



University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur



3rd Semester Syllabus for B.Tech ECE Admission Batch 2024

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Syllabus Structure:

Sl. No.	Type	Subject Code	Subject Name	L	T	P	Total	Credit
1.	CC	PCCECE301	Basic Electronic Devices	3	0	0	3	3
2.	CC	PCCECE302	Analog Electronics	3	0	0	3	3
3.	CC	PCCECE 303	Signals and Systems	3	0	0	3	3
4.	CC	PCCECE 304	Network Theory	3	0	0	3	3
5.	BSC	BSM301	Mathematics - III	3	0	0	3	3
6.	MC	MCC301	Constitution of India	1	0	0	1	0
7.	GSC	ESP301	Essential Studies for Professionals - III	2	0	0	2	0.5
8.	CC	PCCECE391	Electronic Devices Laboratory	0	0	2	2	1
9.	CC	PCCECE392	Analog Electronics Laboratory	0	0	2	2	1
10.	CC	PCCECE393	Signals and Systems Laboratory	0	0	2	2	1
11.	CC	PCCECE394	Network Theory Laboratory	0	0	2	2	1
12.	OEC	OEC381	Data Structure & Algorithm (Sessional)	1	0	2	3	2
13.	OEC	OEC382	Python Lab (Sessional)	0	0	2	2	2
14.	GSC	SDP381	Skill Development for Professionals - III	0	0	2	2	0.5
15.	ECP	PRJECE381	Mini Project	-	-	-	1	1
16.	Mandatory Course	MAR 381	Mandatory Additional Requirement (MAR)	0	0	0	0	0
17.	Mandatory Course	IFC	Industry and Foreign Certification	0	0	0	0	0
Total Credit Points =							25	



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Syllabus for B.Tech Admission Batch 2024

Subject Name: Basic Electronic Devices

Credit: 3

Lecture Hours: 36

Subject Code: PCCECE301

Pre-requisite:

Relevant Links:

[Study Material](#)

[Coursera](#)

[NPTEL](#)

[Linkedin Learning](#)

COURSE OBJECTIVES:

1. To understand the basics of different electronic devices being used by Electronics Engineers.
2. To learn different Physical and mathematical concept within the operation of these electronic devices and apply this knowledge in various applications.
3. To understand operations of different opto-electronic and microwave devices and to apply this knowledge in various applications.
4. To learn the basics of Semiconductor physics.

COURSE OUTCOMES:

CO 1: Student will be able to understand the fundamentals of electrical and electronic circuits and working of basic electrical instruments and electronic components.

CO 2: Student will be able to explain the working principle and operations of basic diode, BJT, JFET, MOSFET, different optoelectronic devices, different microwave devices etc. which are normally used in different electronic applications.

CO 3: Student will be able to compare, analyze and find suitable applications within the different electronic and optoelectronic devices in different fields of electronics.

CO 4: Student will be to develop the understanding regarding application of elementary ideas of electrical and electronics in modern technology.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	Semiconductor Electronics and Statistics	Fermi-Dirac Statistics, Fermi and Quasi-Fermi Level, Drift and Diffusion, Conductivity and mobility, Density of states and carrier concentration, Generation and recombination of carriers, Semiconductor equations, Poisson and Continuity equations, Hall effect, IC fabrication (Elementary discussion of different steps)	International Academia: (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009/pages/lecture-notes/) AICTE-prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) Industry Mapping: SPICE software	5	1. Introduction to programming using P-SPICE
2.a	Junctions and Contacts	p-n junction:- operation and energy band diagram, junction capacitance and frequency limitation; Zener diode and breakdowns, Heterojunction:- operation and band	International Standards :(https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009/pages/lecture-notes/)	5	1. Design Forward biased PN diode and find its V-I characteristics using LT Spice simulator.

		diagram, Ohmic and Schottky contacts.	<p>AICTE prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf)</p> <p>Industry Mapping: SPICE software</p>		<p>2. Design Reverse biased Zener diode and find its V-I characteristics using LT Spice simulator.</p>
2.b	Bipolar junction transistors (BJT)	Construction, operation and band diagram, BJT configurations, load line and Q-point, Amplification, Leakage currents, Early effect, Ebers-Moll equivalent circuit model, frequency limitation.	<p>International Standards : https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009/pages/lecture-notes/)</p> <p>AICTE prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf)</p> <p>Industry Mapping: SPICE software</p>	6	<p>1. Design the circuit using LT SPICE to draw the output characteristics of BJT in common-emitter configuration for different base ($I_b=10\mu A, 20\mu A$) current.</p> <p>2. Design the circuit using LT SPICE to draw input characteristics of BJT in common-emitter configuration for two different values of collector to emitter voltages ($V_{ce}=4V$ and $10V$).</p> <p>3. Design an Amplifier circuit using LT SPICE and find the</p>

