Department of Electronics & Communication Engg.

LESSON PLAN

Session: Feb –June, 2023

Semester: 6th

Name:_____

University Roll Number: _____

BUDDHA INSTITUTE OF TECHNOLOGY

CL-1 Sector - 7, GIDA, Gorakhpur - 273209 (U.P)

Phones : (0551) 2580413-415

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TIME TABLE

Day / Time	9:05-10:00 AM	10:00-10:55 AM	BREAK	11:10-12:05 PM	12:05-01:00 PM	01:00-1:55 PM	LUNCH BREAK	2:40-3:35 PM	3:35-4:30 PM
Monday									
Tuesday									
Wednesday									
Thursday									
Friday									
Saturday									

EVALUATION SCHEME

Subject Code	Subject	Sessional Marks	Exam Marks	Total Marks
THEORY SUBJECTS				
KEC601	DIGITAL COMMUNICATION	50	100	150
KEC602	CONTROL SYSTEM	50	100	150
KEC603	ANTENNA AND WAVE PROPAGATION	50	100	150
KOE062	EMBEDDED SYSTEM	50	100	150
KEC062	SATELLITE COMMUNICATION	50	100	150
KNC601	CONSTITUTION OF INDIA	50	--	--
PRACTICAL/DESIGN/DRAWING				
KEC651	DIGITAL COMMUNICATION LAB	25	25	50
KEC652	CONTROL SYSTEM LAB	25	25	50
KEC653C	MICROCONTROLLERS & EMBEDDED SYSTEM LAB	25	25	50

Buddha Institute of Technology

Gorakhpur

Department of Electronics & Communication Engineering

ALLOTTMENT BASED ON COMPETENCY SKILLS

Academic Session: Jan– June 2023

Name of the Staff	Mr. Sandeep Singh
Area of Specialization	Digital Communication
Subject Allotted	Digital Communication

Sl. #	Course Code	Course Title	Semester	Theory/Lab
1	KEC 601	Digital Communication	VI A	Theory
2	KEC 601	Digital Communication	VI B	Theory
3	KEC 651	Digital Communication Lab	VI A	Lab
4	KEC 651	Digital Communication Lab	VI B	Lab

HOD

Program	: B.Tech
Branch	: ECE
Semester	: VI
Session	: 2022-23
Name of the Course	: Digital Communication
Code	: KEC 601
Name of the Course Instructor	: Mr. Sandeep Singh
Designation	: Assistant Professor
Department	: Electronics & Communication Engineering

Course Outcome and Programme Outcome

Description of the Course Outcome:

CO	After completion of the course students will be able to:
KEC-601.1	To interpret the basic statistics involved in communication theory.
KEC-601.2	To demonstrate the concepts involved in digital communication system.
KEC-601.3	To explain the concepts of digital modulation schemes.
KEC-601.4	To analyze the performance of digital communication systems.
KEC-601.5	To apply the concept of information theory in digital communication systems.

Buddha Institute of Technology, Gorakhpur				
Department: Electronics & Communication Engineering				
Academic Semester: Jan.-June 2023				
Semester: VI	Section: A+B	Course Code: KEC 601	Course: Digital Communication	
Course Instructor: Sandeep Singh		Contact Hours /week: 4+1	# of credits: 4	
CIE Marks: 50		SEE Marks: 100	Exam Hours: 3	

Prerequisites if any:			
Code No	Course Name	Description	Semester
KEC 601	Digital Communication	Basic knowledge of analog communication schemes, AWGN channel, Probability theory	VI

Content delivery:	Chalk & Board, PPT

COURSE SYLLABUS:

Module No	Contents of Module	Hrs	COs
1	**Random Variables:** Concept of Probability, Random variables, Statistical averages, Random process, Power Spectral Density & Autocorrelation Function of Random Processes, Gaussian Random Process.	8	KEC-601.1
2	**Digital Communication Basics:**Introduction to Digital communication systems, PSD of Line Coding schemes, Pulse shaping, Scrambling, Eye diagram, Gram-Schmidt orthogonalization scheme.	8	KEC-601.2
3	**Digital Modulation:** Modulation and Demodulation of Digital modulation schemes-ASK, FSK, PSK, DPSK, QPSK. Constellation diagram, Introduction to M-ary communication.	8	KEC-601.3
4	**Digital Receiver:** Optimum threshold detection, Concept of Matched Filters, BER analysis of BASK, BFSK, BPSK, Introduction of Spread spectrum communication (DS-SS, FH-SS).	8	KEC-601.4
5	**Information Theory:** Measure of information-information, entropy, mutualinformation, mutual entropy, Source encoding (Shannon-Fano, Huffman),Shannon's channel capacity theorem, Introduction to error correction and detection, Linear block codes, Cyclic codes (systematic, non-systematic),Convolution coding and decoding.	8	KEC-601.5

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

KEC-601.1	To interpret the basic statistics involved in communication theory.
KEC-601.2	To demonstrate the concepts involved in digital communication system.
KEC-601.3	To explain the concepts of digital modulation schemes.
KEC-601.4	To analyze the performance of digital communication systems.
KEC-601.5	To apply the concept of information theory in digital communication systems.

Mapping of CO v/s PO:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
KEC-601.1	3	3	2	3	3	-	-	-	-	3	-	3
KEC-601.2	2	2	3	3	3	-	-	-	-	-	-	3
KEC-601.3	3	2	2	3	2	-	-	-	-	-	-	2
KEC-601.4	2	3	3	2	2	-	-	-	-	3	-	3
KEC-601.5	2	3	3	3	2	-	-	-	-	3	-	3
Average	***2.4***	***2.6***	***2.6***	***2.8***	***2.4***	***0.0***	***0.0***	***0.0***	***0.0***	***3.0***	***0.0***	***2.8***

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Mapping of CO v/s PSO:

CO	PSO1	PSO2	PSO3
KEC-601.1	1	-	2
KEC-601.2	2	2	2
KEC-601.3	-	2	2
KEC-601.4	3	3	2
KEC-601.5	3	3	2
Average	***2.3***	***2.5***	***2.0***

Gap in the syllabus	NA

Topics to be covered beyond syllabus	NA

Assessment Methodologies:

Sl. No.	Description	Type
1	Student Assignment	Direct
2	Internal assessment	Direct
3	University exam	Direct
4	Student feedback	Indirect
5	Alumni feedback	Indirect
6	Employers feedback	Indirect

LESSON PLAN

Lecture #	Module#	Topics	RBT Levels	Course Outcome Mapping	Planned Date	Actual Date	References	Faculty Sign	Remarks
1	1	Random Variables	L2	CO 1	13/2/23		TI		
2		Concept of Probability			14/2/23		TI		
3		Types of Random variables			15/2/23		TI		
4		Statistical averages			16/2/23		TI		
5		**Tutorial**			17/2/23		TI		
6		Random process			20/2/23				
7		Power Spectral Density			21/2/23		TI		
8		Autocorrelation Function of Random Processes			22/2/23		TI		
9		Autocorrelation Function of Random Processes			23/2/23		TI		
10		**Tutorial**			24/2/23		TI		
11		Gaussian Random Process			27/2/23		TI		
12	5	Information Theory	L 3	CO 2	28/2/23		TI		
13		Measure of information-information, entropy			1/3/23		TI		
14		Mutual information, mutual entropy			2/3/23		TI		
15		**Tutorial**			2/3/23				
16		Source encoding (Shannon-Fano, Huffman)			6/3/23		TI		
17		Shannon-Fano			10/3/23		TI		
18		Shannon's channel capacity theorem			13/3/23		TI		
19		Introduction to error correction and detection			14/3/23		TI		
20		**Tutorial**			15/3/23		TI		
21		Linear block codes			16/3/23		TI		
22		Cyclic codes (systematic, non-			17/3/23		TI		

		systematic),							
23		Convolution coding and decoding			23/3/23		TI		
24		Numericals			24/3/23		TI		
25		**Tutorial**			27/3/23		TI		
26	**2**	Digital Communication	**L2**	**CO 3**	28/3/23		TI		
27		Digital Communication Basics			29/3/23		TI		
28		Introduction to Digital communication systems			31/3/23		TI		
29		PSD of Line Coding schemes			3/4/23		TI		
30		**Tutorial**			4/4/23		TI		
31		Pulse shaping			4/4/23		TI		
32		Scrambling			10/4/23		TI		
33		Eye diagram			11/4/23		TI		
34		Gram-Schmidt orthogonalization scheme			12/4/23		TI		
35		**Tutorial**			13/4/23		TI		
36	**3**	Modulation and Demodulation of Digital modulation schemes	**L 3**	**CO 4**	14/4/23		TI		
37		ASK			17/4/23		TI		
38		FSK			18/4/23		TI		
39		PSK			19/4/23		TI		
40		**Tutorial**			20/4/23		TI		
41		DPSK			21/4/23		TI		
42		QPSK			24/4/23		TI		
43		Constellation diagram,			25/4/23		TI		
44		Introduction to M-ary communication. schemes			26/4/23		TI		
45		**Tutorial**			27/4/23		TI		
46	**4**	Digital Receiver	**L 2**	**CO 5**	28/4/23		TI		
47		Optimum threshold detection			4/5/23		TI		
48		BER analysis of BASK			5/5/23		TI		
49		BER analysis of BFSK			8/5/23		TI		

50		**Tutorial**			9/5/23		TI		
51		BER analysis of BPSK			10/5/23		TI		
52		Introduction of Spread spectrum communication (DS-SS)			11/5/23		TI		
53		FH-SS			12/5/23		TI		
54		Numericals			15/5/23		TI		
55		**Tutorial**			16/5/23		TI		
56		Numericals			17/5/23		TI		
57		Numericals			18/5/23		TI		
58		Numericals			19/5/23		TI		
59		Numericals			22/5/23		TI		
60		Numericals			23/5/23		TI		
61		Numericals			24/5/23		TI		
62		Numericals			25/5/23		TI		
63		Revision			26/5/23		TI		
64		Revision			29/5/23		TI		
65		Revision			30/5/23		TI		
66		Revision			31/5/23		TI		
67		Revision			1/6/23		TI		
68		Revision			2/6/23		TI		

***L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating**

Syllabus for Sessional:

Sessional	Syllabus
CT1	Class# 1-16
CT2	Class# 17-38
Pre - AKTU	Full Syllabus

Literature:

Text Books

1. B.P. Lathi, "Modern Digital and Analog communication Systems", 4th Edition, Oxford University Press, 2010.
2. Dr. Sanjay Sharma, "Digital Communications", 8th Edition, S.K. Kataria and Sons.

Reference Books

1. H. Taub, D L Schilling, Gautam Saha, "Principles of Communication", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd.
2. John G. Proakis, "Digital Communications", 4th Edition, McGraw-Hill International.
3. Simon Haykin, "Communication Systems", 4th Edition, Wiley India.
4. J.S. Chitode, "Digital Communications", Technical Publications.

Sample Questions:

Question No.	Questions
1	Why do we prefer digital communication over analog communication?
2	Find the PSD of ON OFF signaling and discuss its advantages/disadvantages.
3	What is the use of PDF and CDF?
4	Represent 100111010 using following digital data format (1) Polar RZ (2) Bipolar NRZ (3) AMI NRZ (4) Split Phase Manchester (5) On-Off
5	How the detection of differentially coherent FSK is done?
6	Explain the concept of M-ary communication with suitable examples.
7	A signal m (t) band-limited to 3 kHz is sampled at a rate 33.33% higher than the Nyquist rate. The maximum acceptable error in the sample amplitude is 0.5% of the peak amplitude mp. The quantized samples are binary coded. Find the minimum bandwidth of a channel required to transmit the encoded binary signal. If 24 such signals are time-division multiplexed, determine the minimum transmission bandwidth required to transmit the multiplexed signal.
8	Explain the matched filter and correlation receiver for optimum threshold detection.
9	Compare the probability of error in BASK and BPSK.
10	In an experiment a trial consists of four successive with draw of playing cards from a pack of 52 cards. If we define RV X as number of king appearing in a trial. Find Fx(x)
11	How does a CDMA and FDMA system works?
12	Consider a frequency shift keying system with sine pulses. What is the minimum frequency spacing required?
13	Consider an M ary PAM constellation with symbol spacing Δ. What is the average symbol energy?
14	How is the power spectrum of random signal evaluated?
15	Consider X(t) to be white Gaussian noise with zero mean and autocorrelation function ή/2 Δ(t). It is passed through an LTI system whose impulse response is h (t) =2Bsinc(2Bt). What is the power of output random process Y(t)?

