-9-2020
6	Interactive application over internet and entertainment application	L+D	LCD	1	6	10-9-2020
7	Application and network terminology-media types, communication modes	L+D	BB	1	7	12-9-2020
8	Network types	L+D	BB	1	8	14-9-2020
9	Network QOS, Application QOS	L+D	BB	2	10	15-9-2020 19-9-2020

**MODULE 2: Information Representation**

10	Introduction	L+D	BB	1	11	21-9-2020
11	Digitization principles	L+D	BB	2	13	22-9-2020 24-9-2020
12	Text	L+D	BB+LCD	1	14	26-9-2020
13	Images-graphics, digitized document	L+D	BB+LCD	1	15	28-9-2020
14	Images-digitized pictures	L+D	BB	1	17	29-9-2020
15	Audio	L+D	LCD	1	18	1-10-2020
16	Video-broadcast television	L+D	BB+LCD	1	19	3-10-2020
17	Digital video	L+D	LCD	2	20	8-10-2020 10-10-2020
<b>MODULE 3: Text and image compression, Distributed multimedia systems</b>						
18	Introduction, Compression principles	L+D	BB	1	21	12-10-2020
19	Text compression	L+D	BB	2	23	13-10-2020 15-10-2020
20	Image Compression	L+D	BB+LCD	2	25	17-10-2020 19-10-2020
21	Main Features of a DMS	L+D	BB	1	26	20-10-2020
22	Resource management of DMS	L+D	BB	2	28	22-10-2020 24-10-2020
23	Networking	L+D	BB	1	29	27-10-2020
24	Multimedia operating systems	L+D	BB	1	30	29-10-2020

<b>MODULE 4: Audio and video compression</b>						
25	Introduction,DPCM,ADPCM,Code exited LPC	L+D	,LCD	2	32	5-11-2020 7-11-2020
26	MPEG audio coders,Dolby audio coders	L+D	LCD	2	34	9-11-2020 10-11-2020
27	Video compression-principles,H261,H263	L+D	BB+LCD	2	36	12-11-2020 14-11-2020
28	MPEG,MPEG-1	L+D	BB	2	38	17-11-2020 19-11-2020
29	MPEG-2,MPEG-4	L+D	BB	2	40	21-11-2020 23-11-2020
<b>MODULE 5: Multimedia Communication Across Networks</b>						
30	Packet audio/video in the network environment	L+D	BB	2	42	24-11-2020 26-11-2020
31	Video transport across generic networks	L+D	BB	2	44	28-11-2020 30-11-2020
32	Multimedia Transport across ATM Networks	L+D	BB	3	47	1-12-2020 5-12-2020 14-12-2020
33	Revision of previous year question papers with solution	L+D	BB	2	49	15-12-2020 17-12-2020

*Dinesh*

Signature of Course Incharge

*(VA) [Signature]*

Signature of HOD  
HEAD OF THE DEPARTMENT  
Dept. of Telecommunication Engg  
K. S. Institute of Technology  
Bengaluru - 560 109



# K S INSTITUTE OF TECHNOLOGY, BANGALORE-109

## DEPARTMENT OF TELECOMMUNICATION ENGINEERING

**NAME OF THE STAFF** : Dr.Rekha N  
**SUBJECT CODE/NAME** : 17EC752/ IoT and Wireless Sensor Networks  
**SEMESTER/YEAR** : VII / IV  
**ACADEMIC YEAR** : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1: Overview of Wireless Sensor Networks</b>						
1	Overview of Wireless Sensor Networks	L+D	LCD	1	1	01/09/2020
2	Challenges for Wireless Sensor Networks,	L+D	BB	1	2	03/09/2020
3	Enabling Technologies for Wireless Sensor Networks.	L+ D	BB	1	3	04/09/2020
4	Single-Node Architecture	L+D	LCD+BB	1	4	05/09/2020
5	Hardware Components	L+D	LCD+BB	1	5	08/09/2020
6	Energy Consumption of Sensor Nodes	L+D	LCD+BB	1	6	10/09/2020
7	Operating Systems and Execution Environments,	L+ D	LCD+BB	1	7	11/09/2020
8	Network Architecture-Sensor Network Scenarios,	L+D	BB	1	8	12/09/2020
9	Optimization Goals and Figures of Merit,	L+D	BB	1	9	15/09/2020
10	Design principles for WSNs,	L+D	BB	1	10	18/09/2020
11	Service interfaces of WSNs Gateway Concepts	L+D	BB	1	11	19/09/2020
<b>MODULE 2: Communication Protocols</b>						
12	Communication Protocols	L+ D	BB	1	12	22/09/2020
13	Physical Layer and Transceiver Design Considerations,	L+D	BB	1	13	24/09/2020
14	MAC Protocols for Wireless Sensor Networks,	L+D	BB	1	14	25/09/2020
15	Low Duty Cycle Protocols	L+D	BB	1	15	26/09/2020
16	Wakeup Concepts			1	16	29/09/2020