					gain of it.
3	Field effect transistors:	JFET:- structure, operation and Pinch-off voltage; MOSFET :- structure and operation of concept of accumulation, depletion and inversion with band bending, Threshold voltage: expression and dependencies, drain current equation in terms of W/L (no derivation), drain current characteristics, small signal model, C-V characteristic of ideal MOS capacitor, channel length modulation, MOS scaling and short channel effects (brief introduction), Substrate bias effect, CMOS working principle and switching, frequency limitations; FinFET: structure, design challenges, applications.	<p>International Standards: (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009/pages/lecture-notes/)</p> <p>AICTE prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf)</p> <p>Industry Mapping: Software: Tinker CAD ,VHDL, Xilinx</p>	6	<ol style="list-style-type: none"> 1. Simulation of CMOS Inverter (with different loads) using VHDL and implement this in the FPGA kit using Xilinx 2. Simulation of CMOS Inverter for different parameters K_n, K_p as a design variable in SPICE software. 3. Design the circuit using VHDL to get drain characteristics of a MOSFET and hence determine the FET parameters (drain resistance only) for the given gate to source voltages $V_{gs}=3.5V, 4.5V$.
4	Opto Electronic Devices	Optical absorption:- absorption coefficient and cut-off wavelength, Luminescence, photovoltaic effects, p-n junction solar cell, Photoconductors, Photodiode, avalanche photodiode, phototransistor, LED, semiconductor junction Laser,	<p>International Standards: (https://ocw.mit.edu/courses/6-977-semiconductor-optoelectronics-theory-and-design-fall-2002/)</p> <p>AICTE prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model)</p>	4	<ol style="list-style-type: none"> 1. Compare the efficiency of LED with different structures using COMSOL software. 2. Calculate the Fill Factor of the Solar cell

			_Curriculum/Final ECE.pdf) <p>Industry Mapping:</p> <p>COMSOL Multi physics, Matlab</p>		
5	Special type of Devices	Structure, Characteristics, Operation:- PIN diode, Varactor diode, Tunnel Diode, Gunn Diode, IMPATT diode	<p>International Standards (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009/)</p> <p>AICTE prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final ECE.pdf)</p> <p>Industry Mapping:</p> <p>COMSOL Multi physics, Matlab</p>	4	1. Study the Carrier Dynamics of PIN Semiconductor Devices using COMSOL

TEXT BOOK:

1. [D A Neamen and D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Edition,4th.Edition.](#)
2. Ben. G. Streetman and S.K. Banerjee "Solid State Devices", PHI
3. Pallab Bhattacharya, “Semiconductor Optoelectronic Devices”, Pearson



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Syllabus for B.Tech Admission Batch 2024

Subject Name: ANALOG ELECTRONICS

Credit: 3

Lecture Hours: 36

Subject Code: PCCECE302

Pre-requisite: Mathematics, Basic Electronics

Relevant Links:

[Study Material](#)

[Coursera](#)

[NPTEL](#)

[Linkedin Learning](#)

[Infosys Springboard](#)

COURSE OBJECTIVES:

1. To understand the methods of biasing of transistors.
2. To design and analyse single stage and multistage amplifier circuits.
3. To analyse the frequency response of small signal amplifiers and design of voltage and power amplifiers using ac models of transistor.
4. To analyse and design active filters.
5. To analyse and design regulated DC power supplies.
6. To impart knowledge on oscillators, feedback amplifiers and tuned amplifiers.

COURSE OUTCOMES:

CO 1: Acquire knowledge on Diode based circuits and regulated power supply.

CO 2: Acquire knowledge on different configurations and biasing of bipolar junction transistor (BJT) and FET and their applications.

CO 3: Acquire knowledge on analysis and design of transistor based voltage amplifiers, power amplifiers, feedback amplifiers, oscillators and tuned amplifiers.

CO 4: Acquire knowledge on operational amplifier and its applications, active filter circuits and multi-vibrators.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	Diode based circuits, Filters and Regulators: Text book: Boylestad & Nashelsky (11 th edition) Chapter 15	1. Clippers and Clampers 2. Introduction to full- wave and half-wave rectifiers. Capacitor filter. Inductor filter, LC and π –section filter. Series and Shunt voltage regulator, percentage regulation. Regulator ICs 78xx and 79xx series. Introduction to SMPS.	As per International Standards : (https://explorecourses.stanford.edu/search?q=EE101A) (https://explorecourses.stanford.edu/search?q=EE101B) https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/syllabus/ and AICTE-prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) Industry Mapping: LT-SPICE software, LabView, Proteus. Hardware Chipset: IN4001/4007, 7815, 7915.	4	1. Design of different clippers and clampers using LT-SPICE / MATLAB simulation software 2. Simulation of full-wave and half-wave rectifiers with and without filter using LT-SPICE software to study of Ripple and Regulation characteristics.

2.	Biasing of BJT and FET. Stability of Q- point. Text book: Boylestad & Nashelsky (11 th edition) Chapter 4	Introduction to BJT and FET biasing, Q-point selection, Diode Compensation. Bias stabilization and stability factors, Current Mirror concept. Various configurations (such as CE/CS, CB/CG, CC/CD) and their features.	As per International Standards : (https://explorecourses.stanford.edu/search?q=EE101A) (https://explorecourses.stanford.edu/search?q=EE101B) https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/syllabus/ and AICTE-prescribed syllabus : (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) Industry Mapping: LT-SPICE software, LabView, Proteus. Hardware Chipset: BC547, BC557, SL100, 2N5457, 2N5460.	6	1. Simulation of transistor amplifier circuit with self bias in CE configuration using LT-SPICE software to study parameters of Q-point.
3	Transistor Amplifier Circuits Text book: Boylestad & Nashelsky (11 th edition) Chapter 5	Small Signal Model: Re and h-parameter model of transistors. Analysis of transistor amplifiers, expression for voltage gain, current gain, input and output impedance. Design of transistor amplifier. High frequency model : Hybrid- π model of transistor, short circuit current gain and β cut off frequency, Functions of all parameters of high freq. model, equivalent circuit,	As per International Standards : (https://explorecourses.stanford.edu/search?q=EE101A) (https://explorecourses.stanford.edu/search?q=EE101B) https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/syllabus/ and AICTE-prescribed syllabus : (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) Industry Mapping: LT-SPICE software, LabView, Proteus.		2. Simulation of transistor amplifier circuit with potential divider bias in CE configuration using LT-SPICE software to study output voltage and gain for an input signal. 3. Simulation of two stages R-C coupled