16	Explain the working of frequency hopping spread spectrum system. Discuss its Applications in detail. A slow FH/MFSK system has following parameters: (i) The number of bits per MFSK symbol = 4 (ii) The number of MFSK symbols per hop = 5 (iii) Calculate the processing gain of the system in decibels.
17	With the help of block diagram, explain QPSK coherent digital carrier system. Sketch the QPSK waveform for the sequence 1101010010, assuming the carrier frequency to be equal to the bit rate.
18	A source emits seven messages with probabilities 1/3, 1/3, 1/9, 1/9, 1/9, 1/27 and 1/27 respectively. Find the entropy of the source and compact binary code and also find the average length of the codeword. Determine the efficiency and redundancy of this code
19	Define entropy. Show that the entropy is maximum when all messages are equiprobable
20	Derive channel capacity of a binary symmetric channel
21	How Huffman Codes are obtained? Explain by giving a suitable example.
22	Construct a (7, 4) cyclic code using generator polynomial g(x)=x3+x2+1. Prepare a suitable decoding table. Decode the following received vectors: (a) 1101101 (b) 0101000.
23	Write the advantage and disadvantage of cyclic codes?
24	How the detection of differentially coherent FSK is done?
25	Consider X(t) to be white Gaussian noise with zero mean and autocorrelation function ή/2 Δ(t). It is passed through an LTI system whose impulse response is h (t) =2Bsinc(2Bt). What is the power of output random process Y(t)?

Assessment rubrics that is going to be adopted for direct attainment is depicted in below table

Level of Achievement	**Elaboration on Course Grading Description**	**Bench Mark Set (Out of 70)**
Excellent (A)	The Student's performance is outstanding in almost all the intended course learning outcomes	55 to 70
Good (B)	The student's performance is good in most of the intended course learning outcomes.	41 to 54
Marginal (C)	The student's performance is barely satisfactory. It marginally meets the intended course learning outcomes	21 to 40
Fail (F)	The Students performance is inadequate. Student fails to meet many of the intended course learning outcomes	Less than 21

Buddha Institute of Technology

Gorakhpur

Department of Electronics & Communication Engineering

ALLOTTMENT BASED ON COMPETENCY SKILLS

Academic Session: Feb – May 2023

Name of the Staff	Narendra Kumar Chaurasia
Area of Specialization	Control System, Digital Communication, Microprocessor and Microcontrollers
Subject Allotted	Control System

Sl. #	Course Code	Course Title	Semester	Theory/Lab
1	KEC 602	Control System	VI A	Theory
2	KEC 602	Control System	VI B	Theory
3	KEC 652	Control System Lab	VI A	Lab
4	KEC 652	Control System Lab	VI B	Lab

HOD

Program	: B.Tech
Branch	: ECE
Semester	: VI
Session	: 2022-23
Name of the Course	:Control System
Code	:KEC 602
Name of the Course Instructor	: Mr. Narendra Kumar Chaurasia
Designation	: Assistant Professor
Department	: Electronics & Communication Engineering

Course Outcome and Programme Outcome

Description of the Course Outcome:

CO	**After completion of the course students will be able to:**
CO 1	Summarize the basics and techniques to analyse the performance of linear control system in time as well as frequency domains.
CO 2	Model physical systems in linear range.
CO 3	Utilize the state variable analysis techniques and formulae to check controllability and observability of the system as well as make the system controllable and observable.
CO 4	Apply concepts of time domain analysis to solve for transient performance parameters of the first and second order systems and steady state error specifications.
CO 5	Develop the concept of absolute and relative stability for continuous data systems along with different methods of determining the stability such as Routh Hurwitz Criterion and Root locus methods.
CO 6	Applyconcepts of frequency domain analysis to explain the nature of stability of the system using Nyquist and Bode Plot.

Buddha Institute of Technology, Gorakhpur				
Department: Electronics & Communication Engineering				
Academic Semester: April.-July 2021				
Semester: VI	Section: A+B	Course Code: KEC 602	Course: Control System	
Course Instructor: Narendra Kumar Chaurasia		Contact Hours /week: 4+1	# of credits: 4	
CIE Marks: 50		SEE Marks: 100	Exam Hours: 3	

Prerequisites if any:			
Code No	Course Name	Description	Semester
NA	NA	NA	NA

Content delivery:	Chalk & Board, PPT

COURSE SYLLABUS:			
ModuleNo	**Contents of Module**	**Hrs**	**COs**
1	**Introduction to Control Systems**: Basic Components of a control system, Feedback and its effect, types of feedback control systems. Block diagrams Reduction and signal flow graphs, Modeling of Physical systems: electrical networks, mechanical systems elements, free body diagram, analogous Systems, sensors and encoders in control systems, modeling of armature controlled and field controlled DC servomotor	8	1
2	**State-Variable Analysis**: Introduction, vector matrix representation of state equation, state transition matrix, state-transition equation, relationship between state equations and highorder differential equations, relationship between state equations and transfer functions, Decomposition of transfer functions, Controllability and observability, Eigen Value and Eigen Vector, Diagonalization.	8	2
3	**Time domain Analysis of Control Systems**: Time response of continuous data systems, typical test signals for the time response of control systems, unit step response and timedomain specifications, time response of a first order system, transient response of a prototype second order system, Steady-State error, Static and dynamic error coefficients, error analysis for different types of systems.	8	3
4	**Stability of Linear Control Systems:** Bounded-input bounded-output stability continuous data systems, zero-input and asymptotic stability of continuous data systems, Routh Hurwitz criterion, Root-Locus Technique: Introduction, Properties of the Root Loci, Design aspects of the Root Loci.	8	4
5	**Frequency Domain Analysis:** Resonant peak and Resonant frequency, Bandwidth of the prototype Second order system, effects of adding a zero to the forward path, effects of adding a pole to the forward path,	8	5

	polar plot, Nyquist stability criterion, stability analysis with the Bode plot, relative stability: gain margin and phase margin.		

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO	**After completion of the course students will be able to:**
CO 1	Summarize the basics and techniques to analyse the performance of linear control system in time as well as frequency domains.
CO 2	Model physical systems in linear range.
CO 3	Utilize the state variable analysis techniques and formulae to check controllability and observability of the system as well as make the system controllable and observable.
CO 4	Apply concepts of time domain analysis to solve for transient performance parameters of the first and second order systems and steady state error specifications.
CO 5	Develop the concept of absolute and relative stability for continuous data systems along with different methods of determining the stability such as Routh Hurwitz Criterion and Root locus methods.
CO 6	Applyconcepts of frequency domain analysis to explain the nature of stability of the system using Nyquist and Bode Plot.

Mapping of CO v/s PO:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
KEC-602.1	3	2	1	2	1	1	-	-	-	2	1	-
KEC-602.2	3	2	1	2	2	1	-	-	-	3	2	-
KEC-602.3	3	2	2	3	2	2	-	-	-	2	1	-
KEC-602.4	3	2	2	2	2	2	-	-	-	2	2	-
KEC-602.5	3	2	2	3	2	2	-	-	-	2	1	-
KEC-602.6	3	2	2	3	2	2	-	-	-	2	1	-

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Mapping of CO v/s PSO:

CO	PSO1	PSO2
KEC-602.1	2	1
KEC-602.2	1	2
KEC-602.3	2	2
KEC-602.4	2	2
KEC-602.5	2	3
KEC-602.6	2	2

Gap in the syllabus	NA

Topics to be covered beyond syllabus	NA

Assessment Methodologies:

Sl. No.	Description	Type
1	Student Assignment	Direct
2	Internal assessment	Direct
3	University exam	Direct
4	Student feedback	Indirect
5	Alumni feedback	Indirect
6	Employers feedback	Indirect

LESSON PLAN

Lecture #	Module#	Topics	RBT Levels	Course Outcome Mapping	Planned Date	Actual Date	Faculty Sign	References	Remarks
1	1	Basic Components of a control system	L3	CO1 CO2	14/02/23			T1, T2, R2, R4	
2		Feedback and its effect			16/02/23			T1, T2, R2, R4	
3		Types of feedback control systems			17/02/23			T1, T2, R2, R4	
4		Block diagrams Reduction			20/02/23			T1, T2, R2, R4	
5		**Tutorial**			21/02/23			T1, T2, R2, R4	
6		Block diagrams Reduction			23/02/23			T1, T2, R2, R4	
7		Signal flow graphs			24/02/23			T1, T2, R2, R4	
8		Signal flow graphs			25/02/23			T1, T2, R2, R4	
9		Modeling of Physical systems: electrical networks			27/02/23			T1, T2, R2, R4	
10		**Tutorial**			28/02/23			T1, T2, R2, R4	
11		Mechanical systems elements			02/03/23			T1, T2, R2, R4	
12		Free body diagram			03/03/23			T1, T2, R2, R4	
13		Free body diagram			04/03/23			T1, T2, R2, R4	
14		Analogous Systems			06/03/23			T1, T2, R2, R4	
15		**Tutorial**			10/03/23			T1, T2, R2, R4	
16		Sensors and encoders in control systems			11/03/23			T1, T2, R2, R4	
17		Modeling of armature controlled and field controlled DC servomotor			13/03/23			T1, T2, R2, R4	
18	2	State-Variable Analysis: Introduction	L3	CO1 CO3	14/03/23			T1, T2, R2, R4	
19		Vector matrix representation of state equation			16/03/23			T1, T2, R2, R4	
20		**Tutorial**			17/03/23			T1, T2, R2, R4	
21		State transition matrix			18/03/23			T1, T2, R2, R4	

22		State transition matrix			23/03/23			**T1, T2, R2, R4**	
23		State-transition equation			24/03/23			**T1, T2, R2, R4**	
24		State-transition equation			25/03/23			**T1, T2, R2, R4**	
25		**Tutorial**			27/03/23			**T1, T2, R2, R4**	
26		Relationship between state equations and highorder differential equations			28/03/23			**T1, T2, R2, R4**	
27		Relationship between state equations and transfer functions			31/03/23			**T1, T2, R2, R4**	
28		Decomposition of transfer functions			1/04/23			**T1, T2, R2, R4**	
29		Controllability and observability			03/04/23			**T1, T2, R2, R4**	
30		**Tutorial**			04/04/23			**T1, T2, R2, R4**	
31		Controllability and observability			10/04/23			**T1, T2, R2, R4**	
32		Eigen Value and Eigen Vector			11/04/23			**T1, T2, R2, R4**	
33		Diagonalization			13/04/23			**T1, T2, R2, R4**	
34	**3**	Time response of continuous data systems	**L3**	**CO1** **CO4**	14/04/23			**T1, T2, R2, R4**	
35		**Tutorial**			15/04/23			**T1, T2, R2, R4**	
36		Typical test signals for the time response of control systems			17/04/23			**T1, T2, R2, R4**	
37		Unit step response			18/04/23			**T1, T2, R2, R4**	
38		Time domain specifications			20/04/23			**T1, T2, R2, R4**	
39		Time response of a first order system			21/04/23			**T1, T2, R2, R4**	
40		**Tutorial**			24/04/23			**T1, T2, R2, R4**	
41		Time response of a first order system			25/04/23			**T1, T2, R2, R4**	
42		Transient response of a prototype second order system			27/04/23			**T1, T2, R2, R4**	

