Department of

Electronics Telecommunication Engineering

CURRICULUM

Second Year B.Tech. Engineering Program
With effect from 2025-26

Institute

Vision

To be a reputed Technological and Management Institute imparting Quality Education and developing Core Human Values (H3).

(H3): Honest - Humble - Human Being

Mission

We are committed for Enrichment of the Institute by disseminating the knowledge to achieve academic excellence and develop industry ready technical manpower

Department

Vision

To improve the national asset by producing Electronics and Communication Engineers with high technical knowledge, self esteem, strong national feeling and good ethical practices.

Mission

1. To enrich staff & students with core knowledge in the field of E&TC.
2. To impart professionalism in aspiring engineers.
3. To aware students with social responsibilities & inculcate ethical values among staff & students.

Program Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4).
3. **Design/development of solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5).
4. **Conduct investigations of complex problems:** Conduct investigations of complex engineering problems using research- based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
5. **Modern tool usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).
6. **The engineer and The world:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
7. **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9).
8. **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

9. **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
10. **Project management and finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
11. **Life-long learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8).

Department of Electronics & Telecommunication Engineering

Program Specific Outcomes (PSOs)

Upon successful completion of UG course, the students will attain following Program Specific Outcomes:

1. Apply basic knowledge related to Electronics circuits, Embedded & wireless communication system and signal processing to solve engineering/ societal problems in the field of Electronics and Telecommunication Engineering

2. Recognize and adapt to technical developments and to engage in lifelong learning and develop consciousness for professional, social, legal and ethical responsibilities

3. Excellent adaptability to the changing industrial and real-world requirement

B.Tech. Program with one Major and one Minor (Credits)
Semester wise Indicative Credit Distribution

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course (BSC)	BSC/ESC	8	8							16
Engineering Science Course (ESC)		6	7							13
Programme Core Course (PCC)	Programme Courses	3		14	13	10	6	3	8	57
Programme Elective Course (PEC)						4	7	3	6	20
Multidisciplinary Minor (MDM)	Multi-disciplinary Courses			2	2	4	3	3		14
Open Elective (OE)						2	3	3		8
Vocational and Skill Enhancement Course (VSEC)	Skill Courses		3		2		3			8
Ability Enhancement Course (AEC -01), Modern Indian Language (AEC-02)	Humanities Social Science and Management (HSSM)	3			1					4
Entrepreneurship/Economics/ Management Courses (EEM)				2	2					4
Indian Knowledge System (IKS)			2							2
Value Education Course (VEC)				2	2					4
Internship / OJT (Int/OJT)	Experiential Learning Courses (ELC)					2		4	6	12
Project (Proj)								2	2	4
Community Engagement Activity (CEA) / Field Project (FP)				2				4		6
Co-curricular & Extracurricular Activities (CCA)	Liberal Learning Course (LLC)	2	2							4
Total Credits (Major)		22	22	22	22	22	22	22	22	176

Shri Ambabai Talim Sanstha's

SANJAY BHOKARE GROUP OF INSTITUTES, MIRAJ

Teaching and Evaluation Scheme

Program: B. Tech. Electronics & Telecommunication Engineering

Class.: **Second Year, B. Tech.** Semester: **SEM - III** W.E.F.: **2025-2026**

Sr. No.	Course Code	Course Title	Course Category	Teaching Scheme				Course Credits	Evaluation scheme						
				L	T	P	Contact Hrs/wk		Theory				Practical		Total
									CIE			ESE	CIE	ESE	
									CA-I	MSE	CA-II				
01	24ET301T	Applied Mathematics	PCC	3	-	-	3	3	15	15	20	50	-	-	100
02	24ET302T	Analog Electronics	PCC	3	1	-	4	4	15	15	20	50	-	-	100
03	24ET303T	Digital Design and VLSI	PCC	3	1	-	4	4	15	15	20	50	-	-	100
05	24ET304T	Industrial Management and Operational Research	EEM	2	-	-	2	2	15	15	20	50	-	-	100
04	24ET305T	Multidisciplinary Minor-I	MDM*	2	-	-	2	2	15	15	20	50	-	-	100
06	24UHV306T	Universal Human Values	VEC	2	-	-	2	2	15	15	20	50	-	-	100
07	24ET302L	Analog Electronics Lab	PCC	-	-	2	2	1	-	-	-	-	30	20*	50
08	24ET303L	Digital Design and VLSI Lab	PCC	-	-	2	2	1	-	-	-	-	30	20*	50
09	24T307L	PCB Design	PCC	-	-	2	2	1	-	-	-	-	50		50
10	24ET308L	Technical Paper Review Skills	CEP/ FP	-	-	4	4	2	-	-	-	-	60	40*	100
Total				**15**	**2**	**10**	**27**	**22**	**90**	**90**	**120**	**300**	**170**	**80**	**850**

L:Lecture, **T:**Tutorial, **P:**Practical, **CA-I:** Continuous Assessment-I, **CA-II:** Continuous Assessment-II, **CIE**: Continuous in Semester Evaluation, **ESE**: End Semester Examination

	BSC/ESC		Program Courses		Multidisciplinary Courses		Skill Courses	Humanities Social Science and Management (HSSM)				Experiential Learning Courses (ELC)			Liberal Learning Courses (LLC)
Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC-01, AEC-02	EEM	IKS	VEC	Int/OJT	Proj.	CEA/FP	CCA
Credits	-	-	14	-	2	-	-	-	2	-	2	-	-	2	-
Cum. Sum	**16**	**13**	**17**	**-**	**2**	**-**	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**2**	**4**

