

Koustuv Technical Campus, Plot No. 1 (A), Koustuv Square, Infocity Road, Patia, Bhubaneswar–751024, Odisha, India
[AFFILIATED TO BPUT, ODISHA]
www.coeb.ac.in

ADD-ON COURSE: Applied System Theory

[Programme: B.Tech, EEE/EE]

SYLLABUS

Total Lecture Hours: 40

Course Objectives:

This course delves into the principles, techniques, and practical applications of system theory in various fields, including engineering, biology, economics, and more. Students will learn to analyze, model, and optimize complex systems, and apply system theory to solve real-world problems.

MODULE-I Introduction to System Theory

[10 Hours]

Definition and scope of system theory, Importance of systems thinking, Applications of system theory in various disciplines, Types of systems: open, closed, deterministic, stochastic, System components and interactions, System modeling techniques: block diagrams, state-space representation.

MODULE-II LTI System

[10 Hours]

State Transition Matrix, Solutions to LTI Systems, Solutions to LTV Systems, Equilibrium points, Linearization, Types of Linearization with Examples, Stability, Types of Stability, Lyapunov Equation

MODULE-III Controllability & Observability

[10 Hours]

Controllability, Reachability, Stabilizability, Tests, Controllable and Reachable Subspaces, Grammians, Controllable Decomposition, Observability, Constructibility, Detectability, Tests, Subspaces, Grammians, State Estimation, Observable Decomposition.

MODULE-IV Controller Design

[10 Hours]

Kalman Decomposition, Pole Placement, Controller Design, Observer Design, Duality, Minimal Realization, Basics of Optimal Control, LQR, Ricatti Equation, LMIs in Control

Course Outcomes: After completion of the course, the students will be able to

CO1: Understand the fundamental concepts of system theory.

CO2: Apply system theory to analyze and model dynamic systems

CO3: Use system theory tools for optimization and control.

CO4: Apply system theory to address real-world problems across different domains.

CO5: Communicate system analyses effectively through reports and presentations.

Evaluation Process:

- 1. Attendance for the course is 75%, which is mandatory.
- 2. Minimum qualifying marks percentage for the course is 50.
- 3. Certificate will be issued after successful completion of course and assessment processes.

Learning resources:

Suggested Books:

- 1. Linear Algebra and its Applications by Gilbert Strang
- 2. Linear Systems Theory by J.H.Hespanha
- 3. Linear System Theory and Design by C.T.Chen
- 4. Introduction to Dynamic Systems by D.G. Luenberger
- 5. Linear Systems 1.111by P. Antsaklis and Anthony N. Michel

Other Sources:

e-Learning Resources:

https://onlinecourses.nptel.ac.in/noc23 ee144/preview
 Design and Developed by: Prof. Gopal Krishna Mohanty & Prof. Jagatjyoti Ranjan Das

Principal

Principal

HOD, Electrical Engineering

HOD

Electrical Engineering College of Engineering Bhubaneswar



Plot No.1 (A), CNI Complex, Patia, Bhubaneswar – 751024, Odisha, India.

[AFFILIATED TO BPUT, ODISHA]

www.coeb.ac.in

NOTICE

Department of Electrical Engineering Add On Course 2020-2021

Ref No: COEB/EE/2020/06

Date: 18.08.2020

It is hereby informed to all the students that the Department of Electrical Engineering is going to start the following Add-on courses for <u>Academic year 2020-2021</u> in ON_LINE Mode. All the students are instructed to enroll their names for the following courses <u>on or before 12/09/2020</u>. The classes will be commenced from **14/09/2020**, 5.30pm to 7.30pm. You can contact the following course co-ordinators for enrolment and further queries.

SI. No.	Name of Add-on Course	Sem	Duration in hours	Name of the course co- ordinators
1	Fundamentals of Domestic Appliances	3 rd	38	Dr. P Jagannatham, Assistant Professor
2	Applied System Theory	5 th	40	Anshuman Nayak, Assistant Professor.
3	Mastering MATLAB through guided problem solving	7 th	40	Dr. Prakash Chandra Sahu, Assistant Professor

HOD

Electrical Engineering Department

HOD

Electrical Engineering College of Engineering Bhubaneswar

Copy to: Principal All Notice Board. A.O(Admin) All HODs

Hostel, Security



COLLEGE OF ENGINEERING BHUBANESWAR (COEB) ADD-ON COURSE

STUDENT ENROLLMENT SHEET

Name of the Department: ELECTRICAL ENGINEERING

Course Title: Applied System Theory

Semester: 5th

Academic Year: 2020-21

Student's Declaration/Undertaking

- 1. I do hereby undertake to participate in the above mentioned add on course.
- 2. I do hereby, promise to abide by the admissible rules and regulations, concerning discipline, attendance, etc. of the department, and also to follow the Code of Conduct prescribed for the students of the Institute, as in force from time to time.