43		Transient response of a prototype second order system			28/04/23			**T1, T2, R2, R4**	
44		Steady-State error			29/04/23			**T1, T2, R2, R4**	
45		**Tutorial**			04/05/23			**T1, T2, R2, R4**	
46		Steady-State error			05/05/23			**T1, T2, R2, R4**	
47		Static and dynamic error coefficients			05/05/23			**T1, T2, R2, R4**	
48		Error analysis for different types of systems			06/05/23			**T1, T2, R2, R4**	
49		Error analysis for different types of systems			08/05/23			**T1, T2, R2, R4**	
50		**Tutorial**			09/05/23			**T1, T2, R2, R4**	
51		Bounded-input bounded-output stability			11/05/23			**T1, T2, R2, R4**	
52		Continuous data systems			12/05/23			**T1, T2, R2, R4**	
53		Zero-input and asymptotic stability of continuous data systems			13/05/23			**T1, T2, R2, R4**	
54		Routh Hurwitz criterion			15/05/23			**T1, T2, R2, R4**	
55	**4**	**Tutorial**	**L3**	**CO1**	18/05/23			**T1, T2, R2, R4**	
56		Routh Hurwitz criterion		**CO5**	19/05/23			**T1, T2, R2, R4**	
57		Root-Locus Technique: Introduction			20/05/23			**T1, T2, R2, R4**	
58		Properties of the Root Loci			22/05/23			**T1, T2, R2, R4**	
59		Design aspects of the Root Loci			23/05/23			**T1, T2, R2, R4**	
60		**Tutorial**			25/05/23			**T1, T2, R2, R4**	
61		Design aspects of the Root Loci			26/05/23			**T1, T2, R2, R4**	
62		Resonant peak and Resonant frequency			27/05/23			**T1, T2, R2, R4**	
63	5	Resonant peak and Resonant frequency	**L3**	**CO1**	29/05/23			**T1, T2, R2, R4**	
64		Bandwidth of the prototype Second order system		**CO6**	30/05/23			**T1, T2, R2, R4**	

65		**Tutorial**			01/06/23			**T1, T2, R2, R4**	
66		Effects of adding a zero to the forward path			02/06/23			**T1, T2, R2, R4**	
67		Effects of adding a pole to the forward path			03/06/23			**T1, T2, R2, R4**	
68		Polar plot, Nyquist stability criterion			05/06/23			**T1, T2, R2, R4**	
69		Stability analysis with the Bode plot			06/06/23			**T1, T2, R2, R4**	
70		**Tutorial**			08/06/23			**T1, T2, R2, R4**	
71		Stability analysis with the Bode plot			09/06/23			**T1, T2, R2, R4**	
72		Relative stability: gain margin and phase margin			10/06/23			**T1, T2, R2, R4**	

***L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating**

Syllabus for Sessional:

Sessional	Syllabus
CT1	Class# 1-17
CT2	Class# 18-44
Pre - AKTU	Full Syllabus

Literature:

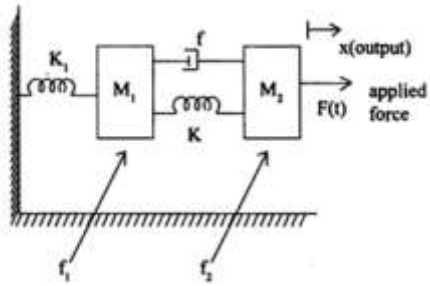
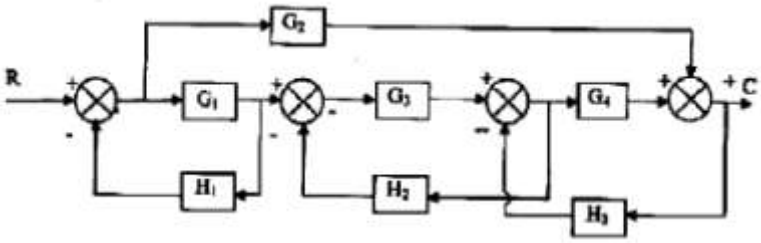
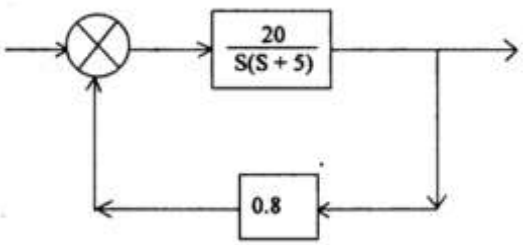
Text Books

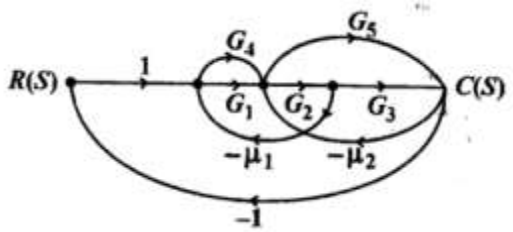
1. I. J. Nagrath& M. Gopal, "Control System Engineering", 6th Ed. New Age International Publishers, 2018
2. B.C. Kuo &FaridGolnaraghi, "Automatic Control Systems", 9th Edition, John Wiley India, 2008

Reference Books

1. (Schaums Outlines Series) Joseph J. Distefano III, Allen R. Stubberud, Ivan J. Williams, "Control Systems", 3rd Edition, TMH, Special Indian Edition, 2010.
2. A. Anand Kumar, "Control Systems", Second Edition, PHI Learning private limited, 2014.
3. William A. Wolovich, "Automatic Control Systems", Oxford University Press, 2011.
4. S. Hasan Saeed, "Automatic Control Systems (with Matlab Programs)", Katson Educational Series, 9th edition, 2020.

Sample Questions:

Question No.	Questions
1	What is an asymptote?
2	Define transfer function.
3	What is the general effect of adding a pole to the forward path transfer function?
4	Compare open loop and closed loop control systems.
5	Give Mason's Gain formula.
6	What is steady-state error?
7	Write the analogous electrical elements in force voltage analogy for the elements of mechanical translational system?
8	Define damping ratio.
9	What is phase margin and gain margin?
10	Why negative feedback is invariably preferred in closed loop system?
11	Obtain the transfer functions of the mechanical systems and the analogous electrical circuit shown in the figure below: 
12	Reduce the block diagram shown below to a single block and find the overall transfer function. 
13	Determine the ranges of K such that the characteristics equation $s^3 + 3(K+1)s^2 + (7K+5)s + 4K + 7 = 0$ has roots more negative than s= -1.
14	Determine the sensitivity of the system given in the figure below with respect to feedback path transfer function at ω = 2.0 rad/s. 
15	Determine the type and order of the unity feedback control systems whose open-loop transfer functions is

	$G(S) = \frac{K}{s(s^2 + 4s + 200)}$ Find also the static error coefficients and the errors for unit step and unit ramp inputs.
16	Determine the overall transfer function from the signal flow graph shown in figure using the Mason's gain formula. 
17	Establish the correlation between time response and frequency response analysis and suitably explain with diagrams.
18	For the following state equation, determine the transfer function Y(s)/U(s). $\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} + \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u$ Where u(t) is a unit step occuring at t=0 and X T (0)=[1 0].
19	For the open loop transfer function $G(s)H(s) = \frac{10}{s(1 + 0.2s)}$
20	Discuss Nyquist Stability criterion in detail. Also sketch the Nyquist plot for the system with $G(S)H(S) = \frac{(1 + 0.5s)}{s^2(1 + 0.1s)(1 + 0.02s)}$ Comment on the stability and find the value of gain margin
21	A unity feedback system has an amplifier with gain Ka=10 and gain ratio G(S) = 1 / S (S+2) in the feed forward Path. A derivative feedback ,H(S)=SK0 is introduced as a minor loop around G(S).Determine the derivative feedback constant ,K0 ,so that the system damping factor is 0.6.
22	Draw the Bode plot for the transfer function $G(s) = \frac{36(1 + 0.2s)}{s^2(1 + 0.05s)(1 + 0.01s)}$ From the bode plot determine: (i) Phase crossover frequency. (ii) Gain crossover frequency (iii) Gain Margin (iv) Phase Margin
23	What is state transition matrix? Write its properties. Derive its expression in time and Laplace domains.
24	Derive the time response of a second order system subjected to unit step input.
25	For the following state equation, determine the transfer function between Y(s)U(s) according to the formula: $\frac{Y(s)}{U(s)} = (C[SI - A]^{-1}B + D$ $A = \begin{bmatrix} 0 & 3 \\ -2 & -3 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 3 \end{bmatrix}$ $C = [1\ 0]$ and $D = 1$
26	What is an asymptote?

Assessment rubrics that is going to be adopted for direct attainment is depicted in below table

Level of Achievement	Elaboration on Course Grading Description	Bench Mark Set (Out of 70)
Excellent (A)	The Student's performance is outstanding in almost all the intended course learning outcomes	55 to 70
Good (B)	The student's performance is good in most of the intended course learning outcomes.	41 to 54
Marginal (C)	The student's performance is barely satisfactory. It marginally meets the intended course learning outcomes	21 to 40
Fail (F)	The Students performance is inadequate. Student fails to meet many of the intended course learning outcomes	Less than 21

Buddha Institute of Technology

Gorakhpur

Department of Electronics & Communication Engineering

ALLOTTMENT BASED ON COMPETENCY SKILLS

Academic Session Feb.-June 2023

Name of the Staff	PERMENDRA KUAMR VERMA
Area of Specialization	Digital System Design, Electronics Measurement & Instrumentation, Microwave Engineering
Subject Allotted	Antenna & Wave Propagation

Sl. #	Course Code	Course Title	Semester	Theory
1	KEC-603	Antenna & Wave Propagation	VI-A	Theory
2	KEC-603	Antenna & Wave Propagation	VI-B	Theory

HOD

Program	**: B. Tech.**
Branch	**: EC**
Semester	**: VI**
Session	**: 2022-23**
Name of the Course	**: Antenna & Wave Propagation**
Code	**: KEC-603**
Name of the Course Instructor	**: Permendra Kumar Verma**
Designation	**: Assistant Professor**
Department	**: Electronics & Communication Engineering**

Course Outcome and Programme Outcome

Description of the Course Outcome:

CO	After completion of the course students will be able to:
KEC-603.1	Apply basic concepts of coordinate systems transformation and vector calculus in electromagnetic (EM) applications.
KEC-603.2	Apply basic concepts Electrostatic fields and Magnetostatic fields in EM applications.
KEC-603.3	Understand the fundamental of Antenna fundamental and its basic parameters.
KEC-603.4	Apply the concepts of dipole antenna for study the different type of antenna.
KEC-603.5	Understand the basic concepts of ground, space, sky wave propagation mechanism.

Buddha Institute of Technology, Gorakhpur				
Department: Electronics & Communication Engg.				
Academic Semester: Feb.-June 2023				
Semester: VI	Section: A+B	Course Code: KEC-603	Course: Antenna & Wave Propagation	
Course Instructor: Permendra Kumar Verma		Contact Hours /week: 4+1		# of credits: 3
CIE Marks: 50		SEE Marks: 100		Exam Hours: 3

Prerequisites if any:			
Code No	Course Name	Description	Semester
KEC-603	Antenna & Wave Propagation	Basic knowledge of coordinate systems, Electric and magnetic field, Antenna fundamentals	VI

Content delivery:	Chalk & Board, PPT

COURSE SYLLABUS:			
Module No	**Contents of Module**	**Hrs**	**COs**
1	Coordinate Systems and Transformation: Cartesian, Cylindrical, Spherical transformation. Vector calculus: Differential length, area and volume, line, surface and volume integrals, Del operator, Gradient, Divergence of a vector, Divergence theorem, Curl of a vector, Stokes's theorem, Laplacian of a scalar.	**6**	**CO1**
2	Electrostatic fields and Magnetostatic fields: Electric field intensity, Electric field due to charge distribution, Electric flux density, Gauss's Law-Maxwell's equation, Continuity equation and relaxation time, boundary conditions, Magneto-static fields, Ampere's circuit law, Maxwell's equation, magnetic scalar and vector potential, Magnetic boundary conditions, Maxwell's equation in final form.	**10**	**CO2**
3	Antenna fundamental and definitions: Introduction, Basic antenna parameters, Patterns, Beam area (or Beam solid angle) ΩA, Radiation intensity, Beam efficiency, Directivity D and Gain G, Directivity and resolution, Antenna apertures, Effective height, The radio communication link, Fields from oscillating dipole, Single-to-noise ratio (SNR), Antenna temperature, Antenna impedance.	**8**	**CO3**
4	Antenna Design: Electric dipoles, The short electric dipole, The fields of a short dipole, Radiation resistance of short electric dipole, Thin linear antenna, Radiation resistance of λ/2 antenna, Array of two driven λ/2 elements: Broadside case and end-fire case, Horizontal antennas above a plane ground, Vertical antennas above a plane ground, Yagi-Uda antenna design, Longwire antennas, Folded dipole antennas.	**8**	**CO4**
5	Wave Propagation: Plane earth reflection, Space wave and surface wave. Space wave propagation: Introduction, Field strength relation, Effects of imperfect earth, Effects of curvature of earth. Sky wave propagation: Introduction structural, details of the ionosphere, Wave propagation mechanism, Refraction and reflection of sky waves by ionosphere, Ray path,	**8**	**CO5**

	Critical frequency, MUF, LUF, OF, Virtual height and skip distance, Relation between MUF and the skip distance, Multi-Hop propagation, Wave characteristics.		