Teaching and Evaluation Scheme

Program: B. Tech. Electronics & Telecommunication Engineering

Class.: **Second Year, B. Tech.** Semester: **SEM - IV** W.E.F.: **2025-2026**

Sr. No.	Course Code	Course Title	Course Category	Teaching Scheme				Course Credits	Evaluation scheme						
				L	T	P	Contact Hrs/wk		Theory				Practical		Total
									CIE			ESE	CIE	ESE	
									CA-I	MSE	CA-II				
01	24ET401T	Network Theory	PCC	3	1	-	4	4	15	15	20	50	-	-	100
02	24ET402T	Analog and Digital Communication	PCC	3	1	-	4	4	15	15	20	50	-	-	100
03	24ET403T	Signal & System	PCC	3	-	-	3	3	15	15	20	50	-	-	100
04	24ET404T*	Multidisciplinary Minor-II	MDM	2	-	-	2	2	15	15	20	50	-	-	100
05	24ET405T	Python Programming	AEC	2	-	-	2	1	15	15	20	50	-	-	100
06	24COI406T	Constitution of India	VEC	2	-	-	2	2	25	25	--	--	-	-	50
07	24ET407T	Engineering Economics and Financial management	EEM	2	-	-	2	2	15	15	20	50	-	-	100
08	24ET402L	Analog and Digital communication lab	PCC	-	-	2	2	1	-	-	-	-	30	20	50
09	24ET409L	Model Based Design Lab	PCC	-	-	2	2	1	-	-	-	-	30	20	50
10	24ET410L	Skill and Innovation lab/IOT lab	VSEC	-	-	4	4	2	-	-	-	-	60	40	100
Total				**17**	**2**	**8**	**27**	**22**	**115**	**115**	**120**	**300**	**120**	**80**	**850**

L:Lecture, **T:**Tutorial, **P:**Practical, **CA-I:** Continuous Assessment-I, **CA-II:** Continuous Assessment-II, **CIE**: Continuous in Semester Evaluation, **ESE**: End Semester Examination

	BSC/ESC		Program Courses		Multidisciplinary Courses		Skill Courses	Humanities Social Science and Management (HSSM)				Experiential Learning Courses (ELC)			Liberal Learning Courses (LLC)
Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC-01, AEC-02	EEM	IKS	VEC	Int/OJT	Proj.	CEA/FP	CCA
Credits			13		2		2	1	2		2				
Cum. Sum	**16**	**13**	**30**	**-**	**4**	**-**	**5**	**4**	**4**	**2**	**4**	**-**	**-**	**2**	**4**

Teaching and Evaluation Scheme

Program: B. Tech. Electronics & Telecommunication Engineering

Class.: **Third Year, B. Tech.** Semester: **SEM - V** W.E.F.: **2025-2026**

Sr. No.	Course Code	Course Title	Course Category	Teaching Scheme				Course Credits	Evaluation scheme						
									Theory				Practical		Total
									CIE			ESE	CIE	ESE	
				L	T	P	Contact Hrs/wk		CA-I	MSE	CA-II				
01	24ET501T	Electromagnetic Field Theory	PCC	3	-	-	3	3	15	15	20	50	-	-	100
02	24ET502T	Digital Signal Processing	PCC	3	-	-	3	3	15	15	20	50	-	-	100
03	24ET503T	Microprocessor and Microcontroller	PCC	3	-	-	3	3	15	15	20	50	-	-	100
04	24ET504TA	Fiber Optic Communication	PEC	3	1	-	4	4	15	15	20	50	-	-	100
	24ET504TB	Computer Network													
	24ET504TC	Computer Organization and Architecture													
	24ET504TD	Information Theory & Coding													
05	24ET505T	Multidisciplinary Minor-III	MDM	3	-	-	3	3	15	15	20	50	-	-	100
06	24ET506TA	Control systems	OE	3	-	-	3	2	15	15	20	50	-	-	100
	24ET506TB	Artificial Intelligence and Machine Learning													
	24ET506TC	Wireless Sensor Networks													
	24ET506TD	Data Structure													
07	24ET503L	Microprocessor and Microcontroller Lab	PCC	-	-	2	4	1	-	-	-		30	20	50
08	24ET505L	Multidisciplinary Minor-III Lab	MDM	-	-	2	4	1	-	-	-		30	20	50
09	24ET507	Internship	ELC	-	-	-	-	2	-	-	-	-	-	-	50
Total				18	1	4	27	22	90	90	120	300	60	40	750

L:Lecture, **T:**Tutorial, **P:**Practical, **CA-I:** Continuous Assessment-I, **CA-II:** Continuous Assessment-II, **CIE**: Continuous in Semester Evaluation, **ESE**: End Semester Examination

	BSC/ESC	Program Courses	Multidisciplinary Courses	Skill Courses	Humanities Social Science and Management (HSSM)	Experiential Learning Courses (ELC)	Liberal Learning Courses (LLC)

Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC-01, AEC-02	EEM	IKS	VEC	Int/OJT	Proj.	CEA/FP	CCA
Credits			10	4	4	2						2			
Cum. Sum	**16**	**13**	**40**	**4**	**8**	**2**	**5**	**4**	**4**	**2**	**4**	**2**	**-**	**2**	**4**

Teaching and Evaluation Scheme

Program: B. Tech. Electronics & Telecommunication Engineering

Class.: **Third Year, B. Tech.** Semester: **SEM - VI** W.E.F.: **2025-2026**

Sr. No.	Course Code	Course Title	Course Category	Teaching Scheme				Course Credits	Evaluation scheme						
				L	T	P	Contact Hrs/wk		Theory				Practical		Total
									CIE			ESE	CIE	ESE	
									CA-I	MSE	CA-II				
01	24ET601T	Antennas and Wave Propagation	PCC	3	-	-	3	2	15	15	20	50	-	-	100
02	24ET602T	Embedded systems	PCC	3	-	-	3	3	15	15	20	50	-	-	100
03	24ET603TA	Power Electronics	PEC	3	-	-	3	3	15	15	20	50	-	-	100
	24ET603TB	Internet of Things													
	24ET603TC	CMOS Design													
	24ET603TD	Nano Electronics													
04	24ET604TA	Cyber Security	PEC	3	-	-	3	3	15	15	20	50	-	-	100
	24ET604TB	VLSI Design													
	24ET604TC	Satellite Communication													
	24ET604TD	Block Chain Technology													
05	24ET605T	Multidisciplinary Minor-IV	MDM	3	-	-	3	3	15	15	20	50	-	-	100
06	24ET606TA	Mechatronics	OE	3	-	-	3	3	15	15	20	50	-	-	100
	24ET606TB	Deep Learning													
	24ET606TC	Automotive Electronics													
	24ET606TD	Data Compression & Encryption													
07	24ET607L	PLC SCADA	VSEC	3	-	-	3	3	15	15	20	50	-	-	100
08	24ET601L	Antennas and Wave Propagation Lab	PCC	-	-	2	4	1	-	-	-	-	30	20	50
10	24ET603LA	Power Electronics Lab	PEC	-	-	2	4	1	-	-	-	-	30	20	50
	24ET603LB	Internet of Things Lab													
	24ET603LC	CMOS Design Lab													
	24ET603LD	Nano Electronics Lab													
Total				21	-	4	29	22	105	105	140	350	60	40	800