		Frequency response of single stage and multi stage amplifier, RC coupled amplifier, derivation of voltage gain, current gain, input impedance and output impedance, frequency response characteristics, lower and upper half frequencies, bandwidth, and concept of wide band amplifier. Tuned Amplifier	Hardware Chipset: BC547, BC557, SL100, 2N5457, 2N5460.		amplifier using LT-SPICE software to study of its gain and bandwidth.
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4	<p>1. Operational Amplifier: Gayakwad. Chapter 3</p> <p>2. Applications of Operational Amplifiers: Gayakwad. Chapter 6</p>	<p>Introduction to operational amplifier, Ideal OP AMP, Differential Amplifier, Constant current source (current mirror etc.), level shifter, CMRR, Open & Closed loop circuits, importance of feedback loop (positive & negative), inverting & non inverting amplifiers, voltage follower/buffer circuit.</p> <p>Applications of Operational Amplifiers: adder, integrator & differentiator, comparator, Schmitt Trigger, Instrumentation Amplifier, Log & Anti-log amplifiers, Trans-conductance multiplier, Precision Rectifier, voltage to current and current to voltage converter, free running oscillator.</p>	<p>As per International Standards : (https://explorecourses.stanford.edu/search?q=EE101A), (https://explorecourses.stanford.edu/search?q=EE101B), https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/syllabus/ and AICTE-prescribed syllabus : (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf),</p> <p>Industry Mapping: LT-SPICE software, LabView, Proteus. Hardware Chipset: IC741, IC328.</p> <p>As per International Standards: (https://explorecourses.stanford.edu/search?q=EE101A), (https://explorecourses.stanford.edu/search?q=EE101B), https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/syllabus/ and AICTE-prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf),</p> <p>Industry Mapping: LT-SPICE software, LabView, Proteus. Hardware Chipset: IC741, IC328, Multiplier IC AD633, Logarithmic Multiplier IC TL441, Anti Logarithmic Amplifier ICL 8049.</p>	6	<ol style="list-style-type: none"> 1. Simulation of ADC using IC AD570, and using LT-SPICE software. 2. Simulation of DAC using DAC 0808 and using LT-SPICE software. 3. Simulation of Inverting and Non Inverting Amplifier using Op-Amp and using LT-SPICE software. 4. Simulation of differentiator and integrator circuit using Op-Amp and using LT-SPICE software. 5. Simulation of Logarithmic and Anti Logarithmic Amplifier circuit using IC TL441, ICL8049 and with LT-SPICE software.
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5	2. Operational Amplifier: Gayakwad. Chapter 3	3. Introduction to operational amplifier, Ideal OP AMP, Differential Amplifier, Constant current source (current mirror etc.), level shifter, CMRR, Open & Closed loop circuits, importance of feedback loop (positive & negative) and AICTE-prescribed syllabus : inverting & non inverting amplifiers, voltage follower/buffer circuit.	As per International Standards : https://explorecourses.stanford.edu/search?q=EE101A), https://explorecourses.stanford.edu/search?q=EE101B), https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/syllabus/ and AICTE-prescribed syllabus : https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf), Industry Mapping: LT-SPICE software, LabView, Proteus. Hardware Chipset: IC741, IC328.	6	6. Simulation of ADC using IC AD570, and using LT-SPICE software. 7. Simulation of DAC using DAC 0808 and using LT-SPICE software. 8. Simulation of Inverting and Non Inverting Amplifier using Op-Amp and using LT-SPICE software.
	2. Applications of Operational Amplifiers: Gayakwad. Chapter 6	Applications of Operational Amplifiers: adder, integrator & differentiator, comparator, Schmitt Trigger, Instrumentation Amplifier, Log & Anti-log amplifiers, Trans-conductance multiplier, Precision Rectifier, voltage to current and current to voltage converter, free running oscillator.	As per International Standards: https://explorecourses.stanford.edu/search?q=EE101A) https://explorecourses.stanford.edu/search?q=EE101B), https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/syllabus/ and AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf), Industry Mapping: LT-SPICE software, LabView, Proteus. Hardware Chipset: IC741, IC328, Multiplier IC AD633, Logarithmic Multiplier IC TL441, Anti Logarithmic Amplifier ICL 8049.	6	9. Simulation of differentiator and integrator circuit using Op-Amp and using LT-SPICE software. 10. Simulation of Logarithmic and Anti Logarithmic Amplifier circuit using IC TL441, ICL8049 and with LT-SPICE software.

6	1. Multivibrator. Chattopadhyay and Rakshit Chapter 11 2. Active Filter	Multivibrator: Introduction to multivibrators, Monostable, Bistable, Astable multivibrators using transistor and op-amp; Monostable and astable operation using 555 timer IC. Active filters: Low pass, high pass, band pass and band stop design guidelines.	As per International Standards: (https://explorecourses.stanford.edu/search?q=EE101A), (https://explorecourses.stanford.edu/search?q=EE101B), (https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/syllabus/) and AICTE-prescribed syllabus : (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf), Industry Mapping: LT-SPICE software, LabView, Proteus. Hardware Chipset: IC555.	4	11. Simulation of Monostable Multivibrator using IC555 and using LT-SPICE software. 12. Simulation of Astable Multivibrator using IC555 and using LT-SPICE software.
	Gayakwad. Chapter 7				13. Simulation of Schmitt trigger circuit using IC555 and using LT-SPICE software.