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Apply basic concepts of coordinate systems transformation and vector calculus in electromagnetic (EM) applications.
CO2	Apply basic concepts Electrostatic fields and Magnetostatic fields in EM applications
CO3	Understand the fundamental of Antenna fundamental and its basic parameters
CO4	Apply the concepts of dipole antenna for study the different type of antenna.
CO5	Understand the basic concepts of ground, space, sky wave propagation mechanism.

Mapping of CO v/s PO:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
KEC-603.1	1	2	1	1	1	-	-	-	-	-	-	1
KEC-603.2	2	1	1	1	1	-	-	-	-	-	-	1
KEC-603.3	1	1	1	1	1	-	-	-	-	-	-	1
KEC-603.4	1	2	1	2	1	-	-	-	-	-	-	1
KEC-603.5	1	1	1	1	1	-	-	-	-	-	-	1
AVERAGE	***1.2***	***1.4***	***1.0***	***1.2***	***1.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***1.0***

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Mapping of CO v/s PSO:

CO	PSO1	PSO2	PSO3
KEC-603.1	1	1	-
KEC-603.2	2	1	2
KEC-603.3	1	1	1
KEC-603.4	1	-	-
KEC-603.5	1	1	1
AVERAGE	***1.4***	***1.2***	***1.3***

Gap in the syllabus	NA

Topics to be covered beyond syllabus	NA

Sl. No.	Description	Type
1	Student Assignment	Direct
2	Internal assessment	Direct
3	University exam	Direct
4	Student feedback	Indirect
5	Alumni feedback	Indirect

Assessment	6	Employers feedback	Indirect	**Methodologies:**

LESSON PLAN

Lecture #	Module#	Topics	RBT Levels	Course Outcome Mapping	Planned Date	Actual Date	Faculty Sign	References	Remarks
1	**1**	Cartesian, Cylindrical Transformation	**L3**	**CO1**	13/02/23			**R1**	
2		Spherical transformation			14/02/23			**R1**	
3		Vector calculus: Differential length, area and volume			16/02/23			**R1**	
4		line, surface and volume integrals			17/02/23			**R1**	
5		**Tutoria1**			20/02/23				
6		Del operator, Gradient			21/02/23			**R1**	
7		Divergence of a vector, Curl of a vector			23/02/23			**R1**	
8		Divergence theorem, Stokes's theorem			24/02/23			**R1**	
9		Laplacian of a scalar			25/02/23			**R1**	
10		**Tutoria2**			27/02/23				
11	**2**	Electric field intensity	**L3**	**CO2**	28/02/23			**R1**	
12		Electric field due to charge distribution			02/03/23			**R1**	
13		Electric field due to charge distribution			03/03/23			**R1**	
14		Electric flux density			04/03/23			**R1**	
15		**Tutoria3**			06/03/23				
16		Gauss's Law			10/03/23			**R1**	
17		Maxwell's equation			11/03/23			**R1**	
18		Continuity equation and relaxation time			13/03/23			**R1**	
19		Boundary conditions			14/03/23			**R1**	
20		**Tutoria4**			16/03/23				
21		Magneto-static fields			17/03/23			**R1**	
22		Ampere's circuit law			18/03/23			**R1**	
23		Maxwell's equation			23/03/23			**R1**	
24		Magnetic scalar and vector potential			24/03/23			**R1**	
25		**Tutoria5**			25/03/23				
26		Magnetic boundary conditions			27/03/23			**R1**	
27		Maxwell's equation in final form.			28/03/23			**R1**	
28	**3**	Antenna fundamental and definitions	**L2**	**CO3**	31/03/23			**R2**	
29		Basic antenna parameters			1/04/23			**R2**	
30		**Tutoria6**			03/04/23				
31		Beam area (or Beam solid angle) ΩA			04/04/23			**R2**	

32		Radiation intensity			10/04/23			**R2**	
33		Beam efficiency			11/04/23			**R2**	
34		Directivity D and Gain G			13/04/23			**R2**	
35		**Tutoria7**			14/04/23				
36		Directivity and resolution, Antenna apertures			15/04/23			**R2**	
37		Effective height			17/04/23			**R2**	
38		The radio communication link			18/04/23			**R2**	
39		Fields from oscillating dipole			20/04/23			**R2**	
40		**Tutoria8**			21/04/23				
41		Single-to-noise ratio (SNR)			24/04/23			**R2**	
42		Antenna temperature			25/04/23			**R2**	
43		Antenna impedance			27/04/23			**R2**	
44		Electric dipoles			28/04/23			**R2**	
45		**Tutoria9**			29/04/23				
46		The short electric dipole			04/05/23			**R2**	
47		The fields of a short dipole			05/05/23			**R2**	
48		Radiation resistance of short electric dipole			05/05/23			**R2**	
49		Thin linear antenna			06/05/23			**R2**	
50		**Tutoria10**			08/05/23				
51	**4**	Radiation resistance of λ/2 antenna	**L3**	**CO4**	09/05/23			**R2**	
52		Array of two driven λ/2 elementss: Broadside case and end-fire case			11/05/23			**R2**	
53		Horizontal antennas above a plane ground			12/05/23			**R2**	
54		Vertical antennas above a plane ground			13/05/23			**R2**	
55		**Tutoria11**			15/05/23				
56		Yagi-Uda antenna design			18/05/23			**R2**	
57		Longwire antennas, Folded dipole antennas			19/05/23			**R2**	
58		Plane earth reflection, Space wave and surface wave			20/05/23			**R2**	
59		Space wave propagation: Introduction			22/05/23			**R2**	
60		**Tutoria12**			23/05/23				
61		Field strength relation			25/05/23			**R2**	
62		Effects of imperfect earth			26/05/23			**R2**	
63		Effects of curvature of earth			27/05/23			**R2**	
64	**5**	Sky wave propagation: Introduction	**L2**	**CO5**	29/05/23			**R2**	
65		**Tutoria13**			30/05/23				
66		structural, details of the ionosphere			01/06/23			**R2**	
67		Wave propagation mechanism,			02/06/23			**R2**	
68		Refraction and reflection of sky waves by ionosphere			03/06/23			**R2**	
69		Ray path, Critical frequency, MUF, LUF, OF			05/06/23			**R2**	
70		**Tutoria14**			06/06/23				
71		Virtual height and skip			08/06/23			**R2**	

		Distance, Relation between MUF and the skip distance							
72		Multi-Hop propagation			09/06/23			**R2**	
73		Wave characteristics			10/06/23			**R2**	

***L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 – Creating**

Syllabus for Sessional:

Sessional	Syllabus
CT1	Class# 1-22
CT2	Class# 23-43
Pre - AKTU	Full Syllabus

Literature:

Reference Books:

R1. MNO Sadiku, "Elements of Electromagnetic', 7th Ed, Oxford University Press, 2018.
R2. John D Kraus, Ronald J Marhefka and Ahmad S. Khan, "Antennas and Wave Propagation", 5th Edition, Tata McGraw Hill, 2017.
R3. Das, Antennas and Wave Propagation, TMH 1st Edition.
R4. C. A. Balanis, "Antenna Theory Analysis and Design", John Wiley, 2016.
R5. WH Hayt and JA Buck, "Engineering Electromagnetic", 7th Edition TMH, 2013.
R6. (Schaums Outlines Series) Joseph J. Distefano III, Allen R. Stubberud, Ivan J. Williams, "Engineering Electromagnetic", 3rd Edition, TMH, Special Indian Edition, 2010.

Sample Questions:

Question No.	Questions
1	Give any three co ordinate systems.
2	Express the value of differential volume in rectangular and cylindrical Co-ordinate systems
3	Write expression for differential length in cylindrical and spherical co- ordinates
4	State divergence theorem
5	State Stoke's theorem
6	Define divergence, gradient, curl in spherical co-ordinate system with mathematical expression
7	State and proof gauss law .and explain applications of gauss law
8	Derive the boundary conditions of the normal and tangential components of electric field at the inter face of two media with different dielectrics.
9	State Ampere circuital law
10	Write the relation between magnetic flux density and field intensity
11	Derive the expressions for boundary conditions in magnetic fields.
12	Define Antenna and it's Radiation Pattern
13	Define Directivity and Gain of Antenna.
14	Define Aperture and Effective Height of Antenna.

15	Define Antenna temperature, Radiation Resistance and Front to back Ratio.
16	With neat sketches explain about Broad Side, End Fire and increased End Fire Arrays.
17	With a neat diagram Explain Structure and operation of Yagi-Uda Antenna.
18	What is Antenna Array and Write the Principle of Multiplication of Patterns.
19	Define Critical frequency and MUF.
20	Obtain the relation between MUF and Skip distance.
21	Explain in detail about Ground wave propagation.
22	Explain in detail about Space wave propagation
23	Explain in detail about Sky wave propagation.
24	Write short notes on Multiple HOP and Duct Propagations.
25	What are sunspots, Sudden Ionospheric Disturbances (SID) and Ionospheric Storms.

Assessment rubrics that is going to be adopted for direct attainment is depicted in below table

Level of Achievement	Elaboration on Course Grading Description	Bench Mark Set (Out of 100)
Excellent (A)	The Student's performance is outstanding in almost all the intended course learning outcomes	**75**
Good (B)	The student's performance is good in most of the intended course learning outcomes.	**60**
Marginal (C)	The student's performance is barely satisfactory. It marginally meets the intended course learning outcomes	**45**
Fail (F)	The Students performance is inadequate. Student fails to meet many of the intended course learning outcomes	**35**

NOTE: Have different Assessment pattern for tests, assignments, quizzes etc.