L:Lecture, **T:**Tutorial, **P:**Practical, **CA-I:** Continuous Assessment-I, **CA-II:** Continuous Assessment-II, **CIE**: Continuous in Semester Evaluation, **ESE**: End Semester Examination

	BSC/ESC		Program Courses		Multidisciplinary Courses		Skill Courses	Humanities Social Science and Management (HSSM)				Experiential Learning Courses (ELC)			Liberal Learning Courses (LLC)
Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC-01, AEC-02	EEM	IKS	VEC	Int/OJT	Proj.	CEA/FP	CCA
Credits			6	7	3	3	3								
Cum. Sum	**16**	**13**	**46**	**11**	**11**	**5**	**8**	**4**	**4**	**2**	**4**	**2**	**-**	**2**	**4**

Teaching and Evaluation Scheme

Program: B. Tech. Electronics & Telecommunication Engineering

Class.: **Final Year, B. Tech.** Semester: **SEM - VII** W.E.F.: **2025-2026**

Sr. No.	Course Code	Course Title	Course Category	Teaching Scheme				Course Credits	Evaluation scheme						
									Theory				Practical		Total
									CIE			ESE	CIE	ESE	
				L	T	P	Contact Hrs/wk		CA-I	MSE	CA-II				
01	24ET701T	Microwave Engineering	PCC	3	-	-	3	2	15	15	20	50	-	-	100
02	24ET702TA	Digital Image Processing	PEC	3	-	-	3	3	15	15	20	50	-	-	100
	24ET702TB	Radar Engineering													
	24ET702TC	Speech Processing													
	24ET702TD	Bio-medical Signal Processing													
03	24ET703T	Multidisciplinary Minor-V	MDM	3	-	-	3	3	15	15	20	50	-	-	100
04	24ET704TA	Robotics Design	OE	3	-	-	3	3	15	15	20	50	-	-	100
	24ET704TB	Computer Vision													
	24ET704TC	Advanced Digital Signal Processing													
	24ET704TD	Mobile Computing													
05	24ET705T	Research Methodology	ELC	3	-	-	3	4	15	15	20	50	-	-	100
06	24ET701L	Microwave Engineering Lab	PCC	-	-	2	4	1	-	-	-		30	20	50
07	24ET707L	Project	ELC	-	-	4	8	2	-	-	--		100	100	200
08	24ET708	Internship	ELC	-	-	-	-	4	-	-	--		100		100
Total				**15**	**0**	**6**	**27**	**22**	**75**	**75**	**100**	**250**	**230**	**120**	**850**

L:Lecture, **T:**Tutorial, **P:**Practical, **CA-I:** Continuous Assessment-I, **CA-II:** Continuous Assessment-II, **CIE**: Continuous in Semester Evaluation, **ESE**: End Semester Examination

	BSC/ESC		Program Courses		Multidisciplinary Courses		Skill Courses	Humanities Social Science and Management (HSSM)				Experiential Learning Courses (ELC)			Liberal Learning Courses (LLC)
Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC-01, AEC-02	EEM	IKS	VEC	Int/OJT	Proj.	CEA/FP	CCA
Credits			3	3	3	3						4	2	4	
Cum. Sum	**16**	**13**	**49**	**14**	**14**	**8**	**8**	**4**	**4**	**2**	**4**	**6**	**2**	**6**	**4**

Teaching and Evaluation Scheme

Program: B. Tech. Electronics & Telecommunication Engineering

Class.: **Final Year, B. Tech.** Semester: **SEM - VIII** W.E.F.: **2025-2026**

Sr. No.	Course Code	Course Title	Course Category	Teaching Scheme				Course Credits	Evaluation scheme						
				L	T	P	Contact Hrs/wk		Theory				Practical		Total
									CIE			ESE	CIE	ESE	
									CA-I	MSE	CA-II				
01	24ET801T	Mobile communication Network	PCC	3	1	-	4	4	15	15	20	50	-	-	100
02	24ET802T	Real Time Operating System	PCC	3	-	-	3	3	15	15	20	50	-	-	100
03	24ET803TA	AI for Medical Imaging	PEC	3	-	-	3	3	15	15	20	50	-	-	100
	24ET803TB	Cloud Computing													
	24ET803TC	Block Chain Technology													
	24ET803TD	Natural language Processing													
05	24ET804TA	6 G Communication	PEC	3	-	-	3	3	15	15	20	50	-	-	100
	24ET804TB	Augmented Reality													
	24ET804TC	Quantum Computing													
	24ET804TD	Big Data Analytics													
06	24ET801L	Mobile communication Network Lab	PCC	-	-	2	4	1	-	-	-	-	30	20	100
07	24ET805L	Project	ELC	-	-	4	8	2	-	-	--	-	100	100	200
08	24ET806	Internship	ELC	-	-	-	-	6	-	-	--	-	100	50	200
Total				12	1	6	25	22	60	60	80	200	230	170	850

L:Lecture, **T:**Tutorial, **P:**Practical, **CA-I:** Continuous Assessment-I, **CA-II:** Continuous Assessment-II, **CIE**: Continuous in Semester Evaluation, **ESE**: End Semester Examination

	BSC/ESC		Program Courses		Multidisciplinary Courses		Skill Courses	Humanities Social Science and Management (HSSM)				Experiential Learning Courses (ELC)			Liberal Learning Courses (LLC)
Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC-01, AEC-02	EEM	IKS	VEC	Int/OJT	Proj.	CEA/FP	CCA
Credits			8	6								6	2		
Cum. Sum	**16**	**13**	**56**	**20**	**14**	**8**	**8**	**4**	**4**	**2**	**4**	**12**	**4**	**6**	**4**

Multidisciplinary Minor (MDM)

- Students should select any one minor, excluding those offered by their parent department, from the diverse range of minors available.
- Students should complete all courses within their selected minor in order to earn credits.