TEXT BOOK:

1. Boylestad, Robert L., and Louis Nashelsky. Electronic devices and circuit theory. PrenticeHall, 2012.
2. Microelectronic Circuits, Sedra & Smith, Oxford University Press.
3. Integrated Electronics, Milman & Halkias, Mc Graw Hill Company.
4. Electronic devices & Circuits, Balbir Kumar & Shail B. Jain, PHI.
5. Op-amps and Linear IC's, R.A. Gayakwad, PHI.

REFERENCE BOOKS:

1. Microelectronic Circuit- Analysis & Design, Rashid, Cengage Learning.
2. Electronic Circuits: Discrete & Integrated, 3rd Edition, Schilling & Belove, Mc Graw Hill Company.
3. Electronic principles, 6th Edition, Malvino, Mc Graw Hill Company.
4. Operational Amplifier & Linear IC's, Bell, Oxford University Press.
5. 2000 Solved Problems in Electronics, Jimmie J. Cathey, Mc Graw Hill Inc.
6. Electronic Devices -System & Application, Robert Diffenderfer, Cengage Learning.
7. Op- Amps & Linear Integrated Circuits, Ravi Raj Dudeja & Mohan Dudeja, Umesh Publication



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Syllabus for B.Tech Admission Batch 2024

Subject Name: Signals & Systems
Subject Code: PCCECE303

Credit: 3

Lecture Hours: 36

Pre-requisite: Mathematics

Relevant Links:

[Study Material](#)

[Coursera](#)

[NPTEL](#)

[Linkedin Learning](#)

[Infosys Springboard](#)

COURSE OBJECTIVES:

1. To understand the fundamental concepts and properties of signals and systems
2. To learn and analyze linear time-invariant (LTI) systems
3. To understand and transform signals using mathematical techniques
4. To apply signals and systems theory to practical applications

COURSE OUTCOMES:

CO1: Students should acquire a good understanding of the fundamental concepts related to signals and systems, including continuous-time and discrete-time signals, system properties, linearity, time-invariance, causality, and stability.

CO2: Students should be able to design and analyze the behavior of LTI continuous-time systems, including system modeling, stability analysis, etc.

CO3: Students should be able to analyze signals in both time and frequency domains using appropriate mathematical techniques such as Fourier series, Fourier transform, and Laplace transform in continuous-time domain. They should also be able to apply these techniques to solve signal and system problems.

CO4: Students should be able to apply their knowledge of signals and systems to practical engineering applications including continuous to discrete transformation and Z-transform analysis. Students should be able to analyze and design systems in different application areas using appropriate techniques and tools.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	Fundamentals of signals	Signals and systems as seen in everyday life, and in various branches of engineering and science. Classifications of signals, continuous and discrete time signals, energy and power signals, Basic continuous-time and discrete-time signals: step, impulse, ramp, parabolic, exponential, sinc, signum etc., properties of different	International Academia: https://ocw.mit.edu/courses/res-6-007-signals-and-systems-spring-2011/pages/lecture-notes/ AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf	7	2. Introduction to programming using MATLAB 3. Write a MATLAB program to plot the following continuous time and discrete time signals: Step signal, Impulse signal, Exponential signal, Ramp signal, and Sine Function. 4. Write a MATLAB program

		continuous-time signals, operations on continuous-time signals: addition, multiplication, shift, scale, fold, etc.	Industry Mapping: MATLAB software		to find the energy and power of the signal $10.\sin(10\pi t)$ 5. Write a MATLAB program to perform amplitude-scaling, time-scaling and time shifting on a given signal: $x(t) = 1+t$ for 0 to 2.
2.	Fundamentals of systems	System properties: linearity-additivity and homogeneity, causality, stability, etc, Linear time-invariant (LTI) continuous-time systems, impulse response and step response, convolution integral, characterization of causality and stability of linear, shift-invariant systems, system representation through differential equations. [All discussion should be on continuous time domain]	International Standards https://ocw.mit.edu/courses/res-6-007-signals-and-systems-spring-2011/pages/lecture-notes/ AICTE prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf Industry Mapping: MATLAB software	12	3. Write a MATLAB program to obtain convolution integral of signals: $x_1(t)=1$ for $1<t<10$ and $x_2(t)=1$ for $2<t<10$. 4. Write a MATLAB program to perform convolution of $x_1(t)$ and $x_2(t)$. Now perform deconvolution with $x_2(t)$ to extract $x_1(t)$: $x_1(t)=e^{-0.7t}$ for $0<t<1$ and $x_2(t)=1$ for $0<t<2$.
3	Transformation in continuous time domain	The Laplace Transform, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behaviour. The notion of a frequency response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain	International Standards https://ocw.mit.edu/courses/res-6-007-signals-and-systems-spring-2011/pages/lecture-notes/ AICTE prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf Industry Mapping: MATLAB software	11	4. Write a MATLAB program to find the Laplace transform of the following standard causal signals: t , e^{-at} , te^{-at} , t^n and $t^n e^{-at}$ 5. Write a MATLAB program to generate Fourier series of a Square Wave. 6. Write a MATLAB program find Fourier transform of the following

		response, Fourier domain duality. Parseval's Theorem.			<p>signals: A, $u(t)$, and $Ae^{-t}u(t)$</p> <p>7. Write a MATLAB program find convolution of two given signals using Fourier transform: $e^{-2t}u(t)$ and $e^{-6t}u(t)$</p>
4	Transformation in discrete time domain	Continuous signal to discrete signal, Sampling process, The Sampling Theorem, Nyquist interval, Reconstruction: ideal interpolator, zero-order hold, first-order hold, Aliasing and its effects. Z-transform, region of convergence, properties.	<p>International Standards https://ocw.mit.edu/courses/res-6-007-signals-and-systems-spring-2011/pages/lecture-notes/</p> <p>AICTE prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf</p> <p>Industry Mapping: MATLAB software</p>	6	<p>3. Write a MATLAB program to find one sided z-transform of the following standard causal signals: n, a^n, na^n, and e^{-anT}</p> <p>4. Write a MATLAB program to find z-transform of the following causal signals: 0.5^n and $1 + n \cdot (0.4)^{n-1}$</p>

TEXT BOOK:

1. A. Anand Kumar, “Signals and Systems”, 3rd Edition, Prentice Hall India.

REFERENCE BOOKS:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983.
2. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998.