Staff In-charge **HOD**

Buddha Institute of Technology

Gorakhpur

Department of Electronics & Communication Engineering

ALLOTTMENT BASED ON COMPETENCY SKILLS

Academic SessionJan.-June 2022

Name of the Staff	GHANSHYAM MISHRA
Area of Specialization	DIGITAL DELECTRONICS, MICROPROCESSOR AND MICROCONTROLLER,EMBEDDED SYSTEMS
Subject Allotted	EMBEDDED SYSTEMS, EMERGING TECHNOLOGY IN ENGINEERING

Sl. #	Course Code	Course Title	Semester	Theory
1	KOE062	EMBEDDED SYSTEMS	VI-A	Theory
2	KOE062	EMBEDDED SYSTEMS	VI-B	Theory
3	KEC 653	MICROCONTROLLER FOR EMBEEDED SYSTEMS LAB	VI-A	Lab
4	KEC 653	MICROCONTROLLER FOR EMBEEDED SYSTEMS LAB	VI-B	Lab
5	KMC102	EMERGING TECHNOLOGY IN ENGINEERING	I-A	Theory
6	KMC102	EMERGING TECHNOLOGY IN ENGINEERING	1-B	Theory

HOD

Program	**: B. Tech.**
Branch	**: EC**
Semester	**: VI**
Session	**: 2020-21**
Name of the Course	**: Embedded Systems**
Code	**: KOE-062**
Name of the Course Instructor	**: Mr. Ghanshyam Mishra**
Designation	**: Assistant Professor**
Department	**: Electronics & Communication Engineering**

Course Outcome and Programme Outcome

Description of the Course Outcome:

CO	**After completion of the course students will be able to:**
CO1	Understand the basics of embedded system and its structural units.
CO2	Understand the embedded system specification and develop software programs
CO3	Understand the requirements of the programming embedded systems, related software architecture
CO4	Understand the RTOS based embedded system design.
CO5	Understand all the applications of the embedded system and designing issues

Buddha Institute of Technology, Gorakhpur				
Department: Electronics & Communication Engg.				
Academic Semester: Jan.-June 2022				
Semester: VI	Section: A+B	Course Code: KOE-062	Course: EMBEDDED SYSTEMS	
Course Instructor: MR.GHANSHYAM MISHRA		Contact Hours /week: 5+1	# of credits: 3	
CIE Marks: 50		SEE Marks: 100	Exam Hours: 3	

Prerequisites if any:			
Code No	Course Name	Description	Semester
NA	NA	NA	NA

Content delivery:	Chalk & Board

COURSE SYLLABUS:

ModuleNo	Contents of Module	Hrs	COs
1	Introduction to Embedded Systems: Introduction to Embedded Systems – The build process for embedded systems- Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging	**8**	**CO1**
2	Embedded Networking: Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols – RS232 standard – RS422 – RS485 – CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) –need for device drivers.	**8**	**CO2**
3	Embedded Firmware Development Environment: Embedded Product Development Life Cycle objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model.	**8**	**CO3**
4	RTOS Based Embedded System Design: Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non preemptive scheduling, Task communication shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance, comparison of Real time Operating systems: Vx Works, ɥC/OS-II, RT Linux.	**8**	**CO4**
5	Embedded System Application Development: Design issues and techniques Case Study of Washing Machine- Automotive Application- Smart card System Application.	**8**	**CO5**

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Attain the knowledge of embedded system
CO2	Gain the knowledge for development of environment for embedded system.
CO3	Gain the knowledge of RTOS
CO4	Gain the knowledge of Embedded system based on RTOS
CO5	Gain the knowledge of different application based on embedded system

Mapping of CO v/s PO:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	3	1	-	-	-	1	3	2
CO2	3	2	1	3	2	2	-	-	-	3	1	1
CO3	2	3	2	2	3	3	-	-	-	1	2	2
CO4	3	3	3	3	3	2	-	-	-	2	2	2
CO5	3	2	2	3	2	1	-	-	-	3	1	1

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Mapping of CO v/s PSO:

CO	PSO1	PSO2
CO1	3	2
CO2	3	3
CO3	3	1
CO4	3	2
CO5	3	1

Gap in the syllabus	NA

Topics to be covered beyond syllabus	NA

Assessment Methodologies:

Sl. No.	Description	Type
1	Student Assignment	Direct
2	Internal assessment	Direct
3	University exam	Direct
4	Student feedback	Indirect
5	Alumni feedback	Indirect
6	Employers feedback	Indirect

LESSON PLAN (SECTION –A)

Lecture #	Module #	Topics	RBT Levels	Course Outcome Mapping	Planned Date	Actual Date	Faculty Sign	Reference	Remarks
1		Introduction to Embedded Systems			13/02/23			**T1/R1**	
2		The build process for embedded systems			16/02/23			**T1/R1**	
3		Structural units in Embedded processor			17/02/23			**T1/R1**	
4		selection of processor & memory devices			20/02/23			**T1/R1**	
5	**1**	**TUTORIAL 1**	**L1**	**CO1**	23/02/23			**T1/R3**	
6		DMA			24/02/23			**T1/R3**	
7		Memory management methods			25/02/23			**T1/R3**	
8		Timer and Counting devices, Watchdog Timer			02/03/23			**T1/R3**	
9		Real Time Clock, In circuit emulator			03/03/23			**T1/R3**	
10		Target Hardware Debugging			04/03/23			**T1/R3**	
11		**TUTORIAL 2**			06/03/23			**T1/R3**	
12		Embedded Networking Introduction			03/03/23			**T1/R3**	
13		I/O Device Ports & Buses			11/03/23			**T1/R3**	
14		Serial Bus communication protocols			03/03/23			**T1/R3**	
15	**2**	RS232& RS422 standard	**L1**	**CO2**	16/03/23			**T1/R3**	
16		**TUTORIAL 3**			17/03/23			**T1/R3**	
17		RS485 and CAN bus standard			24/03/23			**T1/R3**	
18		Serial Peripheral Interface (SPI)			31/03/23			**T1/R3**	
19		Inter Integrated Circuits (I2C)			1/04/23			**T1/R3**	
20		Need for device drivers.			3/04/23			**T1/R3**	
21		**TUTORIAL 4**			14/04/23			**T1/R3**	
22	**3**	Embedded Firmware	**L1**	**CO3**	15/04/23			**T1/R3**	

23		Embedded Firmware Development Environment			17/04/23			**T1/R3**	
24		Embedded Product Development			20/04/23			**T1/R3**	
25		Life Cycle objectives			24/04/23			**T1/R3**	
26		Different phases of EDLC			27/04/23			**T1/R3**	
27		**TUTORIAL 5**			29/04/23			**T1/R3**	
28		Modelling of EDLC			4/05/23			**T1/R3**	
29		Issues in Hardware-software Co-design			8/05/23			**T1/R3**	
30		Data Flow Graph			11/05/23			**T1/R3**	
31		Sequential Program Model, concurrent Model			13/05/23			**T1/R3**	
32		state machine model			14/05/23			**T1/R3**	
33		object oriented Mode			17/05/23			**T1/R3**	
34		**TUTORIAL 6**			19/05/23			**T1/R3**	
35	**4**	RTOS Based Embedded System	**L1**	**CO4**	21/05/23			**T1/R3**	
36		Introduction to basic concepts of RTOS			24/05/23			**T1/R3**	
37		Task, process & threads			26/05/23			**T1/R3**	
38		Interrupt routines in RTOS			28/05/23			**T1/R3**	
39		Design concept Multiprocessing and Multitasking			31/05/23			**T1/R3**	
40		**TUTORIAL 7**			1/06/23			**T1/R3**	
41		Preemptive and non preemptive scheduling			2/06/23			**T1/R3**	
42		Task communication shared memory, message passing			7/06/23			**T1/R3**	
43		Inter process Communication – synchronization between processes-semaphores			9/06/23			**T1/R3**	
44		Mailbox, pipes, priority inversion, priority inheritance			18/06/23			**T1/R3**	
45		comparison of Real time Operating systems: Vx Works, чC/OS-II, RT Linux			21/06/23			**T1/R3**	
46		**TUTORIAL 8**			22/06/23			**T1/R3**	
47	**5**	Embedded System Application Introduction	**L3**	**CO5**	23/06/23			**T1/R3**	
48		Embedded System Application Development			23/06/23			**T1/R3**	
49		Design issues			23/06/23			**T1/R3**	
50		**TUTORIAL 9**			25/06/23			**T1/R3**	
51		Design techniques			25/06/23			**T1/R3**	
52		Case Study of Washing Machine			25/06/23			**T1/R3**	
53		Automotive Application			28/06/23			**T1/R3**	
54		Smart card System Application.			28/06/23			**T1/R3**	
55		**TUTORIAL 10**			28/06/23			**T1/R3**	

***L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating**

Syllabus for Sessional:

Sessional	Syllabus
CT1	Class# 1-17
CT2	Class# 18-37
Pre - AKTU	Full Syllabus

LESSON PLAN (SECTION –B)

Lecture #	Module #	Topics	RBT Levels	Course Outcome Mapping	Planned Date	Actual Date	Faculty Sign	Reference	Remarks
1	1	Introduction to Embedded Systems	L1	CO1	13/02/23			T1/R1	
2		The build process for embedded systems			16/02/23			T1/R1	
3		Structural units in Embedded processor			17/02/23			T1/R1	
4		selection of processor & memory devices			20/02/23			T1/R1	
5		**TUTORIAL 1**			23/02/23			T1/R3	
6		DMA			24/02/23			T1/R3	
7		Memory management methods			25/02/23			T1/R3	
8		Timer and Counting devices, Watchdog Timer			02/03/23			T1/R3	
9		Real Time Clock, In circuit emulator			03/03/23			T1/R3	
10		Target Hardware Debugging			04/03/23			T1/R3	
11		**TUTORIAL 2**			06/03/23			T1/R3	
12	2	Embedded Networking Introduction	L1	CO2	03/03/23			T1/R3	
13		I/O Device Ports & Buses			11/03/23			T1/R3	
14		Serial Bus communication protocols			03/03/23			T1/R3	
15		RS232 & RS422 standard			16/03/23			T1/R3	
16		**TUTORIAL 3**			17/03/23			T1/R3	
17		RS485 and CAN bus standard			24/03/23			T1/R3	
18		Serial Peripheral Interface (SPI)			31/03/23			T1/R3	
19		Inter Integrated Circuits (I2C)			1/04/23			T1/R3	
20		Need for device drivers.			3/04/23			T1/R3	
21		**TUTORIAL 4**			14/04/23			T1/R3	
22	3	Embedded Firmware	L1	CO3	15/04/23			T1/R3	
23		Embedded Firmware Development Environment			17/04/23			T1/R3	
24		Embedded Product Development			20/04/23			T1/R3	
25		Life Cycle objectives			24/04/23			T1/R3	
26		Different phases of EDLC			27/04/23			T1/R3	

27		**TUTORIAL 5**			29/04/23			**T1/R3**	
28		Modelling of EDLC			4/05/23			**T1/R3**	
29		Issues in Hardware-software Co-design			8/05/23			**T1/R3**	
30		Data Flow Graph			11/05/23			**T1/R3**	
31		Sequential Program Model, concurrent Model			13/05/23			**T1/R3**	
32		state machine model			14/05/23			**T1/R3**	
33		object oriented Mode			17/05/23			**T1/R3**	
34		**TUTORIAL 6**			19/05/23			**T1/R3**	
35		RTOS Based Embedded System			21/05/23			**T1/R3**	
36		Introduction to basic concepts of RTOS			24/05/23			**T1/R3**	
37		Task, process & threads			26/05/23			**T1/R3**	
38		Interrupt routines in RTOS			28/05/23			**T1/R3**	
39		Design concept Multiprocessing and Multitasking			31/05/23			**T1/R3**	
40		**TUTORIAL 7**			1/06/23			**T1/R3**	
41	**4**	Preemptive and non preemptive scheduling	**L1**	**CO4**	2/06/23			**T1/R3**	
42		Task communication shared memory, message passing			7/06/23			**T1/R3**	
43		Inter process Communication – synchronization between processes-semaphores			9/06/23			**T1/R3**	
44		Mailbox, pipes, priority inversion, priority inheritance			18/06/23			**T1/R3**	
45		comparison of Real time Operating systems: Vx Works, чC/OS-II, RT Linux			21/06/23			**T1/R3**	
46		**TUTORIAL 8**			22/06/23			**T1/R3**	
47		Embedded System Application Introduction			23/06/23			**T1/R3**	
48		Embedded System Application Development			23/06/23			**T1/R3**	
49		Design issues			23/06/23			**T1/R3**	
50	**5**	**TUTORIAL 9**	**L3**	**CO5**	25/06/23			**T1/R3**	
51		Design techniques			25/06/23			**T1/R3**	
52		Case Study of Washing Machine			25/06/23			**T1/R3**	
53		Automotive Application			28/06/23			**T1/R3**	
54		Smart card System Application.			28/06/23			**T1/R3**	
55		**TUTORIAL 10**			28/06/23			**T1/R3**	

***L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating**

Syllabus for Sessional:

Sessional	**Syllabus**
CT1	**Class# 1-17**
CT2	**Class# 18-37**
Pre - AKTU	**Full Syllabus**

Literature:

Text Books:

1. Wayne Wolf, “Computers as Components: Principles of Embedded Computer System Design”, Elsevier, 2006.
2. Michael J. Pont, “Embedded C”, Pearson Education , 2007.
3. Steve Heath, “Embedded System Design”, Elsevier, 2005.
4. Muhammed Ali Mazidi, Janice GillispieMazidi and Rolin D. McKinlay, “The 8051 5. Microcontroller and Embedded Systems”, Pearson Education, Second edition, 2007Text Books:

Sample Questions:

1.Write about tasks and processes in detail?