MDM Name	Sr. No	Course Code	Course Name	Sem	Offered by Department
	1				Civil Engineering
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				
	1				Computer Science (AIML) Engineering
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				
	1				Computer Science Engineering
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				
	1				Electrical Engineering
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				

	10				
	1	25ET304T	Analog Communication		Electronics & Telecommunication Engineering
	2	25ET404T	Digital Communication		
	3	25ET505T	Wireless Communication		
	4	25ET505L	Wireless Communication Lab		
	5	25ET605T	Computer Network		
	6	25ET703T	Optical Communication Network		
	7				
	8				
	9				
	10				
	1				Electronics & Computer Engineering
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				
	1				Mechanical Engineering
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				

Second Year B. Tech (Electronics & Telecommunication Engineering) Semester -III

Course Code	24ET301T	Course Name	Applied Mathematics			
Teaching Scheme			Evaluation Scheme			
L	T	Credits	CA-I	MSE	CA-II	ESE
03	0	03	15	20	15	50

Course Prerequisites:

1. Fundamentals of Engineering Mathematics – Knowledge of calculus (differentiation, integration, and differential equations), sequences and series, and basic concepts of linear algebra.

2. **Basics of Complex Numbers and Functions** – Understanding of exponential, logarithmic, and trigonometric functions, along with familiarity with complex numbers and their algebra.

Course Objective:

1. To introduce fundamental concepts of Laplace Transform & Inverse Laplace transform and its applications.
2. To introduce Partial Differential Equations and its Applications
3. To develop Mathematical skills and enhance thinking power of students.
4. To introduce Mathematics and their applications in engineering fields

Course Outcome:

CO-1	Comprehend the fundamental knowledge of the Laplace transforms and its properties for elementary functions
CO-2	Use Laplace Transform and Inverse Laplace Transform to solve linear differential equations with constant coefficients
CO-3	Understand the Fourier transform and its properties
CO-4	Apply PDEs for solving Engineering problems.
CO-5	Apply numerical methods for differentiation and integration to solve engineering problems.

Course Contents

Unit-I	**Laplace Transform**	Hours: 9
Definition – conditions for existence ; Transforms of elementary functions ; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n, scale change property, transforms of functions divided by t, transforms of integral of functions, transforms of derivatives ; Evaluation of integrals by using Laplace transform ; Transforms of some special functions- periodic function, Heaviside unit step function, Dirac delta function.		
Unit-II	**Inverse Laplace Transform**	Hours: 9
Introductory remarks; Inverse transforms of some elementary functions; General methods of finding inverse transforms; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients		
Unit-III	**Fourier Transform**	Hours: 9
Definitions – integral transforms; Fourier integral theorem (without proof); Fourier sine and cosine integrals; Complex form of Fourier integrals; Fourier sine and cosine transforms; Properties of Fourier transforms; Parseval's identity for Fourier Transforms.		
Unit-IV	**Partial Differential Equations and Their Applications**	Hours: 9

Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables – applications to find solutions of one-dimensional heat flow equation (∂u ∂t = c 2 ∂ 2u ∂x 2), and one-dimensional wave equation (i.e.∂ 2y ∂t 2 = c 2 ∂ 2y ∂x 2).		
Unit-V	**Numerical Differentiation and Integration**	Hours: 9
Numerical differentiation, methods based on interpolation, Error analysis, numerical integration, methods based on interpolation, Newton cotes methods, Error estimates for trapezoidal and Simpson's rule.		
Text Books:		
1. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi. 2. A course in Engineering Mathematics (Vol III) by Dr. B. B. Singh, Synergy Knowledgeware, Mumbai. 3. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi. 4. "A Text Book of Applied Mathematics", P. N. and J. N. Wartikar, Vol I and II", Vidyarthi Griha Prakashan, Pune, 2006. 5. "Introductory Methods of Numerical Analysis", S.S. Sastry, 3rd edition, Prentice Hall of India, 1999.		
Reference Books:		
1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York. 2. A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pte Ltd., Singapore. 3. Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., New Delhi. 4. "Advanced Engineering Mathematics", Wylie C.R, Tata McGraw Hill Publication, 8th Edition, 1999. 5. "Fundamentals of Mathematical Statistics", Gupta and Kapoor, S. Chand & Sons Publishers, 10th Edition, 2000. 6. "Numerical methods for scientific and Engineering Computation", M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age International Limited Publishers.		
MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:		

Second Year B. Tech (Electronics & Telecommunication Engineering Engineering) Semester -III

Course Code	24ET302T	Course Name	Analog Electronics			
Teaching Scheme			Evaluation Scheme			
L	T	Credits	CA-I	MSE	CA-II	ESE
03	0	03	15	20	15	50

Course Prerequisites:

1. Basic Electronics – Knowledge of semiconductor physics, PN junction diode, Zener diode, rectifiers, and Bipolar Junction Transistors (BJT) along with their characteristics and biasing.
2. Network Analysis and Circuit Theory – Understanding of electrical circuit laws (Ohm's law, KVL, KCL), Thevenin's and Norton's theorems, AC/DC circuit analysis, and basic resonance concepts.

Course Objective:

1. Familiarize with FET and MOSFET devices and explore their amplification capabilities in various configurations.
2. Study the design and analysis of power amplifiers and understand the role and types of negative feedback in electronic circuits.
3. To understand the internal structure, characteristics, and configurations of operational amplifiers and analyze their frequency response and performance parameters.
4. To study and design various linear and nonlinear op-amp based circuits for signal conditioning and processing applications
5. To explore the principles of oscillation and develop sinusoidal and non-sinusoidal waveform generators using op-amps and IC555.

Course Outcome:

CO-1	Analyze the performance of JFET and MOSFET devices in various amplifier configurations.
CO-2	Classify and compare power amplifier types and apply negative feedback in amplifier circuits.
CO-3	Explain op-amp architecture, characteristics, and configurations with frequency response and slew rate considerations.
CO-4	Design and analyze various op-amp based linear and nonlinear circuits
CO-5	Design and implement sinusoidal and non-sinusoidal signal generators

Course Contents

Unit-I	**Junction Field Effect Transistor and MOSFET**	Hours: 9

JFET: JFET and its characteristics, pinch off voltage, drain saturation current, JFET amplifiers, CS, CD, CG amplifiers, Biasing the FET.

MOSFET: Overview of DMOSFET, EMOSFET, CMOS devices, MOSFET as an Amplifier, Comparison of FET with MOSFET and BJT w.r.t. to device and Circuit parameter.

Unit-II	**Power and Feedback amplifiers**	Hours: 9

Power amplifiers: Introduction, classification of power amplifiers -A, B, AB and C , transformer coupled class A amplifier, Class B push pull and complementary symmetry amplifier.