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Syllabus for B.Tech Admission Batch 2024

Subject Name: Mathematics - III

Credit: 3

Lecture Hours: 42

Subject Code: BSM301

Pre-requisite: Permutation & Combination, Concept of Basic Probability, Evaluation of definite, improper and infinite integrals, Concept of functions.

Relevant Links:

[Study Material](#)

[Coursera](#)

[NPTEL](#)

COURSE OBJECTIVES:

1. The syllabus will prepare the learners for Engineering Exit Examinations, ESE and campus placements.
2. Students will apply concepts of various probability distributions to find probabilities.
3. Students will make estimations for a mean, variance, standard deviation and proportions for big data.
4. Students will be eligible to work in the Data domain which is the emerging technology of the future and create more opportunities for creative work.
5. Students will be able to describe and quantify the uncertainty inherent in predictions made by machine learning models.

COURSE OUTCOMES:

- CO1:** Illustrate the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment that will make a bridge between elementary statistical tools and probability theory.
- CO2:** Find the inter-relation between two or more phenomena with the help of curve fitting.
- CO3:** Understand the basic components of sampling and have the knowledge on exact sampling distributions which are essential for estimating and testing hypothetical statements. Know the various sampling methodologies and their efficiencies in theoretical and practical aspects.
- CO4:** Estimate and test the parameters associated with the relevant areas for forecasting and verification of economic theory.
- CO5:** Apply the statistical tools in business, economical and commercial areas for analyzing problems and to make better decisions for future in their fields.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	Random Variables and Probability Distributions	<p><i>Discrete Random Variable:</i> Discrete Probability Distribution, Expectation and Variance of random variables; Binomial and Poisson Distributions; Mean, Variance and Moment Generating Functions of Binomial and Poisson Variates; Convergence of Binomial to Poisson Variate.</p> <p><i>Continuous Random Variable;</i> Continuous Probability Distributions, Expectation and Variance of random variables, Exponential, Normal Distributions; Mean, Variance and Moment Generating Functions of the corresponding variates.</p>	https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/	12	"R" software for statistical computing

2	Method of Least Squares and Curve Fitting	Principle of Least Squares, Curve fitting by the method of Least Squares - fitting of straight lines, second degree parabolas and exponential curves.	https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/	4	"stata": statistical software for data science
3	Sampling and Sampling Distributions	Population and Sample, Sampling With and Without Replacement (SRSWR and SRSWOR); Random Samples, Population Parameters, Sample Statistics, Sampling Distributions, Standard Error and Probable Error; Sample Mean, Sampling Distribution of Means; Sample Proportion, Sampling Distribution of Proportions, Sample Variances, Sampling Distribution of Variances; Case where Population Variance is unknown; Central Limit Theorem (Statement only); Degrees of freedom, Chi-square distribution, Mean & Variance of Chi-square variate.	https://www.cl.cam.ac.uk/teaching/2021/IntroProb/materials.html	8	"stata": statistical software for data science

4	Estimation of Parameters	Point and Interval estimations, Biased and Unbiased estimators, Minimum Variance Unbiased Estimator (MVUE), Consistent Estimator, Maximum Likelihood Estimation of Parameters, Applications in populations following theoretical distributions (Binomial, Poisson and Normal), Calculation of confidence limits for population mean and population proportions.	https://ocw.mit.edu/courses/1-010-uncertainty-in-engineering-fall-2008/	6	"R" software for statistical computing
5	Testing of Hypothesis	<i>Large Sample Test:</i> Statistical Hypotheses, Test Statistic, Best Critical Region, Test for single mean, difference of means, single proportion, difference of proportions, and difference of standard deviations. <i>Small Sample Test:</i> Test for single mean, difference of means and correlation coefficients, Test for ratio of variances, Chi-square test for goodness of fit and independence of attributes.	https://ocw.mit.edu/courses/6-041-probabilistic-systems-analysis-and-applied-probability-fall-2010/	12	"R" software for statistical computing

TEXT BOOK:

- 1. Saktipada Nanda and Sibashis Nanda** , "A Course on Probability & Statistics", 2nd Edition (2024), Mindprobooks Academic Series
[Available in flipkart.com/amazon.in]
- 2. N.G.Das**, "Statistical Methods", Combined Edition Vol. 1 &2 (2017) McGraw Hill Education

REFERENCE BOOKS:

- 1. Sheldon M. Ross**, "Introduction to Probability and Statistics for Engineers and Scientists", 6th Edition (2020), Academic
- 2. Douglas C, Montgomery and George C. Runger**, Applied Statistics and Probability for Engineers, 7th edition (2018), John Wiley & Sons.
- 3. Murray R. Spiegel, John J. Schiller and R. Alu Srinivasan**, "Schaum's Outline of Probability & Statistics" , 4th Edition (2012), McGraw Hill Education.