2. Write short notes on priority Scheduling?

3. Explain about Power optimization strategies for processes?

4. Explain in detail about Scheduling policies?

5. Write in detail about evaluating operating system performance?

6. Explain the function pointers, function queues and ISR queues.

7. Explain the real time operating systems

8. Explain interprocess communication and synchronization

9. Explain interprocess communications using signals

10. Explain process management and memory management in embedded system

11 .Explain in detail about Design methodologies.

12. Discuss about different types of design flows used for design methodologies.

13. Write short note on requirement analysis.

14. How do you perform state chart for AND and OR gate.

15. Explain in detail about CRC cards and methodologies.

16. Explain about quality assurance techniques.

17. Write about distributed embedded architecture.

18. Explain in detail about networks for embedded systems.

19. Write in detail about network based design and Internet enabled systems.

20. Explain how Internet can be used by embedded computing systems.

21. Discuss about different types of networks used in distributed embedded systems.

22. Illustrate I^2C bus with meaningful diagram

Assessment rubrics that is going to be adopted for direct attainment is depicted in below table

Level of Achievement	Elaboration on Course Grading Description	Bench Mark Set (Out of 100)
Excellent (A)	The Student's performance is outstanding in almost all the intended course learning outcomes	**75**
Good (B)	The student's performance is good in most of the intended course learning outcomes.	**60**
Marginal (C)	The student's performance is barely satisfactory. It marginally meets the intended course learning outcomes	**45**
Fail (F)	The Students performance is inadequate. Student fails to meet many of the intended course learning outcomes	**35**

NOTE: Have different Assessment pattern for tests, assignments, quizzes etc.

Staff In-charge **HOD**

Buddha Institute of Technology

Gorakhpur

Department of Electronics & Communication Engineering

ALLOTTMENT BASED ON COMPETENCY SKILLS

Academic Session: Jan – June 2023

Name of the Staff	Mr. Sudhir Shukla
Area of Specialization	Satellite Communication
Subject Allotted	Satellite Communication

Sl. #	Course Code	Course Title	Semester	Theory/Lab
1	KEC 062	Satellite Communication	VI A	Theory
2	KEC 062	Satellite Communication	VI B	Theory

HOD

Program	: B.Tech
Branch	: ECE
Semester	: VI
Session	: 2022-23
Name of the Course	: Satellite Communication
Code	: KEC 062
Name of the Course Instructor	: Mr. Sudhir Shukla
Designation	: Assistant Professor
Department	: Electronics & Communication Engineering

Course Outcome and Programme Outcome

Description of the Course Outcome:

CO	**After completion of the course students will be able to:**
CO 1	Define and list the benefits of satellite communication
CO 2	Demonstrate orbital mechanics principles of satellite communication systems and solve problems related to it
CO 3	Describe a satellite link and identify ways to improve the link performance.
CO 4	Classify new technologies of satellite communication systems as per given specifications.
CO 5	Examine advanced technologies of satellite launching and describe the Indian satellite system.

Buddha Institute of Technology, Gorakhpur				
Department: Electronics & Communication Engineering				
Academic Semester: Jan – June 2023				
Semester: VI	Section: A+B	Course Code: KEC 062	Course: Digital Communication	
Course Instructor: Sudhir Shukla		Contact Hours /week: 3+1	# of credits: 4	
CIE Marks: 50		SEE Marks: 100	Exam Hours: 3	

Prerequisites if any:			
Code No	Course Name	Description	Semester
KEC 062	Satellite Communication	Basic knowledge of Satellite, Types of satellite, launching and Technologies associated with satellite	VI

Content delivery:	Chalk & Board, PPT

COURSE SYLLABUS:

Module No	Contents of Module	Hrs	COs
1	**Introduction to Satellite Communication:** History, Overview of Satellite Communication, Types of Satellite, Types of Orbit, Satellite services, Advantages & Applications of Satellite communication, Satellite Life phases, Space Debris, Introduction to Geo-synchronous and Geo-stationary satellites.	8	1
2	**Orbital Mechanics:** Orbital Mechanics, Kepler's Three laws of Planetary Motion, Developing the Equations of the orbit, Look Angle Determination, Earth Stations, Orbital Perturbations, Orbital effects in Communication system performance.	8	2
3	**Satellite Sub-systems:** Seven segments of Satellite communication, Attitude and Orbit control systems, Telemetry, Tracking and command control system, Power supply system. Satellite Link Design: Basic transmission theory, System noise temperature and G/T ratio, Design of down link and uplink, Design of satellite links for specified C/N.	8	3
4	**Introduction to Various Satellite Systems:** VSAT, Direct broadcast satellite television and radio, Satellite navigation and the Global positioning systems, GPS position location principle, GPS receivers and codes, Satellite Signal Acquisition, GPS navigation Message, GPS Signal Levels, Timing Accuracy, GPS Receiver Operation.	8	4
5	**Launchers & Advanced Technologies:** Mechanism of Satellite launching, Launch Vehicles, Advanced launching tech like Space X, Intelligent Testing, Control and Decision making for Space, Inter Satellite Link. Indian Satellite Systems: History and Overview of Indian Satellite System, Achievements, GSLV, PSLV, Advanced Technology Vehicle.	8	5

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO 1	Define and list the benefits of satellite communication
CO 2	Demonstrate orbital mechanics principles of satellite communication systems and solve problems related to it
CO 3	Describe a satellite link and identify ways to improve the link performance.
CO 4	Classify new technologies of satellite communication systems as per given specifications.
CO 5	Examine advanced technologies of satellite launching and describe the Indian satellite system.

Mapping of CO v/s PO:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
KEC-601.1	3	2	1	2	1	1	-	-	-	2	1	-
KEC-601.2	3	2	1	2	2	1	-	-	-	3	2	-
KEC-601.3	3	2	2	3	2	2	-	-	-	2	1	-
KEC-601.4	3	2	2	2	2	2	-	-	-	2	2	-
KEC-601.5	3	2	2	3	2	2	-	-	-	2	1	-

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Mapping of CO v/s PSO:

CO	PSO1	PSO2
KEC-062.1	2	1
KEC-062.2	1	2
KEC-062.3	2	2
KEC-062.4	2	2
KEC-062.5	2	3

Gap in the syllabus	NA

Topics to be covered beyond syllabus	NA

Assessment Methodologies:

Sl. No.	Description	Type
1	Student Assignment	Direct
2	Internal assessment	Direct
3	University exam	Direct

4	Student feedback	Indirect
5	Alumni feedback	Indirect
6	Employers feedback	Indirect

LESSON PLAN Section -A

Lecture #	Module#	Topics	RBT Levels	Course Outcome Mapping	Planned Date	Actual Date	Faculty Sign	REFF.	Remarks
1	1	Introduction to Satellite Communication: History	L2	CO 1	14/02/23			T1/R3	
2		Overview of Satellite Communication			16/02/23			T1/R3	
3		Types of Satellite,			17/02/23			T1/R3	
4		**Tutorial**			20/02/23			T1/R3	
5		Types of Orbit			23/02/23			T1/R3	
6		Satellite services			24/02/23			T1/R3	
7		Advantages & Applications of Satellite communication			25/02/23			T1/R3	
8		**Tutorial**			02/03/23			T1/R3	
9		Satellite Life phases			03/03/23			T1/R3	
10		Space Debris			04/03/23			T1/R3	
11		Introduction to Geo-synchronous and Geo-stationary satellites			06/03/23			T1/R3	
12	2	**Tutorial**	L 2	CO 2	10/03/23			T1/R3	
13		Orbital Mechanics: Orbital Mechanics			11/03/23			T1/R3	
14		Kepler's Three laws of Planetary Motion,			13/03/23			T1/R3	
15		Developing the Equations of the orbit			16/03/23			T1/R3	
16		**Tutorial**			17/03/23			T1/R3	
17		Look Angle Determination			24/03/23			T1/R3	
18		Earth Stations, Orbital Perturbations			31/03/23			T1/R3	

19		Orbital effects in Communication system performance			1/04/23			**T1/R3**	
20		**Tutorial**			3/04/23			**T1/R3**	
21		Satellite Sub-systems:			14/04/23			**T1/R3**	
22	**3**	Seven segments of Satellite communication	**L2**	**CO 3**	15/04/23			**T1/R3**	
23		Attitude and Orbit control systems			17/04/23			**T1/R3**	
24		**Tutorial**			20/04/23			**T1/R3**	
25		Telemetry			24/04/23			**T1/R3**	
26		Tracking and command control system			27/04/23			**T1/R3**	
27		Power supply system			29/04/23			**T1/R3**	
28		**Tutorial**			4/05/23			**T1/R3**	
29		Satellite Link Design:			8/05/23			**T1/R3**	
30		Basic transmission theory			11/05/23			**T1/R3**	
31		System noise temperature and G/T ratio			13/05/23			**T1/R3**	
32		**Tutorial**			14/05/23			**T1/R3**	
33	**4**	Design of down link and uplink, Design of satellite links for specified C/N	**L 3**	**CO 4**	17/05/23			**T1/R3**	
34		Introduction to Various Satellite Systems: VSAT, Direct broadcast satellite television and radio			19/05/23			**T1/R3**	
35		Direct broadcast satellite television and radio			21/05/23			**T1/R3**	
36		**Tutorial**			24/05/23			**T1/R3**	
37		Satellite navigation and the Global positioning systems, GPS position location			26/05/23			**T1/R3**	

		principle							
38		GPS receivers and codes, Satellite Signal Acquisition			28/05/23			**T1/R3**	
39		GPS navigation Message, GPS Signal Levels			31/05/23			**T1/R3**	
40		**Tutorial**			01/06/23			**T1/R3**	
41		Timing Accuracy			02/06/23			**T1/R3**	
42		Launchers & Advanced Technologies:			7/06/23			**T1/R3**	
43		Mechanism of Satellite launching			9/06/23			**T1/R3**	
44		**Tutorial**			18/06/23			**T1/R3**	
45		Launch Vehicles			21/06/23			**T1/R3**	
46		Advanced launching tech like Space X			22/06/23			**T1/R3**	
47		Intelligent Testing			23/06/23			**T1/R3**	
48		**Tutorial**			23/06/23			**T1/R3**	
49		Control and Decision making for Space			23/06/23			**T1/R3**	
50	**5**	Inter Satellite Link	**L 4**	**CO 5**	25/06/23			**T1/R3**	
51		Indian Satellite Systems:			25/06/23			**T1/R3**	
52		**Tutorial**			25/06/23			**T1/R3**	
53		History and Overview of Indian Satellite System, Achievements			28/06/23			**T1/R3**	
54		GSLV			28/06/23			**T1/R3**	
55		PSLV			28/06/23			**T1/R3**	
56		**Tutorial**			30/06/23			**T1/R3**	
57		Advanced Technology Vehicle			30/06/23			**T1/R3**	

Syllabus for Sessionals:

Sessional	**Syllabus**
CT1	Class 1 – Class 19
CT2	Class 20 – Class 38
Pre- Aktu	Full Syllabus