Feedback amplifiers: Principle of Negative feedback in electronic circuits, Voltage series, Voltage shunt, Current series, Current shunt types of Negative feedback amplifiers.

Unit-III	**Introduction to op-amp**	Hours: 9

Block diagram of OP-AMP, Differential amplifier analysis (AC & DC) for dual-input balanced-output configuration, practical parameters of OP-AMP, Comparative study of OP 07, LM 741, LM 311, Transfer characteristics of op-amp, Virtual ground concept, Open loop configuration, closed loop configuration, unity gain amplifier, frequency Response of both configurations, Slew Rate. Effects of slew rate.

Unit-IV	**Applications of Operational Amplifiers**	Hours: 9

Summing, Scaling & Averaging Amplifiers using Op-amps, Differential amplifier using op-amp, Subtractor Circuit, Instrumentation amplifier, V to I & I to V Converter, Precision Rectifiers, Study of comparator, Schmitt Trigger, Clippers & Clampers, Peak Detectors, Sample & Hold Circuits, Integrator and Differentiator. High Pass filter, Low Pass filter

Unit-V	**Signal Generators**	Hours: 9

Barkhausen criteria for oscillation, Analysis & Design of RC phase shift oscillator, RC Wein bridge oscillator, Colpitts oscillator, Hartley oscillator. Analysis & Design of Square wave generator, Triangular wave generator, Sawtooth wave generator, IC555 as Astable and Monostable Multivibrator.

Text Books:

1. Integrated Electronics Analog Digital Circuits, Jacob Millman and D. Halkias, McGraw Hill.
2. Ramakant. A. Gayakwad, “Op-Amps & Linear Integrated Circuits”, 4th Edition, PHI, 2010.
3. Electronic Devices and Circuits Theory, Boylsted, Prentice Hall Publications.
4. Electronic Devices and Circuits, S.Salivahanan,N.Suresh kumar, McGraw Hill.
5. Sergio Franco, “Design with op-amp & Analog Integrated Circuits”, 3rd Edition, Tata McGraw Hill,2011.
6. Salivahanan & Bhaaskaran, “Linear Integrated Circuits”, 1st Edition, Tata McGraw, 2012
7. Brijesh Iyer, S. L. Nalbalwar, R. Dudhe, “Electronics Devices & Circuits”, Synergy
8. Knowledge ware Mumbai, 2017.ISBN:9789383352616
9. Electronic Devices and Circuits,A.P Godse, U.A Bakshi , Technical Publications
10. Principles of Electronics,V.K.Mehta,Rohit Mehta,S.Chand publications.

Reference Books:

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

Second Year B. Tech (Electronics & Telecommunication Engineering) Semester -III

Course Code	24ET303T		Course Name	Digital Design and VLSI			
Teaching Scheme				Evaluation Scheme			
L	T	Credits		CA-I	MSE	CA-II	ESE
03	0	03		15	20	15	50

Course Prerequisites:

1. Basic Electrical and Electronics Engineering – Knowledge of number systems, binary arithmetic, logic gates, and basic circuit concepts.

2. Fundamentals of Digital Electronics – Understanding of Boolean algebra, basic combinational circuits (adders, multiplexers), and flip-flop concepts.

Course Objective:

After completion of the course, students will have adequate background, conceptual clarity and knowledge of appropriate solution techniques related to:

1. The concept and theory of digital Electronics are needed in almost all electronics and telecommunication engineering fields and in many other engineering and scientific disciplines as well.

2. The main objective of this course is to lay the foundation for further studies in areas such as communication, VLSI, computer, microprocessor etc. One of the most important reasons for the unprecedented growth of digital electronics is the advent of integrated circuit.

3. This course will explore the basic concepts of digital electronics

Course Outcome:

CO-1	Apply Boolean algebra, K-maps, and logic simplification techniques to design combinational logic circuits.
CO-2	Analyze and implement digital arithmetic units using MSI devices and ALU structures.
CO-3	Design sequential logic circuits, counters, shift registers, and finite state machines.
CO-4	Compare logic families, memory elements, and implement circuits using PLDs and FPGA.
CO-5	Develop and simulate combinational and sequential circuits using VHDL in VLSI design flow.

Course Contents

Unit-I	**Combinational Logic Circuits :**	Hours: 9

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan,,sTheorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion

Unit-II	**Digital Arithmetic Units**	Hours: 9

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

Unit-III	**Sequential Logic Design**	Hours: 9

Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation.

Unit-IV	**Digital Logic and PLDs**	Hours: 9

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA.Logic implementation using Programmable Devices.

Unit-V	**VLSI Design**	Hours: 9

VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Introduction to VHDL: Behavioral – data flow, and algorithmic and structural description, Basic Elements, data objects, data types, attributes, operators; VHDL coding examples, combinational circuit design examples in VHDL and simulation.

Text Books:

1. M.Morris Mano and Michel.D.Ciletti, Digital Design with an introduction to HDL, VHDL and Verilog, Sixth edition Pearson education
2. R. Anand, Digital System Design Using VHDL, Khanna Book Publishing Company.
3. R. Anand, Digital Electronics, Khanna Book Publishing Company.
4. R.P. Jain, —Modern digital Electronics‖, Tata McGraw Hill, 4th edition, 2009.
5. Douglas Perry, —VHDL‖, Tata McGraw Hill, 4th edition, 2002.
6. W.H. Gothmann, —Digital Electronics- An introduction to theory and practice‖, PHI, 2nd edition ,2006.
7. D.V. Hall, —Digital Circuits and Systems‖, Tata McGraw Hill, 1989

Reference Books:

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

Second Year B. Tech (Electronics & Telecommunication Engineering) Semester -III

Course Code	24ET305T		Course Name	Industrial Management and Operation Research			
Teaching Scheme				Evaluation Scheme			
L	T	Credits		CA-I	MSE	CA-II	ESE
03	0	03		15	20	15	50

Course Prerequisites:

1. Fundamentals of Management and Economics – Basic understanding of organizational structure, business environment, and economic principles.

2. Applied Mathematics – Knowledge of matrices, linear equations, and basic optimization concepts to support Operations Research techniques like LPP, Assignment, and Transportation models.

Course Objective:

1. State the various functions of management.
2. Know various functional areas of management.
3. Aware about the norms of industrial safety, business ethics, MIS, Industrial Safety and procedure to start small scale industries.
4. Apply the various models of operation research such as assignment model, transportation model, Linear programming model, Decision Theory Model, Network Model and Sequencing Model. To relate the concepts of management with industrial organizations.