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University of Engineering & Management, Jaipur



Syllabus for B.Tech Admission Batch 2024

Subject Name: NETWORK THEORY

Credit: 3

Lecture Hours: 36

Subject Code: PCCECE304

Pre-requisite: Basic Electrical

Relevant Links:

[Study Material](#)

[Coursera](#)

[NPTEL](#)

[Linkedin](#)

[Infosys Springboard](#)

COURSE OBJECTIVES:

1. To learn about different types of network theorem and to apply this knowledge in circuit analysis.
2. To learn about transient response of a circuit.
3. To understand the application of Laplace transform and graph theory in circuits.
4. To learn about the resonating nature of a circuit.
5. To learn the two port parameters and their applications in circuit

COURSE OUTCOMES:

CO1: After completing this course, the students will be able to analyze a circuit with respect to node voltages and currents.

CO2: They will be able to understand the transient and steady state response of the circuit.

CO3: They will be able to analyze resonating and coupled circuits.

CO4: They will be able to analyze simple two-port circuit and analyze circuits using Graph Theory.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	Network Theorems Text Book: D Roy Chowdhury Chapter	Basic nodal and mesh analysis, linearity, superposition and source transformation, Thevinin's Theorem, Norton's and maximum power transfer theorem and useful circuit analysis techniques, Tallegen's theorem, network topology	As per International Standards : Syllabus (stanford.edu) and AICTE-prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) Industry Mapping: Circuit Simulation using MATLAB,LTSPICE,PORTEUS	8	Verification of various theorems using Hardware and Simulation.

2.	TRANSIENT ANALYSIS: Text Book: A. Chakrabarty	Natural response-Forced response - Transient response of RC, RL and RLC circuits to excitation by Step Signal, Impulse Signal and exponential sources - Complete response of RC, RL and RLC Circuits to sinusoidal excitation	As per International Standards : Syllabus (stanford.edu) and AICTE-prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) Industry Mapping: Circuit Simulation using MATLAB,LTSPICE,PORTEUS	8	Observe the transient response of various RC,RL and RLC series parallel circuits for different values of circuit parameters.

3	Laplace transform and its circuit applications Text Book: M.E. Van Valkenburg	<p>a) Laplace transform, initial and final value theorem, circuit analysis in s domain, frequency response.</p> <p>b) Waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.</p> <p>Concept of pole, zero and transfer function.</p>	<p>As per International Standards : Syllabus (stanford.edu) and AICTE-prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf)</p> <p>Industry Mapping: Circuit Simulation using MATLAB,LTSPICE,PORTEUS</p>	8	<p>Perform Laplace and Inverse Laplace of various functions using MATLAB</p>

5	TWO PORT NETWORKS: Text Book: A. Chakrabarty	Two port networks, Z parameters, Y parameters, Transmission (ABCD) parameters, Hybrid (H) Parameters, Interconnection of two port networks, Symmetricity and reciprocity conditions.	As per International Standards : Syllabus (stanford.edu) and AICTE-prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) Industry Mapping: Circuit Simulation using MATLAB,LTSPICE,PORTEUS	6	1. Find out Y,Z,h and ABCD parameters of various two port network 2. Find symmetricity and Reciprocity of 2-Port Network
6	GRAPH THEORY IN CIRCUITS Text Book: A. Chakrabarty	Graph of a network - Incident and reduced incident matrices – Trees – Cut sets - Fundamental cut sets – Cut set matrix – Tie set matrix	As per International Standards : Syllabus (stanford.edu) and AICTE-prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) Industry Mapping: Circuit Simulation using MATLAB,LTSPICE,PORTEUS	4	

TEXT BOOK:

1. V.Valkenbeg,*Network Analysis* , Pentice Hall India
2. D Roy Chowdhury,Networks and Systems,New Age Interntional Publishers

REFERENCE BOOKS:

1. Fundamentals of Electric Circuits, Charles K. Alexander,Mc Graw Hill
2. Network Analysis and Synthesis, S Ghosh , A. Chakraborty
3. A William Hayt, “Engineering Circuit Analysis” 8th Edition, McGraw-Hill Education



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Syllabus for B. Tech Admission Batch 2024

Subject Name: Data Structures & Algorithms

Credit: 2

Lecture Hours: 32 Subject Code:

OEC381

Pre-requisite: Fundamentals of C Programming and Engineering Mathematics

Relevant Links:

[Study Material](#)

[Coursera](#)

[NPTEL](#)

[Infosys Springboard](#)

[Linkedin learning](#)

Course Objectives:

The purpose of learning this course is to:-

1. Understand the fundamentals of data structures and algorithms.
2. Familiarize the students with basic data structures and their use in fundamental algorithms.
3. Understand and design efficient algorithms for sorting and searching.
4. Be able to solve problem statements using algorithms.

5. Apply the skills to store and interpret data using defined structures and perform various operations.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1: Students will be able to acquire and remember the knowledge of fundamental data structures

CO2: Students will be able to understand any data structure properly and to have knowledge on basics of computer hardware and number systems.

CO3: Students will be able to implement any problem by writing their own algorithms

CO4: Students will be able to analyze the algorithm for a given problem.

CO5: Students will be able to use different data structures and create/update basic data files

CO6: Students will be able to learn various data structure approaches and techniques to develop and design projects.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	Introduction to Data Structures in C programming	Algorithms Functions and Recursion Flowchart and pseudo-code Time and Space complexity Defining Data Structures Arrays 1D array, 2D array, multi-dimensional arrays Operations in array	<i>AICTE-prescribed syllabus:</i> https://www.aicte-india.org/sites/default/files/Model_C_curriculum/UG-1/ug-vol1.pdf <i>International Academia:</i> Lecture Notes Advanced Data Structures Electrical Engineering and Computer Science MIT OpenCourseWare <i>International Mapping:</i> Hackerrank, TCS Codevita projects,	7	<u>Assignment 1</u> <ul style="list-style-type: none"> Write a C Program to Check Whether a Number is Prime or Composite. Write a C Program to calculate GCD of two numbers.