LESSON PLAN Section B

Lecture #	Module#	Topics	RBT Levels	Course Outcome Mapping	Planned Date	Actual Date	Faculty Sign	REFF.	Remarks
1		Introduction to Satellite Communication: History			13/02/23			**T1/R3**	
2		Overview of Satellite Communication			15/02/23			**T1/R3**	
3		Types of Satellite,			16/02/23			**T1/R3**	
4		**Tutorial**			20/02/23			**T1/R3**	
5		Types of Orbit			23/02/23			**T1/R3**	
6	**1**	Satellite services	**L2**	**CO 1**	24/02/23			**T1/R3**	
7		Advantages & Applications of Satellite communication			27/02/23			**T1/R3**	
8		**Tutorial**			02/03/23			**T1/R3**	
9		Satellite Life phases			03/03/23			**T1/R3**	
10		Space Debris			06/03/23			**T1/R3**	
11		Introduction to Geo-synchronous and Geo-stationary satellites			10/03/23			**T1/R3**	
12		**Tutorial**			03/03/23			**T1/R3**	
13		Orbital Mechanics: Orbital Mechanics			13/03/23			**T1/R3**	
14	**2**	Kepler's Three laws of Planetary Motion,			03/03/23			**T1/R3**	
15		Developing the Equations of the orbit	**L 2**	**CO 2**	16/03/23			**T1/R3**	
16		**Tutorial**			17/03/23			**T1/R3**	
17		Look Angle Determination			24/03/23			**T1/R3**	
18		Earth Stations, Orbital Perturbations			31/03/23			**T1/R3**	
19		Orbital effects in			3/04/23			**T1/R3**	

		Communication system performance							
20		**Tutorial**			10/04/23			**T1/R3**	
21		Satellite Sub-systems:			13/04/23			**T1/R3**	
22	**3**	Seven segments of Satellite communication	**L2**	**CO 3**	14/04/23			**T1/R3**	
23		Attitude and Orbit control systems			17/04/23			**T1/R3**	
24		**Tutorial**			20/04/23			**T1/R3**	
25		Telemetry			24/04/23			**T1/R3**	
26		Tracking and command control system			27/04/23			**T1/R3**	
27		Power supply system			28/04/23			**T1/R3**	
28		**Tutorial**			4/05/23			**T1/R3**	
29		Satellite Link Design:			8/05/23			**T1/R3**	
30		Basic transmission theory			11/05/23			**T1/R3**	
31		System noise temperature and G/T ratio			12/05/23			**T1/R3**	
32		**Tutorial**			14/05/23			**T1/R3**	
33	**4**	Design of down link and uplink, Design of satellite links for specified C/N	**L 3**	**CO 4**	17/05/23			**T1/R3**	
34		Introduction to Various Satellite Systems: VSAT, Direct broadcast satellite television and radio			18/05/23			**T1/R3**	
35		Direct broadcast satellite television and radio			21/05/23			**T1/R3**	
36		**Tutorial**			24/05/23			**T1/R3**	
37		Satellite navigation and the Global positioning systems, GPS position location principle			25/05/23			**T1/R3**	

38		GPS receivers and codes, Satellite Signal Acquisition			28/05/23			**T1/R3**	
39		GPS navigation Message, GPS Signal Levels			31/05/23			**T1/R3**	
40		**Tutorial**			1/06/23			**T1/R3**	
41		Timing Accuracy			4/06/23			**T1/R3**	
42		Launchers & Advanced Technologies:			7/06/23			**T1/R3**	
43		Mechanism of Satellite launching			8/06/23			**T1/R3**	
44		**Tutorial**			18/06/23			**T1/R3**	
45		Launch Vehicles			20/06/23			**T1/R3**	
46		Advanced launching tech like Space X			20/06/23			**T1/R3**	
47		Intelligent Testing			21/06/23			**T1/R3**	
48		**Tutorial**			21/06/23			**T1/R3**	
49		Control and Decision making for Space			22/06/23			**T1/R3**	
50	**5**	Inter Satellite Link	**L 4**	**CO 5**	22/06/23			**T1/R3**	
51		Indian Satellite Systems:			25/06/23			**T1/R3**	
52		**Tutorial**			25/06/23			**T1/R3**	
53		History and Overview of Indian Satellite System, Achievements			27/06/23			**T1/R3**	
54		GSLV			27/06/23			**T1/R3**	
55		PSLV			28/06/23			**T1/R3**	
56		**Tutorial**			28/06/23			**T1/R3**	
57		Advanced Technology Vehicle			28/06/23			**T1/R3**	

***L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating**

Literature:

Text Books

1. B.Pratt, A.Bostian, "Satellite Communications", Wiley India, 2nd Edition,2006.

2. D. Roddy, "Satellite Communications", TMH, 4th Edition, 2001.

Reference Books

3. Digital Satellite Communications/ Tri T. Ha./ McGraw-Hill, 2nd Edition**.**

4. D.C. Agrawal, Satellite communication, Khanna Publishers; 7th Edition.

Sample Questions:

Question No.	Questions
1	What do you mean by a satellite Transponder?
2	What is the difference between geosynchronous and a geostationary satellite?
3	Explain the interpretation of kepler's laws.
4	With a neat sketch explain launching mechanism.
5	With a neat sketch, explain Telemetry, Tracking and command subsystem.
6	Derive link power budget equation.
7	Explain detail about the VSAT
8	What are polar orbiting satellites?
9	State kepler's three laws planetary motion. Explain their relevance to artificial satellites orbiting the earth.
10	List out the frequency bands used for satellite services.
11	Give the application of satellites.
12	What are look angles and derive the expressions for azimuth and elevation?
13	What is meant by perigee?
14	List the earth station parameters affecting the C/N ratio.
15	The cosmos 1675 satellite has an apogee height of 39342 Km and a Perigee height of 613Km. Determine the semi major axis and the eccentricity of its orbit. Assume a mean earth radius of 6371 Km.

16	Discuss in detail about Global Positioning satellite System.
17	Write brief notes on the advantages and disadvantages of using satellites in LEOs, MEOs and GEOs for mobile satellite communications.
18	What is meant by Hohmann transfer orbit?
19	Explain the effected of rain on satellite communication system.
20	Explain in detail transmit receive earth stations.
21	The EIRP of a 240 W transponder is 57 dBW. Calculate the approximate gain of the antenna. Suppose if this transponder is switched to 120 W.What will be the new EIRP, given the same antenna is used?
22	Write brief notes on the advantages and disadvantages of using satellites in LEOs, MEOs and GEOs for mobile satellite communications.
23	What is meant by apogee and perigee heights?
24	Explain the TDMA burst frame structure of satellite system with necessary diagrams.
25	Define false detection probability.

Assessment rubrics that is going to be adopted for direct attainment is depicted in below table

Level of Achievement	**Elaboration on Course Grading Description**	**Bench Mark Set (Out of 70)**
Excellent (A)	The Student's performance is outstanding in almost all the intended course learning outcomes	55 to 70
Good (B)	The student's performance is good in most of the intended course learning outcomes.	41 to 54
Marginal (C)	The student's performance is barely satisfactory. It marginally meets the intended course learning outcomes	21 to 40
Fail (F)	The Students performance is inadequate. Student fails to meet many of the intended course learning outcomes	Less than 21

Staff In- charge **HOD**

Buddha Institute of Technology

Gorakhpur

Department of Electronics & Communication engineering

ALLOTTMENT BASED ON COMPETENCY SKILLS

Academic Session: Jan – June2023

Name of the Staff	Dr. Rakesh Kumar Tiwari
Area of Specialization	Sociology, Universal Human Values and Professional Ethics, Law
Subject Allotted	Constitution of India, Law and Engineering

Sl.	Course Code	Course Title	Semester	Theory
1.	KNC-601	Constitution of India, Law and Engineering	6th	Theory
2.	KVE-401 KNC-502	Universal Human Values and Professional Ethics And Indian Tradition Culture and Society	3rdth & 5th	Theory

HOD

Program	:	B. Tech.
Branch	:	Civil Engineering
Semester	:	VIth
Session	:	2022-23
Name of the Course	:	Constitution of India, Law and Eng.
Code	:	KNC-601
Name of the Course Instructor	:	Dr. Rakesh Kr. Tiwari
Designation	:	Asst. Professor
Department	:	ASH

Course Outcome and Programme Outcome

Description of the Course Outcome:

CO	After completion of the course students will be able to:
KNC-601.1	Identify and explore the basic features and modalities about Indian constitution.
KNC-601.2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level.
KNC-601.3	Differentiate different aspects of Indian Legal System and its related bodies.
KNC-601.4	Discover and apply different laws and regulations related to engineering practices.
KNC-601.5	Correlate role of engineers with different organizations and governance models

Buddha Institute of Technology, Gorakhpur			
Department: ECE			
Academic Semester: Jan-June 2023			
Semester: VI	Section: A&B	Course Code: KNC-601	Course:COI
Course Instructor: Dr. Rakesh K. Tiwari		Contact Hours /week: 1	# of credits:NON
CIE Marks: 25		SEE Marks:100	Exam Hours: 3

Prerequisites if any:			
Course Code	**Course Name**	**Description**	**Semester**

Content delivery:	CHALK & BOARD, PPT, Video Lectures

COURSE SYLLABUS:			
Module No	**Contents of Module**	**Hrs**	**COs**
1	**Introduction and Basic Information about Indian Constitution:** Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947, Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.	**6**	**CO1**
2	**Union Executive and State Executive:** Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, LokAyukta, The Lokpal and Lokayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.	**4**	**CO2**
3	**Introduction and Basic Information about Legal System:**	**4**	**CO3**

	The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.		
4	**Intellectual Property Laws and Regulation to Information:** **Intellectual Property Laws**: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information-Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.	**4**	**CO4**
5	**Business Organizations and E-Governance:** **Sole Traders, Partnerships**: Companies: The Company's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.	**4**	**CO5**

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO	After completion of the course students will be able to:
KNC-601.1	Identify and explore the basic features and modalities about Indian Constitution.
KNC-601.2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level.
KNC-601.3	Differentiate different aspects of Indian legal system and its related bodies.
KNC-601.4	Discover and apply different laws and regulations related to engineering practices.
KCE 601.5	Correlate role of engineers with different organizations and governance models.

Mapping of CO v/s PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
KNC-601.1												
KNC-601.2												
KNC-601.3												
KNC-601.4												
KNC-601.5												
Average												

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Mapping of CO v/s PSO:

	PSO1	PSO2	PSO3
KCE064.1			
KCE064.2			
KCE064.3			
KCE064.4			
KCE064.5			

Gap in the syllabus	Practical approach

Topics to be covered beyond syllabus	Modern History

Assessment Methodologies:

Sl. No.	Description	Type
1	Student Assignment	Direct
2	Internal assessment	Direct
3	University exam	Direct
4	Student feedback	Indirect
5	Alumni feedback	Indirect
6	Employers feedback	Indirect

LESSON PLAN

Lecture #	Module #	Topics	RBT Levels	Course Outcome Mapping	Planned Date	Actual Date	Faculty Sign	Remarks
1	1	Meaning of the constitution law and constitutionalism, ,	L1	CO1	14/2/23			
2		Historical Background of the Constituent Assembly			21/2/23			
3		Government of India Act of 1935 and Indian Independence Act of 1947,			28/2/23			
4		Enforcement of the Constitution, Indian Constitution and its Salient Features			27/9/21			
5		, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties,			14/3/23			
6		Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure,			28/3/23			
7	2	The historical perspectives of the constitutional amendments in India,		CO2	4/4/23			
8		Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States,Local Self Government – Constitutional Scheme in India.Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism,			18/4/23			
9		LokPal, LokAyukta, The Lokpal and Lokayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister,			25/4/23			
10		Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.			9/5/23			

***L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating**

Text Books:

- Brij Kishore Sharma: *Introduction to the Indian Constitution*, 8th Edition, PHI Learning Pvt. Ltd.
- Granville Austin: *The Indian Constitution: Cornerstone of a Nation (Classic Reissue)*, Oxford University Press.
- S.G Subramanian: *Indian Constitution and Indian Polity*, 2nd Edition, Pearson Education

2020.
- Subhash C. Kashyap: *Our Constitution: An Introduction to India's Constitution and constitutional Law*, NBT, 2018.
- Madhav Khosla: *The Indian Constitution*, Oxford University Press.
- PM Bakshi: *The Constitution of India*, Latest Edition, Universal Law Publishing.
- V.K. Ahuja: *Law Relating to Intellectual Property Rights* (2007)
- Suresh T. Viswanathan: *The Indian Cyber Laws, Bharat Law House*, New Delhi-88
- P. Narayan: Intellectual Property Law, Eastern Law House, New Delhi
- PrabudhGanguli: *Gearing up for Patents: The Indian Scenario*, Orient Longman.
- BL Wadehra: Patents, Trademarks, *Designs and Geological Indications Universal Law* Publishing - LexisNexis.*Intellectual Property Rights: Law and Practice, Module III* by ICSI (only relevantsections)
- Executive programme study material Company Law, Module II, by ICSI (The Institute of Companies Secretaries of India) (Only relevant sections i.e., Study 1, 4 and36).https://www.icsi.edu/media/webmodules/publications/Company%20Law.pdf
- Handbook on e-Governance Project Lifecycle, Department of Electronics & Information Technology, Government of India, https://www.meity.gov.in/writereaddata/files/e-Governance_Project_Lifecycle_Participant_Handbook-5Day_CourseV1_20412.pdf
- Companies Act, 2013 Key highlights and analysis by PWC. https://www.pwc.in/assets/pdfs/publications/2013/companies-act-2013-key-highlightsand-analysis.pdf

Reference Books:

- Dr. J.N Pandey: *Constitutional Law of India; Central Law Agency*, IABN 81-940757-2-1
- M. Laxmikanth: Indian Polity; McGraw Hill Education, ISBN-13: 25-906412-8, 10-1-25906412-3

Assessment rubrics that is going to be adopted for direct attainment is depicted in below table

Level of Achievement	Elaboration on Course Grading Description	Bench Mark Set (Out of 100)
Excellent (A)	The Student's performance is outstanding in almost all the intended course learning outcomes	60 to 100
Good (B)	The student's performance is good in most of the intended course learning outcomes.	45 to 59
Marginal (C)	The student's performance is barely satisfactory. It marginally meets the intended course learning outcomes	30 to 44
Fail (F)	The Students performance is inadequate. Student fails to meet many of the intended course learning outcomes	Less than 30

NOTE: Have different Assessment pattern for tests, assignments, quizzes etc.