Course Outcome:

CO-1	Understand and apply the core functions of management including planning, organizing, staffing, leading, and controlling.
CO-2	Analyze marketing strategies, materials management, and cost concepts to support effective business operations.
CO-3	Evaluate business ethics, entrepreneurship development, small-scale industry procedures, industrial safety, and MIS concepts
CO-4	Formulate and solve linear programming problems using graphical and simplex methods for decision-making.
CO-5	Apply assignment and transportation models, including optimization techniques, to solve real-world operational problems.

Course Contents

Unit-I	**Functions of Management:**	Hours: 9

Definition of Management, Management environment. Planning – Need, Objectives, Strategy, policies, Procedures, Steps in Planning, Decision making Forecasting. Organizing – Process of Organizing importance and principle of organizing, departmentation, Organizational relationship,

Authority, Responsibility, Delegation, Span of control. Staffing – Nature, Purpose, Scope, Human resource management, Policies, Recruitment procedure training and development, appraisal methods. Leading – Communication process, Barriers, remedies, motivation, importance, Theories, Herzberg's theory, Maslow's theory, McGrager's theory, leadership style. Controlling – Process, requirement for control Management, accountability.

Unit-II	**Marketing management, Materials management and Costing**	Hours: 9

I. Marketing Management: Marketing Concepts –Objective –Types of markets – Market Segmentation, Market strategy – 4 APs of market, Market Research, Salesmanship, Advertising.
II. Materials Management: Definition, Scope, advantages of materials management, functions of materials management, Purchase Objectives, 5-R Principles of purchasing, Functions of Purchase department, Purchasing cycle, Purchase policy & procedure, Evaluation of Purchase Performance.
III. Costing: Elements of Costs, Cost estimation, Cost control and Cost reduction.

Unit-III	**Ethics, EDP, SSI, Industrial Safety, MIS**	Hours: 9

I. Environmental factors influencing business, Business ethics and social responsibility of business, effect of globalization.
II. Concept of an entrepreneur, Entrepreneurship development, Qualities requires to become entrepreneurs,
III. Definition, Procedure to start Small Scale Industry. Assistance and Incentives offered to SSI, Problems of SSI, Feasibility report writing.
IV. Industrial Safety – Reasons for accidents, prevention of accidents, Promotion of Safety mindness.
V. Introduction to management information system, Introduction to ISO 9001 procedure

Unit-IV	**Introduction to OR and Linear Programming Problems:**	Hours: 9

Introduction: History and development of OR, Applications, modeling in OR, OR models and their applications.

Linear Programming Problems: Formulation of problem, Graphical solution, Simplex procedure for maximization and minimization, Big M Method, Duality concept.

Unit-V	**Assignment Model and Transportation Model:**	Hours: 9

Assignment Model: Mathematical statement, Methods to solve balanced and unbalanced assignment problems, Maximization problems, Assignment with restrictions, Traveling salesman problem.
Transportation Model: Mathematical formulation, methods to obtain initial basic feasible solution (IBFS), NWCR, Least Cost and VAM, conditions for testing

Text Books:

1. Management – James A.F. Stoner, R. Edward Freeman, Prentice Hall of India New Delhi.
2. Management, Today – Principles and Practice – Gene Burton and Manab Thakur, Tata McGraw Hill Publishing Company, New Delhi.
3. Essentials of Management – Koontz & H.Weinrich, Tata McGraw Hill Publil.
4. Human Behaviour at Work Organisational Benhviour – Keith Davis, Tata McGraw Hill Publi. New Delhi.
5. Business Management – J.P.Bose, S. Talukdar, New Central Agencies (P) Ltd.,
6. Marketing Management – Philip Kotler, Prentice Hall of India, New Delhi.
7. Production and Operation Management -Tripathy scitech publication 8. Engineering Management Chithambaranathan scitech publication

Reference Books:

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

Second Year B. Tech (Engineering) Semester -IV

Course Code	25ET401T	Course Name	Network Theory			
Teaching Scheme				Evaluation Scheme		
L	T	Credits		CA-I	MSE	CA-II	ESE
03	1	04		15	20	15	50

Course Prerequisites:

1. Basic Electrical Engineering – Knowledge of Ohm's law, Kirchhoff's laws, series-parallel circuits, and AC fundamentals.
2. Circuit Theory – Understanding of network theorems, RLC circuits, phasors, and basic circuit analysis techniques

Course Objective:

1. To learn about the basic laws of electric circuits as well as the key fundamentals of the communication channels, namely transmission lines.
2. To understand the need of simplification techniques of complicated circuits
3. To learn about the comprehensive insight into the principle techniques available for characterizing circuits, networks and their implementation in practice.
4. To learn about the use of mathematics, need of different transforms and usefulness of differential equations for analysis of networks.
5. To train the students for handling analog filter design through theory of NA along with practical, this is basic requirement of signal processing field.

Course Outcome:

CO-1	Apply basic network theorems, nodal and mesh analysis, and circuit analysis techniques for DC and AC circuits.
CO-2	Analyze transient responses of RL, RC, and RLC circuits and perform sinusoidal steady-state analysis using phasors.
CO-3	Design and analyze resonance circuits and active/passive filters for given specifications.
CO-4	Model and analyze two-port networks using Z, Y, h, and ABCD parameters, including interconnected networks.
CO-5	Apply state variable analysis and synthesize RL & RC networks for desired transfer functions and filter characteristics.

Course Contents

Unit-I	**Network Theorems:**	Hours: 9

Basic nodal and mesh analysis, linearity, superposition and source transformation, Thevinin"s, Norton"s and maximum power transfer theorem (Analysis for DC , AC and Dependent Sources) and useful circuit analysis techniques, network topology, introduction to SPICE in circuit analysis.

Unit-II	**Transient Analysis and Frequency Domain Analysis:**	Hours: 9

Transient Analysis: Source free RL and RC circuits, unit step forcing function, source free parallel and series RLC circuit, complete response of the RLC circuit, lossless LC circuit. Frequency Domain Analysis: The phasor concept, sinusoidal steady state analysis; AC circuit power analysis.