17	The Mediation Device Protocol, S-MAC ,	L+D	BB+LCD	1	17	01/10/2020
18	Wakeup Radio Concepts,	L+D	BB+LCD	1	18	03/10/2020
19	Contention based protocols(CSMA,PAMAS),	L+D, PS	BB	1	19	08/10/2020
20	Schedule based protocols (LEACH, SMACS, TRAMA)	L+D, PS	BB	1	20	09/10/2020
21	Address and Name Management in WSNs,	L+D, PS	BB	1	21	10/10/2020
22	Assignment of MAC Addresses,	L+D, PS	BB	1	22	13/10/2020
23	Routing Protocols&Energy-Efficient Routing,	L+D, PS	BB	1	23	15/10/2020
24	Geographic Routing,	L+D	BB	1	24	16/10/2020
25	Hierarchical networks by clustering.	L+D	BB	1	25	17/10/2020
<b>MODULE 3: Overview of Internet of Things</b>						
26	Overview of Internet of Things:			1	26	20/10/2020
27	IoT Conceptual Framework,	L+D	BB	1	27	22/10/2020
28	IoT Architectural View,	L+D	BB	1	28	23/10/2020
29	Technology Behind IoT, Sources of IoT	L+D	BB	1	29	24/10/2020
30	Examples of IoT.	L+D	BB	1	30	27/10/2020
31	M2M communication,	L+D	BB	1	31	29/10/2020
32	Data enrichment	L+D	BB	1	32	05/11/2020
33	Data Consolidation			1	33	06/11/2020
34	Modified OSI Model for the IoT/M2M Systems,	L+D	BB	1	34	07/11/2020
35	data consolidation and device management at IoT/M2M Gateway,	L+D	BB	1	35	10/11/2020
36	web communication protocols used by connected IoT/M2M devices,	L+D	BB	1	36	12/11/2020
37	Message communication protocols (CoAP-SMS, CoAP-MQ, MQTT, XMPP) for IoT/M2M devices	L+D, PS	BB	1	37	13/11/2020
<b>MODULE 4: Architecture and Design Principles for IoT</b>						
38	Architecture and Design Principles for IoT	L+D	BB	2	38	14/11/2020
39	Internet connectivity,	L+D	LCD	1	39	17/11/2020
40	Internet-based communication,	L+D	BB	1	40	19/11/2020
41	IPv4, IPv6, 6LoWPAN protocol	L+D	BB	1	41	20/11/2020
42	IP Addressing in the IoT,	PS	BB	1	42	21/11/2020
43	Application layer protocols: HTTP, HTTPS, FTP, TELNET and ports.	L+D	BB	1	43	24/11/2020
44	Data Collection,	L+D	BB	1	44	26/11/2020
45	Storage and Computing using a Cloud Platform	L+D	BB	1	45	27/11/2020

<b>MODULE 5: IoT Cloud- based data collection</b>						
46	IoT Cloud- based data collection, storage and computing services using Nimbits.	L+D	BB	1	46	28/11/2020
47	Prototyping and Designing Software for IoT Applications	L+D	BB	1	47	01/12/2020
48	Prototyping Embedded device software and IDE	L+D	LCD	1	48	04/12/2020
49	Reading data from sensors and devices, gateways	L+D	BB+LCD	1	49	05/12/2020
50	Internet and Web/Cloud services software development.	L+D	BB	1	50	10/12/2020
51	Programing MQTT clients and server	L+D	BB	1	51	11/12/2020
52	IOT privacy and security	LCD	BB	1	52	12/12/2020
53	Revision	LCD	BB	1	53	15/12/2020
54	Revision	LCD	BB	1	54	17/12/2020