Department of Electronics & Communication Engineering						
PPC Lesson Plan (Feb - May 2023)						
	SEC : CE 6A					
S. No.	Scheduled		Conducted			No. of Students
	Topic	Faculty	Date	Topic	Faculty	
1	Review & Revision Questions	SKT				
2	Tense exercise Revision	SKT				
3	UnderStanding Hard Skills & Soft Skills	SKT				
4	Nuances of Group Discussion	SKT				
5	Mock Group Discussion	SKT				
6	Writing Cover Letters	SKT				
7	CV Writing	SKT				
8	Topic Presentation	SKT				
9	Grammar Revision Test	SKT				
10	Application of Preposition	SKT				
11	Application of Preposition	SKT				
12	Mock Verbal Ability Test	SKT				
13	Interview Concepts: Dos & Don’ts	SKT				
14	Mock Interview	SKT				
15	Mock GD	SKT				
16	Mock Test (Logical Reasoning)	SKT				
17	Test on Vocabulary	SKT				
18	Topic Presentation	SKT				
19	Mock Interview	SKT				
20	Mock Test	SKT				

Buddha Institute of Technology (525)						
DEPARTMENT OF ECE (3rd Year)						
PPC LESSON PLAN FEB-MAY 2023						
SCHEDULE			CONDUCTED			
S.NO.	TOPIC	FACULTY	DATE	TOPIC	FACULTY	NO. OF STUDENTS
1	PROBABILITY	SUDHAKER TRIPATHI				
2	PERMUTATIONS AND COMBINATIONS	SUDHAKER TRIPATHI				
3	HEIGHTS AND DISTANCES	SUDHAKER TRIPATHI				
4	VOLUME AND SURFACE AREAS	SUDHAKER TRIPATHI				
5	AREA	SUDHAKER TRIPATHI				
6	BOATS AND STREAMS	SUDHAKER TRIPATHI				
7	TIME AND WORK	SUDHAKER TRIPATHI				
8	TIME AND DISTANCE	SUDHAKER TRIPATHI				
9	PROBLEMS ON NUMBERS	SUDHAKER TRIPATHI				
10	AVERAGE	SUDHAKER TRIPATHI				
11	SIMPLE INTEREST	SUDHAKER TRIPATHI				
12	COMPOUND INTEREST	SUDHAKER TRIPATHI				
13	CALENDAR	SUDHAKER TRIPATHI				
14	CLOCKS	SUDHAKER TRIPATHI				
15	NUMBERS	SUDHAKER TRIPATHI				

Buddha Institute of Technology(525)						
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING						
Techedge Lesson Plan (Even Sem 2022-23) ECE VI Sem						
Class: ECE- 6A						
SL. NO.	**Scheduled**			**Conducted**		
	Topic	**Coordinator**	**Date**	**TOPIC**	**FACULTY**	**No Of Students**
1	Introduction and First Program	Sunit Kr. Jaiswal				
2	Variables and Data types	Sunit Kr. Jaiswal				
3	Console IO Operations	Sunit Kr. Jaiswal				
4	Operators and Expressions	Sunit Kr. Jaiswal				
5	Flow Controllers	Sunit Kr. Jaiswal				
6	Working with Functions	Sunit Kr. Jaiswal				
7	Working with Arrays	Sunit Kr. Jaiswal				
8	Pointers	Sunit Kr. Jaiswal				
9	String Handling	Sunit Kr. Jaiswal				
10	Structures and Unions	Sunit Kr. Jaiswal				
11	File Handling	Sunit Kr. Jaiswal				
12	Pre-Processor Directives	Sunit Kr. Jaiswal				
13	Command Line Arguments and Variable Arguments	Sunit Kr. Jaiswal				
14	Searching and Sorting	Sunit Kr. Jaiswal				
15	Stack	Sunit Kr. Jaiswal				
16	Queue					

Buddha Institute of Technology(525)						
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING						
Techedge Lesson Plan (Even Sem 2022-23) ECE VI Sem						
Class: ECE- 6(A+B)						
SL. NO.	**Scheduled**			**Conducted**		
	Topic	**Coordinator**	**Date**	**TOPIC**	**FACULTY**	**No Of Students**
1	Introduction of IoT and Robotics	Amreesh Tiwari				
2	Introduction of basic Electronic Component	Amreesh Tiwari				
3	Basic Led Glowing Circuit and Measure all Parameters	Amreesh Tiwari				
4	Sensor Based Automatic Circuit	Amreesh Tiwari				
5	Relay and its Circuit use in Automation	Amreesh Tiwari				
6	Introduction Of Arduino and its family	Amreesh Tiwari				
7	What is Microcontroller and Microprocessor	Amreesh Tiwari				
8	Use of Arduino with Actuators	Amreesh Tiwari				
9	Introduction of Sensors	Amreesh Tiwari				
10	Use of Arduino with Sensors	Amreesh Tiwari				
11	About NodeMCU and its Uses	Amreesh Tiwari				
12	Motor driver And Its Uses	Amreesh Tiwari				
13	Remote Controled Robot	Amreesh Tiwari				
14	Remote Controled appliances	Amreesh Tiwari				
15	IoT based Automation's	Amreesh Tiwari				
16	Project Research And Development	Amreesh Tiwari				

KEC 651 DIGITAL COMMUNICATION LAB (L-T-P 0-0-2) Credit – 1
PART -A (To be performed in lab)

1. To study generation of Unipolar RZ & NRZ Line Coding.
2. To study generation of Bipolar RZ & NRZ Line Coding.
3. Implementation and analysis of BASK modulation and demodulation
4. Implementation and analysis of BFSK modulation and demodulation
5. Implementation and analysis of BPSK modulation and demodulation.
6. To simulate M-ary Phase shift keying technique using MATLAB.
7. To study generation and detection of DPSK using MATLAB.
8. Implementation and analysis of Delta modulation and demodulation.
9. To study generation of Polar RZ & NRZ Line Coding.
10. To study encoding and decoding of Linear Block Codes
11. To study the working of Convolution encoder.
12. To study Eye diagram patterns of various digital pulses.
13. To study the inter symbol interference.

Note: A minimum of 8 experiments are to be performed from the list of Experiments.
PART B
1. To study simple dipole λ 2 antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
10.
2. To study folded dipole antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
3. To study λ 2 phase array end-fire antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
4. To study broadside array antenna and to calculate beam-width, front / back ratio, and gain of the antenna.

References:

1. B.P. Lathi, "Modern Digital and Analog communication Systems", 4th Edition, Oxford University Press.
2. John G. Proakis, "Digital Communications", 5th Edition, TMH.
3. H. Taub, D L Schilling, Gautam Saha, "Principles of Communication", 4th Edition, TMH.
4. Singh &Sapray, Communication Systems, 3th Edition, TMH.

KEC-652 CONTROL SYSTEM LAB 0L:0T:2P 1 Credit

1. Introduction to MATLAB Control System Toolbox.
2. Determine transpose, inverse values of given matrix.
3. Plot the pole-zero configuration in s-plane for the given transfer function.
4. Determine the transfer function for given closed loop system in block diagram representation.
5. Create the state space model of a linear continuous system.
6. Determine the State Space representations of the given transfer function.
7. Determine the time response of the given system subjected to any arbitrary input.
8. Plot unit step response of given transfer function and find delay time, rise time, peak time, peak overshoot and settling time.
9. Determine the steady state errors of a given transfer function.
10. Plot root locus of given transfer function, locate closed loop poles for different values of k.
11. Plot bode plot of given transfer function. Also determine gain and phase margins.

12. Plot Nyquist plot for given transfer function. Also determine the relative stability by measuring gain and phase margin.

Note: A minimum of 8 experiments are to be performed from the list of Experiments

References:

1. S. Hasan Saeed, "Automatic Control Systems (with Matlab Programs)", Katson Educational Series, 9th edition, 2020.
2. A. Anand Kumar, "Control Systems", Second Edition, PHI Learning private limited, 2014.
3. I. J. Nagrath& M. Gopal, "Control System Engineering", 6th Ed. New Age International Publishers, 2018

KEC-653C MICROCONTROLLERS FOR EMBEDDED SYSTEMLAB0L:0T:2P 1 Credit
PART -A (To be performed in lab)

1. Write a program of flashing LED connected to port 1 of the 8051 Micro Controller.
2. Write a program to generate 10 kHz squire wave using 8051.
3. Write a program to show the use of INT0 and INT1 of 8051.

Part B: Based on MSP 430

1. Write a program for temperature & to display on intelligent LCD display.
2. Write a program to generate a Ram waveform using DAC with micro controller.
3. Write a program to Interface GPIO port in C using MSP430 (blinking LEDs, push buttons)
4. Write a program Interface potentiometer with GPIO.
5. Write a program of PWM based Speed Controller of Motor controlled by potentiometer connected to GPIO.
6. Write a program of PWM generation using Timer on MSP430 GPIO.
7. Write a program to Interface an accelerometer.
8. Write a program using USB (Sending data back and forth across a bulk transfer-mode USB connection.)
9. Write a program for Master Slave Communication between 2MSP430s using SPI
10. Write a program of basic Wi-Fi application-Communication between two MSP430 based sensor nodes.
11. Setting up the CC3100 as a HTTP server.
12. Review of User APIs for TI CC3100 & Initialization and Setting of IP addresses.

Note: A minimum of 8 experiments are to be performed from the list of Experiments
Part B: Based on ARM Process:

1. To develop and verify the interfacing ADC and DAC with LPC 2148 Arm Micro Controller.
2. Interfacing of LED and PWM with Micro Controller. (ARM-) using embedded C program.
3. Interfacing of serial port with Am processor using embedded C-program.
4. Interfacing of key board and LCD with Arm processor using embedded C-Program.
5. To develop and verify Embedded C program mailbox using ARM.
6. To implement zigbee protocol with ARM program.
7. Implement the lighting and winking LEDs of the ARM I/O port via programming.
8. ARM programming in C language using KEIL IDE.
9. Demonstrate the TIMING concept of real time application using RTOS on ARM microcontroller kit.
10. Demonstrate the Multi-Tasking concept of real time application using RTOs on ARM microcontroller.
11. Demonstrate the RS 232 serial communication using RTOS on ARM microcontroller kit.
12. ISR (Interrupt Service Routine) programming in ARM based system with I/O port