Unit-III	**Resonance and Filters:**	Hours: 9

Derivation for resonance frequency , Series resonance , Parallel resonance constant -k type and m-derived Low Pass , High pass , Band pass and Band reject filter designs

Unit-IV	**Two Port Networks:**	Hours: 9

Two Port Networks: Z, Y, h and ABCD parameters, analysis of interconnected (magnetically coupled) two port, three terminal networks

Unit-V	**State Variable Analysis and RL & RC Network Synthesis:**	Hours: 9

State Variable Analysis: State variables and normal-form equations, matrix-based solution of the circuit equations. RL & RC Network Synthesis: Synthesis of one-port networks, transfer function synthesis, basics of filter design.

Text Books:

1. Hayt, Kemmerley and Durbin, "Engineering Circuit Analysis", 8th 2012 Ed., Tata McGraw-Hill
2. DeCarlo, R.A. and Lin, P.M., "Linear Circuit Analysis: Time Domain, Phasor and Laplace Transform Approaches", Oxford University Press.2003.
3. M.E. Van Valkenburg, "Network Analysis", 3rd ed., Pearson2006.
4. M.E. Van Valkenburg, "Network Synthesis," PHI2007.
5. Kuo, F.F., "Network Analysis and Synthesis", 2nd Ed., Wiley India.2008.
6. D Roy Choudary, "Network and Systems" 1st edition, New Age International,1988
7. Boylestead, "Introductory Circuit Analysis", 4th edition, Charles & Merrill,1982.
8. Royal Signal Handbook on Line Communication.

Reference Books:

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

Second Year B. Tech (Engineering) Semester -IV

Course Code	25ET402T	Course Name	Analog and Digital Communication			
Teaching Scheme			Evaluation Scheme			
L	T	Credits	CA-I	MSE	CA-II	ESE
03	0	03	15	20	15	50

Course Prerequisites:

1. Signals and Systems – Knowledge of time and frequency domain representation of signals, convolution, and Fourier transforms.

2. Basic Electronics and Communication – Understanding of electronic devices, circuits, and fundamental modulation concepts.

Course Objective:

1. To understand the mathematical description of continuous and discrete time signals and systems.
2. Understand frequency-domain representation and analysis using Fourier analysis tools, Z-transform.
3. To provide with an understanding of sampling techniques and prepare to learn digital signal processing.
4. To analyse Linear Time Invariant (LTI) systems in time and transform domains.
5. To equip with mathematical and computational skills needed to understand the principal of convolution.
6. To build basics for understanding of courses such as signal processing, control system and communication.

Course Outcome:

CO-1	Understand the fundamentals of communication systems, including analog and digital signals, channel effects, and noise.
CO-2	Analyze and design amplitude modulation and demodulation systems, including DSB, SSB, and VSB techniques.
CO-3	Understand angle modulation, FM generation and demodulation, and analyze superheterodyne receiver systems.
CO-4	Apply sampling and analog-to-digital conversion techniques, including PCM, DPCM, and delta modulation.
CO-5	Design and analyze digital data transmission systems, including line coding, modulation schemes, and error performance.

Course Contents

Unit-I	**Introduction To Communication System.**	Hours: 9
Analog and Digital Messages, Channel Effect, Signal-to Noise ration and capacity,Modulation and Detection, History of Communications. (Revision of Signal Transmission through a linear system, Signal distortion over a communication channel, Signal Energy and Energy spectra density, Signal power and power density).		
Unit-II	**Amplitude modulation And Demodulations**	Hours: 9
Single and Double sideband Amplitude modulation, Amplitude modulation, Bandwidth-efficient Amplitude modulation, VSB, Local Carrier synchronization, FDM, PLL.		
Unit-III	**Angle Modulation and demodulation**	Hours: 9
Nonlinear Modulation, Bandwidth of Angle-modulated Waves,, Generating FM waves, Demodulation of FM signals, Nonlinear distortion and interference, Superheterodyne Receivers, FM broadcasting System		
Unit-IV	**Sampling and Analog to digital Conversion**	Hours: 9
Sampling theorem, Sampling and signal reconstruction, Aliasing, Types of sampling, Quantization, PCM, Companding, DPCM, ADPCM, Delta modulation, Adaptive delta modulation, T1 carrier system		
Unit-V	**Digital Data Transmission**	Hours: 9
Components of digital communication system, line coding, pulse shaping, Scrambling, Regenerative Repeater, Eye Diagram, Timing Extraction, Detection Error Probability, M-ary communication, Digital Carrier Systems ,Modulation techniques for ASK,FSK, PSK, MSK, BPSK, QPSK, GMSK		
Text Books:		
Digital and analog communication system by B.P.Lathi .Zhi Ding 4th edition 2. Communication Systems by Simon Haykins. 3. Electronic Communications Systems by Wayne Tomasi		
Reference Books:		
MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:		

Second Year B. Tech (Engineering) Semester -IV

Course Code	25ET403T	Course Name	Signals and Systems			
Teaching Scheme			Evaluation Scheme			
L	T	Credits	CA-I	MSE	CA-II	ESE
03	1	04	15	20	15	50

Course Prerequisites:

Course Objective:

1. To understand the mathematical description of continuous and discrete time signals and systems.
2. Understand frequency-domain representation and analysis using Fourier analysis tools, Z-transform.
3. To provide with an understanding of sampling techniques and prepare to learn digital signal processing.
4. To analyse Linear Time Invariant (LTI) systems in time and transform domains.
5. To equip with mathematical and computational skills needed to understand the principal of convolution.
6. To build basics for understanding of courses such as signal processing, control system and communication.

Course Outcome:

CO-1	To define signals and systems, classify them and understand their properties.
CO-2	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.
CO-3	An ability to convert analog signal to digital signal & vice versa through sampling & reconstruction process.
CO-4	Develop input output relationship for linear Time invariant system and understand the convolution operator for continuous and discrete time system.
CO-5	Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to apply Laplace transforms and Z-transforms to analyse both continuous-time and discrete-time signals and systems, including understanding their properties and regions of convergence.