Sl. No.	Registration No.	Name of the Student	Signature of the Student
1	1801219004	ALOK BEHERA	
2	1801219016	ASHIS ASUTOSH PRADHAN	
3	1801219038	CHANDAN MALIK	
4	1801219075	MANAS PURTTY	
5	1801219076	MANAS RANJAN DALAI	
6	1801219085	NALIN SURIN	
7	1801219098	PRAKASH RANA	
8	1801219100	PRASANTA PATRA	
9	1801219104	PREMJYOTI SURYAKANTA OJHA	
10	1801219118	RAKESH PRADHAN	
11	1801219127	SANGRAM TARAI	
12	1801219164	SUVENDU SOURAV PRADHAN	
13	1801219173	VIKASH KUMAR	





COLLEGE OF ENGINEERING BHUBANESWAR (COEB) DEPARTMENT OF ELECTRICAL ENGINEERING ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Sheet No. 01

Programme: B.Tech in Electrical Engineering Semes

Name of the Course: Applied System Theory

Semester: 5th

Course Code (if any):

Academic Year: 2020-21

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ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Sheet No. 02

Programme: B.Tech in Electrical Engineering

Name of the Course: Applied System Theory

Semester: 5th

Course Code (if any):

Academic Year: 2020-21

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ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Sheet No. 03

Programme: B.Tech in Electrical Engineering
Name of the Course: Applied System Theory

Semester: 5th

Course Code (if any):

Academic Year: 2020-21

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ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Sheet No. 04

Name of the Course: Applied System Theory

Programme: B.Tech in Electrical Engineering

Semester: 5th

Course Code (if any):

Academic Year: 2020-21

Duration: 5/3 c SL. Reg. No./ NO. Enrollment No.	Duration: 5.3 opm - 7.30 pm SL. Reg. No./ NO. Enrollment No. NAME OF THE STUDENT	Date: 06/10/20	<u> </u>	Date & Signatur	Date & Signature of the Student Date: 07/10/20 Date: 08/10/20 Date: 09/10/20
1 18012190	1801219004 ALOK BEHERA	P	P	4	P
2 18012190	1801219016 ASHIS ASUTOSH PRADHAN	Þ.	A	A	P
3 18012190	1801219038 CHANDAN MALIK	7	P.	4	P
4 18012190	1801219075 MANAS PURTTY	P	P	P	P
5 18012190	1801219076 MANAS RANJAN DALAI	P	P	P	p
6 18012190	1801219085 NALIN SURIN	A	P	P	P
7 18012190	1801219098 PRAKASH RANA	7	P	P	P
8 1801219:	1801219100 PRASANTA PATRA	P	P	P	P
9 1801219:	1801219104 PREMJYOTI SURYAKANTA OJHA	P	P	P	A
10 1801219:	1801219118 RAKESH PRADHAN	P	P	ρ	P
11 1801219:	1801219127 SANGRAM TARAI	-6	P	P	P
12 1801219:	1801219164 SUVENDU SOURAV PRADHAN	P	P	P	P
13 1801219:	1801219173 VIKASH KUMAR	P	P	P	P
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ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Sheet No. 05

Programme: B.Tech in Electrical Engineering

Name of the Course: Applied System Theory

Semester: 5th

Course Code (if any):

Academic Year: 2020-21

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PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024





Octificate of Oompletion

conducted at College of Engineering Bhubaneswar in the academic year 2020-21	has successfully completed the ADD-ON Course titled	of Electrical Engg.	This is to certify that Mr./MsMANAS PURTTY
swar in the academic year 2020-21	se titledApplied System Theory	semester Fifth bearing registration numb	PURTTY
		number 1801219075	, student of the Department

TRUE COPYS BISWY

Course-Coordinator

Principal

& Bhy.



PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024





Certificate of Completion

conducted at College of Engineering Bhubaneswar in the academic year 2020-21	has successfully completed the ADD-ON Course titled Applied System Theory	of Electrical Engg semester Fifth bearing registration number	This is to certify that Mr./Ms. MANAS RANJAN DALAI , stu
		number 1801219076	student of the Department

RUE COPY BYBUTY

Course-Coordinator

Principal



PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024





Certificate of Completion

conducted at College of Engineering Bhubaneswar in the academic year 2020-21	has successfully completed the ADD-ON Course titled _	of Electrical Engg.	This is to certify that Mr./Ms. NALIN SURIN
ne academic year 2020-21	Applied System Theory	semester <u>Fifth</u> bearing registration number_	
	- 3	n number <u>1801219085</u>	student of the Department

SPECT-C

Course-Coordinator

Principal



PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024





Certificate of Completion

This is to certify that Mr./Ms	PRAKASH RANA semester Fifth	, student of the Department bearing registration number 1801219098
ofElectrical Engg.	semester Fifth	pearing registration number1801219098
has successfully completed the ADD-ON Course titled		Applied System Theory
conducted at College of Engine	conducted at College of Engineering Bhubaneswar in the academic year 20	2020-21

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Course-Coordinator

UE COPY

Principal



PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024





conducted at College of Engineering Bhubaneswar in the academic year 2020-21	has successfully completed the ADD-ON Course titled Applied System Theory	of Electrical Engg semester Fifth bearing registration number 1801219100 🔾	This is to certify that Mr./Ms. PRASANTA PATRA, student of the Department of the Dep	Certificate of Completion
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Course-Coordinator

Principal

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COLLEGE OF ENGINEERING BHUBANESWAR (COEB) ADD-ON COURSE

STUDENT ENROLLMENT SHEET

Name of the Department: ELECTRICAL AND ELECTRONICS ENGINEERING

Course Title: Applied System Theory

Semester: 5th

Academic Year: 2020-21

Student's Declaration/Undertaking

- 1. I do hereby undertake to participate in the above mentioned add on course.
- 2. I do hereby, promise to abide by the admissible rules and regulations, concerning discipline, attendance, etc. of the department, and also to follow the Code of Conduct prescribed for the students of the Institute, as in force from time to time.

Sl. No.	Registration No.	Name of the Student	Signature of the Student
1	1801219001	ABHISHEK	
2	1801219025	BHABANI SHANKAR MINZ	
3	1801219028	BIBEKANANDA MOHARANA	
4	1801219040	CHANDRACHUDA MAJHI	
5	1801219073	MAHIMA DANDASENA	
6	1801219093	OMKARNATH KHILAR	
7	1801219218	MANTU NAYAK	
8	1801219219	NILESH CHAUDHARY	
9	1801219220	PRAVATI NAYAK	
10	1801219221	SANDEEP BARLA	
11	1801219222	SATYABRATA PRADHAN	
12	1801219223	SITAKANTA SAHOO	
13	1801219224	SMRUTI RANJAN BISWAL	
14	1801219225	SUSHMITA DALAI	
15	1801219226	SWARAJ SAMANTRAY	





DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING COLLEGE OF ENGINEERING BHUBANESWAR (COEB) ADD ON/CERTIFICATE COURSE

Sheet No. 02

STUDENT ATTENDANCE SHEET

Engineering

Programme: B.Tech in Electrical and Electronics

Semester: 5th

Academic Year: 2020-21

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING COLLEGE OF ENGINEERING BHUBANESWAR (COEB)

ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Sheet No.__

Engineering Programme: B.Tech in Electrical and Electronics

Name of the Course: Applied System Theory

Semester: 5th

Academic Year: 2020-21

Duration: (5,30 57:30) 10 Signature of the Course Coordinator Enrollment No. 1801219226 SWARAJ SAMANTRAY 1801219225 SUSHMITA DALAI 1801219224 SMRUTI RANJAN BISWAL 1801219223 SITAKANTA SAHOO 1801219222 SATYABRATA PRADHAN 1801219001 ABHISHEK Reg. No./ 1801219220 PRAVATI NAYAK 1801219025 BHABANI SHANKAR MINZ 1801219221 SANDEEP BARLA 1801219219 NILESH CHAUDHARY 1801219218 MANTU NAYAK 1801219093 OMKARNATH KHILAR 1801219073 MAHIMA DANDASENA 1801219040 CHANDRACHUDA MAJHI 1801219028|BIBEKANANDA MOHARANA NAME OF THE STUDENT 23 Date: 25/09/20 Date: 28/09/20 Date: 29/09/20 Course Code (if any): Date & Signature of the Student Date: 30/09/20

College of Engineering Bhubaneswar



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING COLLEGE OF ENGINEERING BHUBANESWAR (COEB)

ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Sheet No. OU

Engineering Programme: B.Tech in Electrical and Electronics

Semester: 5th

Academic Year: 2020-21

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ADD ON/CERTIFICATE COURSE
STUDENT ATTENDANCE SHEET

Sheet No.