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**Course In charge**

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## KS INSTITUTE OF TECHNOLOGY, BANGALORE

### DEPARTMENT OF TELECOMMUNICATION ENGINEERING

NAME OF THE STAFF : Mr. Satish Kumar B

SUBJECT CODE/NAME : 17EC81/ WIRELESS CELLULAR AND LTE 4G BROADBAND

SEMESTER/YEAR : VIII/IV

ACADEMIC YEAR : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1 : Key Enablers for LTE features</b>						
1	<b>Key Enablers for LTE features:</b> OFDM, Single carrier FDMA.	L+D	BB	1	1	19/04/21
2	Single carrier FDE	L+D	BB	1	2	20/04/21
3	Channel Dependent Multiuser Resource Scheduling	L+D	BB	1	3	21/04/21
4	Multi antenna Techniques, IP based Flat network Architecture.	L+D	BB	1	4	21/04/21
5	LTE Network Architecture.	L+D	BB	1	5	26/04/21
6	<b>Wireless Fundamentals:</b> Cellular concept,	L+D	BB	1	6	27/04/21
7	Fading in BWC	L+D	BB	1	7	28/04/21
8	Broadband wireless channel (BWC).	L+D	BB	1	8	28/04/21
9	Modeling BWC	L+D	BB	1	9	03/05/2021
10	Empirical and Statistical models.	L+D	BB	1	10	04/05/2021
11	Mitigation of Narrow band and Broadband Fading.	L+D	BB	1	11	05/05/2021
<b>MODULE 2 : Multicarrier Modulation</b>						

12	<b>Multicarrier Modulation: OFDM basics, OFDM in LTE.</b>	L+D	BB	1	12	05/05/2021
13	Timing and Frequency Synchronization.	L+D	BB	1	13	10/05/2021
14	PAR, SC-FDE.	L+D	BB	1	14	11/05/2021
15	<b>OFDMA and SC-FDMA: OFDM with FDMA.</b>	L+D	BB	1	15	12/05/2021
16	TDMA, CDMA, OFDMA, SC-FDMA.	L+D	BB	1	16	12/05/2021
17	OFDMA and SC-FDMA in LTE	L+D	BB	1	17	17/05/2021
18	<b>Multiple Antenna Transmission and Reception: Spatial Diversity overview, Receive Diversity.</b>	L+D	BB	1	18	18/05/2021
19	Transmit Diversity, Interference cancellation and signal enhancement.	L+D	BB	1	19	19/05/2021
20	Spatial Multiplexing, Choice between Diversity.	L+D	BB	1	20	19/05/2021
21	Interference suppression	L+D	BB	1	21	31/05/2021
22	Spatial Multiplexing	L+D	BB	1	22	01/06/2021
<b>MODULE 3: Overview and Channel Structure of LTE</b>						
23	<b>Overview and Channel Structure of LTE: Introduction to LTE</b>	L+D	BB	1	23	02/06/2021
24	Channel Structure of LTE	L+D	BB	1	24	02/06/2021
25	Downlink OFDMA Radio Resource	L+D	BB	1	25	07/06/2021
26	Uplink SC	L+D	BB	1	26	08/06/2021
27	FDMA Radio Resource	L+D	BB	1	27	09/06/2021
28	<b>Downlink Transport Channel Processing: Overview</b>	L+D	BB	1	28	09/06/2021
29	Downlink shared channels	L+D	BB	1	29	14/06/2021
30	Downlink Control Channels	L+D	BB	1	30	15/06/2021