Course Contents

Unit-I	**Introduction to Signals and Systems**	Hours: 9
Introduction and Classification of signals: Definition of signal and systems, Continuous time and discrete time signal, Classification of signals as even, odd, periodic and non-periodic, deterministic and non-deterministic, energy and power, elementary signals used for testing: exponential, sine, impulse, step and its properties, ramp, rectangular, triangular, signum, sinc. Basic Operations on signals: Time shifting, Time scaling, Time Reversal, Amplitude scaling, Signal addition, Signal multiplication. Systems: Definition, Classification: linear and non-linear, time variant and invariant, causal and non-causal, static and dynamic, stable and unstable, invertible		
Unit-II	**Fourier Series**	Hours: 9
Fourier series (FS) representation of periodic Continuous Time (CT) signals, Dirichlet's conditions for existence of Fourier series, FS representation of CT signals using exponential Fourier series, Fourier spectrum representation, properties of Fourier series, Gibbs phenomenon, Discrete Time Fourier Series and its properties.		
Unit-III	**Fourier Transform**	Hours: 9
Fourier Transform (FT) representation of aperiodic CT signals, Dirichlet's condition for existence of Fourier transform, evaluation of magnitude and phase response, FT of standard CT signals, FT of standard periodic CT signals, Introduction to Fourier Transform of DT signals, Properties of CTFT and DTFT, Fourier Transform of periodic signals. Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat Top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing.		
Unit-IV	**Time domain representation of LTI System**	Hours: 9
System modelling: Input-output relation, definition of impulse response, convolution sum, convolution integral, computation of convolution integral using graphical method, Computation of convolution sum. Properties of convolution, properties of the system based on impulse response, step response in terms of impulse response.		
Unit-V	**Laplace and Z-Transform**	Hours: 9
Laplace transforms**:** Definition of Laplace Transform (LT), Limitations of Fourier transform and need of Laplace transform, ROC and its properties, properties of Laplace transform, Laplace transform evaluation using properties, Inverse Laplace transform based on partial fraction expansion, Application of Laplace transforms to the LTI system analysis. Z–transforms**:** Introduction to Z-transform, and its properties, Distinction between Laplace, Fourier and Z transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, different methods of inverse Z-transform.		
Text Books:		

1. Alan V. Oppenheim. Alan S. Willsky and S. Hamid Nawab, "Signals and Systems" PHI, 2nd Edition.
2. Simon Haykin and Barry Van Veen, "Signals and Systems", 2nd Edition, Wiley India.
3. A. Nagoor Kani "Signals and Systems", 2nd edition, McGraw-Hill.
4. NPTEL video lectures on Signals and Systems.
5. B.P. Lathi, "Signals, Systems & Communications", BS Publications, 2003.
6. Robert, M.J., "Fundamentals of Signals & Systems", Tata McGraw Hill, 2008.
7. C. L. Philips, J. M. Parr and Eve A. Riskin, "Signals, Systems and Transforms", Pearson education.3rd Edition, 2004

Reference Books:

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

Second Year B. Tech (Engineering) Semester -IV

Course Code	25SET405T		Course Name	Python Programming			
Teaching Scheme				Evaluation Scheme			
L	T	Credits		CA-I	MSE	CA-II	ESE
02	0	02		15	20	15	50

Course Prerequisites:

Course Objective:

1. Provide an understanding of the role computation can play in solving problems.
2. Help students, including those who do not plan to major in Computer Science and Electrical Engineering, feel confident of their ability to write small programs that allow them to accomplish useful goals.
3. Position students so that they can compete for research projects and excel in subjects with programming components.

Course Outcome:

CO-1	Experience with an interpreted Language.
CO-2	To build software for real needs
CO-3	Prior Introduction to testing software
CO-4	
CO-5	

Course Contents

Unit-I	**Introduction:**	Hours: 9

History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment,Keywords, Input-Output, Indentation.

Unit-II	**Types, Operators and Expressions:**	Hours: 9

Types – Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while break, continue, pass.

Data Structures Lists – Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences, Comprehensions

Unit-III	**Default Arguments:**	Hours: 9

Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function- Global and Local Variables. Modules: Creating modules, import statement, from. Import statement, name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages.

Unit-IV	**Object-Oriented Programming OOP in Python:**	Hours: 9

Classes,"self-variable", Methods, Constructor Method, Inheritance, Overriding Methods,Data hiding, Error, and Exceptions: Difference between an error and Exception, Handling Exception, try except for block, Raising Exceptions, User Defined Exceptions.

Unit-V	**Brief Tour of the Standard Library:**	Hours: 9

Operating System Interface – String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics Testing: Why testing is required? Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

Text Books:

. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

2. Learning Python, Mark Lutz, Orielly

3. Think Python, Allen Downey, Green Tea Press

4. Core Python Programming, W. Chun, Pearson

5. Introduction to Python, Kenneth A. Lambert, Cengage

Reference Books:

MOOCs Course (Course name and Weblink) / Supplementary Readings / Videos:

Second Year B. Tech (Engineering) Semester -III

Course Code	25SET307L	Course Name	Analog Electronics Lab	
Teaching Scheme			Evaluation Scheme	
P	Credits		CIE	ESE
02	1		60	40

Course Prerequisites:

Course Objective:

1. Familiarize with FET and MOSFET devices and explore their amplification capabilities in various configurations.
2. Study the design and analysis of power amplifiers and understand the role and types of negative feedback in electronic circuits.
3. To understand the internal structure, characteristics, and configurations of operational amplifiers and analyze their frequency response and performance parameters.
4. To study and design various linear and nonlinear op-amp based circuits for signal conditioning and processing applications
5. To explore the principles of oscillation and develop sinusoidal and non-sinusoidal waveform generators using op-amps and IC555.

Course Outcome:

CO-1	Analyze the performance of JFET and MOSFET devices in various amplifier configurations.
CO-2	Classify and compare power amplifier types and apply negative feedback in amplifier circuits.
CO-3	Explain op-amp architecture, characteristics, and configurations with frequency response and slew rate considerations.
CO-4	Design and analyze various op-amp based linear and nonlinear circuits
CO-5	Design and implement sinusoidal and non-sinusoidal signal generators

Course Contents

Exp. No.	Experiment Title	CO
1	To study the FET characteristics	
2	To study the MOSFET characteristics	
3	To design, study any transistor biasing technique.	
4	To study current series feedback amplifier	
5	Study of Op-Amp Characteristics (Offset Voltage, Bias Current, Slew Rate, CMRR)	

6	Implementation of Inverting and Non-Inverting Amplifier using Op-Amp	
7	Realization of Summing and Averaging Amplifiers	
8	Design of Comparator and Schmitt Trigger using Op-Amp	
9	To study and design RC phase shift oscillator	
10	To study Astable Multivibrator using IC555.	
11		
12		
13		