			<p>GitHub platform. Dev C++ platform for coding will be used.</p>	<ul style="list-style-type: none"> • Write a program to swap 2 numbers using call by value and call by reference. • Write a program to calculate n^m using recursion. • Write a C Program to print first 15 number of Fibonacci series. <p><u>Assignment 2</u></p> <ul style="list-style-type: none"> • Write a program to create dynamically allocated array and find the 3 largest numbers. • Write a program to input two matrices and then calculate the SUM and PRODUCT of their corresponding elements using dynamic memory allocation. • Write a program to merge two sorted arrays.
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					<ul style="list-style-type: none"> Determine if each input is a vowel. Save the non-vowel characters in a new array. Write a program to transpose a matrix using malloc or calloc.
2	Linear Data Structures	<p>Linked Lists Singly linked list Doubly linked list Circular linked list</p> <p>Stack</p> <p>Queue</p>	<p>AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf</p> <p>International Academia: Lecture Notes Advanced Data Structures Electrical Engineering and Computer Science MIT OpenCourseWare</p> <p>International Mapping: Hackerrank, TCS Codevita projects, GitHub platform. Dev C++ platform for coding will be used.</p>	9	<p>Assignment 3</p> <ul style="list-style-type: none"> Write a program to implement integer singly link list with the following primitive: create(); display(); insert_begin(); insert_end(); insert_pos(); delete_begin(); delete_end(); delete_pos(); Merge to link list of same size with alternative elements without using a third list. Write a function to insert a value in the new list at any

					<p>position.</p> <ul style="list-style-type: none"> • Write a program to count the number of occurrences of a given value in a linked list. • Write a program to form a linked list of floating point numbers. Display the sum and mean of these numbers. • Write a program to count the number of non-zero values in a circular linked list. <p><u>Assignment 4</u></p> <ul style="list-style-type: none"> • Write a program to implement a stack using a linked list. <p><u>Assignment 5</u></p> <ul style="list-style-type: none"> • Write a program to implement a dequeue with the help of a linked list.
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					<ul style="list-style-type: none"> • Write a program to create a queue from a stack. • Write a program to create a queue which permits insertion at any vacant location at the rear end.
3	Non-Linear Data Structures	<p>Trees</p> <p>Binary tree</p> <p>Binary tree - operations</p> <p>Height and depth of B-Tree</p> <p>Graphs</p> <p>Definition and concepts</p> <p>Types of graphs</p> <p>Graph traversals – BFS, DFS, Shortest path</p>	<p>AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf</p> <p>International Academia: Lecture Notes Advanced Data Structures Electrical Engineering and Computer Science MIT OpenCourseWare</p> <p>International Mapping: Hackerrank, TCS Codevita projects, GitHub platform. Dev C++ platform for coding will be used.</p>	9	<p>Assignment 6</p> <ul style="list-style-type: none"> • Write a program to Print Height and Depth of Binary Tree. <p>Assignment 7</p> <ul style="list-style-type: none"> • Write a program to implement BFS and DFS algorithms.

4	Searching and Sorting	<p>Hashing, Collision resolution techniques</p> <p>Linear search, binary search, sequential search</p> <p>Bubble sort, Insertion sort, Selection sort, Quick sort, Merge sort</p>	<p>AICTE-prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf</p> <p>International Academia: Lecture Notes Advanced Data Structures Electrical Engineering and Computer Science MIT OpenCourseWare</p> <p>International Mapping: Hackerrank, TCS Codevita projects, GitHub platform. Dev C++ platform for coding will be used.</p>	7	<p><u>Assignment 8</u></p> <ul style="list-style-type: none"> Implement Linear probing collision resolution technique with the help of hashing in C programming. <p><u>Assignment 9</u></p> <ul style="list-style-type: none"> Write a program to create a binary search tree and perform all the operations. Write a program to search and erase the duplicate values from a list. <p><u>Assignment 10</u></p> <ul style="list-style-type: none"> Write a program to Convert Sorted Array to Balanced binary search tree. Write a program to implement Bubble sort and Selection sort in a linked
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					list.
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Suggested Learning Resources:

Text Books

1. “[Data Structures Using C](#)” by Reema Thareja.
2. “[Data Structures](#)” by S. Lipschutz.

Reference Books

1. “Data Structures And Program Design In C”, 2/E by Robert L. Kruse, Bruce P Leung.
2. “Data Structure Through C in Depth” by S.K. Srivastava and Deepali Srivastava; published by BPB Publications.
3. “Introduction to Algorithms” by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.

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Type of Course	Course Code	Course Name	L	T	P	Credit Points
Sessional	OEC382	Python Programming Laboratory	1	0	2	2

Course Objective:

Through this sessional hands-on Python programming lab, the students will be introduced the paradigm of Python programming. They will learn basic concepts such as data handling, control flow, and relevant command structure for procedural and object-oriented programming. Additionally, these fundamental concepts of programming will lay the foundation for students and enable them to design solutions for real problems in the field of AI and Data Science data analysis.

Course Outcomes: After completion of this course students would be able to

- CO1:** Understand fundamental components of programming in python
- CO2:** Implement solutions using object orient programming concepts using python classes and objects
- CO3:** Develop databases, perform numerical computation and visualize data using python packages
- CO4:** Apply concepts of python to solve challenges in AI and Data Science.