31	Broadcast channels, Multicast channels.	L+D	BB	1	31	16/06/2021
32	Downlink physical channels	L+D	BB	1	32	16/06/2021
33	H-ARQ on Downlink	L+D	BB	1	33	21/06/2021
<b>MODULE 4 : Uplink Channel Transport Processing</b>						
34	<b>Uplink Channel Transport Processing:</b> Overview, Uplink shared channels.	L+D	BB	1	34	22/06/2021
35	Uplink Control Information, Uplink Reference signals.	L+D	BB	1	35	23/06/2021
36	Random Access Channels, H-ARQ on uplink.	L+D	BB	1	36	23/06/2021
37	<b>Physical Layer Procedures:</b> Hybrid – ARQ procedures, Channel Quality Indicator CQI feedback.	L+D	BB	1	37	05/07/2021
38	Precoder for closed loop MIMO Operations,.	L+D	BB	1	38	06/07/2021
39	Uplink channel sounding	L+D	BB	1	39	07/07/2021
40	Buffer status Reporting in uplink,	L+D	BB	1	40	07/07/2021
41	Scheduling and Resource Allocation.	L+D	BB	1	41	
42	Cell Search, Random Access Procedures,	L+D	BB	1	42	
43	Power Control in uplink.	L+D	BB	1	43	
<b>MODULE 5 : Radio Resource Management and Mobility Management</b>						
44	<b>Radio Resource Management and Mobility Management:</b> PDCP overview	L+D	BB	1	44	12/07/2021
45	Inter cell	L+D	BB	1	45	13/07/2021
46	Interference Coordination	L+D	BB	1	46	14/07/2021

47	MAC/RLC overview	L+D	BB	1	47	14/07/2021
48	RRC overview.	L+D	BB	1	48	19/07/2021
49	Mobility Management.	L+D	BB	1	49	20/07/2021
50	Interference Coordination.	L+D	BB	1	50	26/07/2021
51	Revision	L+D	BB	1	51	27/07/2021

  
Course In charge

  
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**INSTITUTE OF TECHNOLOGY, BENGALURU – 560109**  
**DEPARTMENT OF TELECOMMUNICATION ENGINEERING**

**LESSON PLAN**

NAME OF THE STAFF : Mr. DINESH KUMAR D S  
SUBJECT CODE/NAME : 17EC82/FIBER OPTICS AND NETWORKS  
SEMESTER/YEAR : VIII/IV  
ACADEMIC YEAR : 2020-2021

Sl. No	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1: Developments of telecommunications</b>						
1	<b>Module 1: Optical fiber Communications:</b> Historical development, The general system	L+D	BB+LCD	1	1	19/4/2021
2	Advantages of optical fiber communication, Optical fiber waveguides: Ray theory transmission	L+D	BB+LCD	1	2	19/4/2021
3	Modes in planar guide.	L+D	BB+LCD	1	3	20/4/2021
4	Phase and group velocity	L+D	BB+LCD	1	4	21/4/2021
5	Tutorial	L+D	BB	1	5	24/4/2021
6	Cylindrical fiber: Modes, Step index fibers	L+D	BB+LCD	1	6	26/4/2021
7	Graded index fibers, Single mode fibers	L+D	BB+LCD	1	7	26/4/2021
8	Cutoff wavelength, Mode field diameter	L+D	BB+LCD	1	8	27/4/2021
9	Effective refractive index	L+D	BB+LCD	1	9	28/4/2021

10	Fiber Materials, Photonic crystal fibers.	L+D	BB+LCD	1	10	3/5/2021
<b>MODULE 2: Transmission characteristics of optical fiber:</b>						
11	Attenuation, Material absorption losses	L+D	BB+LCD	1	11	3/5/2021
12	Linear scattering losses	L+D	BB	1	12	4/5/2021
13	Nonlinear scattering losses	L+D	BB	1	13	5/5/2021
14	Fiber bend loss, Dispersion	L+D	BB	1	14	8/5/2021
15	Chromatic dispersion	L+D	BB	1	15	10/5/2021
16	Intermodal dispersion: Multimode step index fiber.	L+D	BB	1	16	10/5/2021
17	Expression for pulse delay	L+D	BB	1	17	11/5/2021
18	<b>Optical Fiber Connectors:</b> Fiber alignment and joint loss	L+D	BB	1	18	12/5/2021
19	Fiber splices, Fiber connectors	L+D	BB	1	19	17/5/2021
20	Fiber couplers	L+D	BB	1	20	17/5/2021
<b>MODULE 3: Optical sources</b>						
21	<b>Optical sources:</b> Energy Bands, Direct and Indirect Bandgaps	L+D	BB	1	21	18/5/2021
22	Light Emitting diodes: LED Structures	L+D	BB	1	22	19/5/2021
23	Light Source Materials, Quantum Efficiency and LED Power			1	23	22/5/2020
24	Modulation. Laser Diodes: Modes and Threshold conditions	L+D	BB	1	24	31/5/2021
25	Rate equation, External Quantum Efficiency, Resonant frequencies,	L+D	BB	1	25	31/5/2021
26	Laser Diode structures and Radiation Patterns: Single mode lasers.	L+D	BB	1	26	1/6/2021
27	<b>Photodetectors:</b> Physical principles of Photodiodes,	L+D	BB	1	27	2/6/2021
28	Working of PIN photo diode	L+D	BB	1	28	5/6/2021