Programme: B.Tech in Electrical and Electronics

Engineering

Name of the Course: Applied System Theory

Semester: 5th

Course Code (if any):

Academic Year: 2020-21

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING COLLEGE OF ENGINEERING BHUBANESWAR (COEB) ADD ON/CERTIFICATE COURSE

STUDENT ATTENDANCE SHEET

Sheet No. 3

Engineering Name of the Course: Applied System Theory Programme: B.Tech in Electrical and Electronics Course Code (if any): Semester: 5th

Academic Year: 2020-21

Dura St.	Reg. No./	St. Reg. No./ NAME OF THE STREET		Date & Signatur		
•	Enrollment No.	NAME OF THE STUDENT	Date: 14/09/20	Date: 15/09/20	Date: 16,	109/20
Н	1801219001 ABHISHEK	ABHISHEK	P	P		P
2	1801219025	1801219025 BHABANI SHANKAR MINZ	0	D		d
ω	1801219028	1801219028 BIBEKANANDA MOHARANA	ף .	9		q
4	1801219040	1801219040 CHANDRACHUDA MAJHI	P	0		P
5	1801219073	1801219073 MAHIMA DANDASENA	p	5 5		ر ال
6	1801219093	1801219093 OMKARNATH KHILAR	p	b		J.
7	1801219218	1801219218 MANTU NAYAK	ρ.	P		ر ا
00	1801219219	1801219219 NILESH CHAUDHARY	ر ا	<u>ئ</u>		7
9	1801219220	1801219220 PRAVATI NAYAK	P	P		D "
10	1801219221	1801219221 SANDEEP BARLA	7	p		ر ب
11	1801219222	1801219222 SATYABRATA PRADHAN	₹ ·	A		P
12	1801219223	1801219223 SITAKANTA SAHOO	J.	<i>b</i> .		٠, ١
13	1801219224	1801219224 SMRUTI RANJAN BISWAL	p	P		P'
14	1801219225	1801219225 SUSHMITA DALAI	, p	P		P
15	1801219226	1801219226 SWARAJ SAMANTRAY	H	P		P
70	signature of t	Signature of the Course Coordinator	New	J. Mary C.	1.7	HOWAR



PLOT NO-1(A), CNI COMPLEX, PATIA, BHUBANESWAR, KHORDHA, ODISHA-751024





Oprificate of Oempletion

nas successfully completed the ADD-ON Course titled	Electrical & Electronics Engg seme	This is to certify that Mr./MsABHISHEK
Applied System Theory	semester Fifth bearing registration number 1801219001	, student of the Department

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2020-21

Story C

Course-Coordinator

Principal



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Certificate of Completion

	has succ	of	This is to
	has successfully completed the ADD-ON Course titled	Electrical & Electronics Engg.	This is to certify that Mr./Ms. BHABANI SHANKAR MINZ
		tronics Engg.	BHABANI SH
		semester	ANKAR
	Applied !	Fifth	MINZ
N.	Applied System Theory	semester Fifth bearing registration number 1801219025	
1200		r1801219025	student of the Department

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Optificate of Completion

has successfully completed the ADD-ON Course titled	of <u>Electrical & Electronics Engg.</u> semeste	This is to certify that Mr./MsCHANDRACHUDA MAJHI
Applied System Theory	semester Fifth bearing registration number 1801219040	MAJHI , student of the Department

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2020-21

Course-Coordinator

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Oertificate of Oompletion

nas successfully comple	ofElectrical	This is to certify that Mr./
has successfully completed the ADD-ON Course titled	Electrical & Electronics Engg.	This is to certify that Mr./MsMAHIMA DANDASENA
	_semester_Fif	NDASENA
Applied System Theory	semester Fifth bearing registration number 1801219073	
5	1801219073	student of the Department

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Course-Coordinator

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	ADD-ON Course titled	ctronics Engg.	OMKARNATH KHILAR
	Applied	semester Fifth	KHILAR
\$ \$	Applied System Theory	bearing registration number1801219093	, stuc
40		1801219093	, student of the Department

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