29	Working of avalanche photodiode	L+D	BB	1	29	7/6/2021
30	Photodetector noise, Detector response time.	L+D	BB	1	30	7/6/2021
31	<b>Optical Receiver:</b> Optical Receiver Operation, Error sources	L+D	BB	1	31	8/6/2021
32	Front End Amplifiers, Receiver sensitivity, Quantum Limit.	L+D	BB	1	32	9/6/2021
<b>MODULE 4: WDM Concepts and Components</b>						
33	Overview of WDM: Operational Principles of WDM	L+D	LCD	1	33	14/6/2021
34	WDM standards, Mach-Zehnder Interferometer Multiplexers	L+D	LCD	1	34	14/6/2021
35	Isolators and Circulators	L+D	BB	1	35	15/6/2021
36	Fiber grating filters, Dielectric Thin-Film Filters	L+D	BB	1	36	16/6/2021
37	Diffraction Gratings, Active Optical Components	L+D	BB	1	37	19/6/2021
38	Tunable light sources	L+D	BB	1	38	19/6/2021
39	<b>Optical amplifiers:</b> Basic application and Types	L+D	BB	1	39	21/6/2021
40	Semiconductor optical amplifiers, Erbium Doped Fiber Amplifiers	L+D	BB	1	40	21/6/2021
41	Raman Amplifiers, Wideband Optical Amplifiers.	L+D	BB	1	41	22/6/2021
42	Diffraction Gratings, Active Optical Components	L+D	BB	1	42	23/6/2021
<b>MODULE 5: Optical Networks</b>						
43	Optical network evolution and concepts:Optical networking terminology	L+D	BB	1	43	5/7/2021
44	Optical network node and switching elements, Wavelength division multiplexed networks	L+D	BB	1	44	5/7/2021
45	Public telecommunication network overview. Optical network transmission modes, layers and protocols	L+D	BB	1	45	6/7/2021

46	Synchronous networks, Asynchronous transfer mode, OSI reference model	L+D	BB	1	46	7/7/2021
47	Optical transport network, Internet protocol,	L+D	BB	1	47	12/7/2021
48	Wavelengthroutng networks: Routing and wavelength assignment	L+D	BB	1	48	12/7/2021
49	OpticalSwitching networks: Optical circuit switched networks, packetswitched networks,	L+D	BB	1	49	13/7/2021
50	Optical network deployment: Long-haul networks,	L+D	BB	1	50	14/7/2021
51	Metropolitan area networks	L+D	BB	1	51	19/7/2021
52	Multiprotocol Label Switching, Optical burst switching networks	L+D	BB	1	52	19/7/2021
53	Revision	L+D	BB	1	53	20/7/2021
54	Revision	L+D	BB	1	54	26/7/2021
55	Revision	L+D	BB	1	55	27/7/2021

**Total No. of Lecture Hours = 48**

**Total No. of Tutorial Hours = 04**

**Total No. of Revision Hours =03**

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Course in charge

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# K S INSTITUTE OF TECHNOLOGY BANGALORE

## DEPARTMENT OF TELECOMMUNICATION ENGINEERING

NAME OF THE STAFF : Dr. Rekha N

SUBJECT CODE/NAME : 17EC834/ MACHINE LEARNING

SEMESTER/YEAR/SEC : VIII/ IV

ACADEMIC YEAR : 2020-2021

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date
<b>MODULE 1:Introduction</b>						
1	Introduction	L+D	BB	1	1	19/04/2021
2	Designing a Learning system	L+ D	BB	1	2	20/04/2021
3	Perspective and Issues in Machine Learning	L+ D	BB	1	3	20/04/2021
4	Concept Learning Introduction	L+D	BB	1	4	21/04/2021
5	Concept learning task, Concept learning as search	L+D	BB	1	5	26/04/2021
6	Find-S algorithm	L+D	LCD	1	6	27/04/2021
7	Version space, Candidate Elimination algorithm	L+ D	BB	1	7	27/04/2021
8	Inductive Bias.	L+ D	BB	1	8	28/04/2021
9	Review	L+D	BB	1	9	03/05/2021
<b>MODULE 2:Decision Tree Learning</b>						
10	Decision tree representation	L+D	BB	1	10	04/05/2021
11	Appropriate problems for decision tree learning	L+ D	BB	1	11	04/05/2021
12	Basic decision tree learning algorithm	L+ D	LCD	1	12	05/05/2021
13	hypothesis space search	L+D	BB	1	13	10/05/2021
14	Inductive bias in decision tree learning	L+D	BB	2	15	11/05/2021

15	Issues in decision tree learning.	L+D	BB	1	16	12/5/2021
16	Review, and problem solving	L+ D	BB	1	17	17/5/2021
17	problem solving	L+D,PS	BB	1	18	18/5/2021
18	problem solving	L+D,PS	BB	1	19	18/5/2021
19	problem solving	L+D,PS	BB	1	20	19/5/2021
<b>MODULE 3:Artificial Neural Network</b>						
20	Introduction, Neural Network representation	L+D	BB	1	21	31/5/2021
21	Appropriate problems, Perceptrons-representation	L+D	BB	1	22	1/6/2021
22	Perceptrons - Training Rules, Gradient Descent, Delta Rule	L+D	BB	1	23	1/6/2021
23	Back propagation algorithm	L+D,PS	LCD	3	26	2/6/2021 7/6/2021 8/6/2021
24	Review and Exercises	L+D,PS	BB	1	27	8/6/2021
<b>MODULE 4: Bayesian Learning</b>						
25	Introduction, Bayes theorem	L+D	BB	1	28	9/6/2021
26	Bayes theorem and concept learning	L+ D	BB	1	29	14/6/2021
27	ML and LS error hypothesis, ML for predicting probabilities	L+ D	BB	1	30	15/6/2021
28	Minimum Description Length principle	L+D	BB	1	31	15/6/2021
29	Bayes optimal Classifier, Gibbs Algorithm	L+D	BB	1	32	16/6/2021
30	Naive Bayes classifier- Classify text	L+D	LCD	1	33	21/6/2021
31	Bayesian belief networks	L+ D	BB	1	34	22/6/2021
32	Bayesian belief networks - Gradient Descent	L+ D	BB	1	35	22/6/2021
33	EM algorithm	L+ D	BB	1	36	23/6/2021
34	EM algorithm	L+D,PS	BB	1	37	5/7/2021
35	Review and Exercises	L+D,PS	BB	1	38	6/7/2021
<b>MODULE 5: Evaluating Hypothesis,Instance Based Learning, Reinforcement Learning</b>						
36	Motivation, Estimating hypothesis accuracy	L+D	BB	1	39	6/7/2021
37	Basics of sampling theorem	L+ D	BB	1	40	7/7/2021
38	General approach for deriving confidence intervals, Difference in error of two hypothesis	L+ D	BB	1	41	12/7/2021
39	Comparing learning algorithms	L+D	BB	1	42	13/7/2021
40	Instance Based Learning: Introduction, k-nearest neighbor learning	L+D	BB	1	43	13/7/2021
41	locally weighted regression	L+D	BB	1	44	14/7/2021
42	Radial basis function, Cased-based reasoning,	L+ D	BB	1	45	19/7/2021

43	Reinforcement Learning: Introduction, Learning Task	L+ D	BB	1	46	20/7/2021
44	Q Learning - Q function	L+D	LCD	1	47	20/7/2021
45	Q Learning - Convergence and experimentation strategies	L+I,PS	LCD	1	48	26/7/2021
46	Discussions	L+D	BB	1	49	27/7/2021
47	Review and Exercises	L+D,PS	BB	2	51	27/7/2021 28/7/2021

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