Syllabus:

Module 1: Introduction to Python: The Python Interpreter, Console I/O, Conditions, Control Flow, Functions,

Module 2: Python Data Handling: Datatypes, List, Tuple, Set, Dictionaries, File I/O

Module 3: Object Oriented Programming with Python: Classes, Objects, Special Methods: `__init__`, `__call__`, `__iter__`, `__getitem__`, `__len__`

Module 4: Numerical Data Analysis with Python: NumPy N-D arrays, Indexing, Slicing, Reshaping, ND-Array Arithmetic

Module 5: Database Handling with Python: Introduction to Pandas, Series, Dataframes, read CSV, read JSON

Module 6: Data Visualization: Introduction to Matplotlib: Pyplot, markers, lines, labels, grid, subplot, scatter, bars, histograms, pie-chart

Text Books:

- (1) **Head First Python: A Learner's Guide to the Fundamentals of Python Programming, a Brain-Friendly Guide – (3rd edition, September 2023) - by Paul Barry (PUBLISHER: O'Reilly book, Indian edition by SPD)**
- (2) **Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter – (3rd edition, September 2022) – by Wes McKinney (PUBLISHER: O'Reilly book, Indian edition by SPD)**
- (3) **Introduction to Computation and Programming Using Python, third edition: With Application to Computational Modeling and Understanding Data Paperback – (3rd edition, January 2021) – by John V. Guttag (PUBLISHER: The MIT Press)**

Reference Books:

- 1) Python: The Complete Reference, Martin C. Brown, Osborne/McGraw-Hill
- 2) Python Crash Course, 3rd Edition: A Hands-On, Project-Based Introduction to Programming Paperback – (3rd edition, January 2023) – by Eric Matthes
- 3) Python for Everybody: Exploring Data in Python 3 – (October 2017) – by Charles Severance (Shroff Publishers; First Edition (10 October 2017))

Alternate Courses:

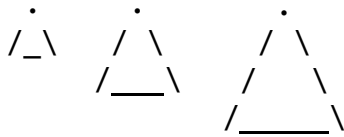
NPTEL – Python for Data Science – Prof. Ragunathan Rengasamy, IIT Madras.
<https://nptel.ac.in/courses/106106212>

COURSERA – Python for Data Science, AI & Development, Joseph Santarcangelo -
<https://www.coursera.org/learn/python-for-applied-data-science-ai>

MIT MOOCS:

<https://ocw.mit.edu/courses/6-0002-introduction-to-computational-thinking-and-data-science-fall-2016/>

Laboratory/Practical: List of Experiments:

Mod	Wk	Ques	Problem Statements
1	1	1a	Write a program in python to calculate the area and perimeter of various polygons such as triangle, rectangles and circles.
		1b	Write a program in python to input 3 numbers separated by comma, and find the largest and smallest among them.
		1c	Write a program in python to find the roots of a quadratic equation using python.
		1d	Write a program in python to print all prime numbers inside a range of numbers provided by the user.
		1e	Write a program in python to print the mean and standard deviation of 5 scores input by the user.
	2	2a	Write a program in python to calculate the factorial of number
		2b	Write a program in python to calculate the Fibonacci sequence till a specific no. of terms
		2c	Write a program in python to calculate the factors of number
		2d	Write a program in python to count the number of words in a string
		2e	Write a program in python to calculate the magic square based on a given number
	3	3a	Print the series upto N terms: 1, 4, 9, 16, 25, 36...
		3b	Print the series upto N terms: 2, 4, 8, 16, 32, 64...
		3c	Print the series upto N terms: 1, 3, 7, 13, 21, 31 ...
		3d	Print the series upto N terms: 1, 2, 4, 8, 16, 23, 28, 38, 49, 62 ...
		3e	Print the series upto N terms: 1,2,6,24,120,720 ...
	4	4a	Print the pattern upto N Lines: <div style="text-align: center;"></div>

			N=4																		
			N=2 N=3																		
		4b	Print a number as a 8 segment display N Lines: <div><div><div> </div><div> </div><div> </div><div> </div><div> </div><div> </div><div> </div><div> </div></div><div><div> </div><div> </div><div> </div><div> </div><div> </div><div> </div><div> </div><div> </div></div><div><div> </div><div> </div><div> </div><div> </div><div> </div><div> </div><div> </div><div> </div></div></div> <div>N=2 N=3 N=4</div>																		
		4c	Print the pattern upto N lines: <div><div><div>1 2</div><div>4 3</div></div><div><div>1 2 3</div><div>8 9 4</div><div>7 6 5</div></div><div><div>1 2 3 4</div><div>12 13 14 5</div><div>11 16 15 6</div><div>10 9 8 7</div></div></div> <div>N=2 N=3 N=4</div>																		
		4d	Print the following pattern upto N lines: <div>1 1 1 1 2 1 1 3 3 1 1 4 6 4 1 1 5 10 10 5 1 ...</div>																		
		4e	Print the shape for Height = N <table><tr><td>***</td><td>****</td><td>*****</td></tr><tr><td>* *</td><td>* *</td><td>* *</td></tr><tr><td>***</td><td>* *</td><td>* *</td></tr><tr><td></td><td>****</td><td>* *</td></tr><tr><td></td><td></td><td>*****</td></tr><tr><td>N=3</td><td>N=4</td><td>N=5</td></tr></table>	***	****	*****	* *	* *	* *	***	* *	* *		****	* *			*****	N=3	N=4	N=5
***	****	*****																			
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N=3	N=4	N=5																			
	5	5a	Input a number and check whether a given number is prime or not using functions.																		
		5b	Input a number and check whether it is Armstrong or not using functions.																		
		5c	Input a number and check whether it is Krishnamurthy or not using functions.																		
		5d	Input a number and check whether the number is perfect or not using functions.																		
		5e																			
2	6	6a	Write a program to Insert and Delete elements from list based on a given position																		
		6b	Find out Mean, Median and Mode of a list of numbers.																		
		6c	Sort a list of numbers without using a user defined function																		
		6d	Use a dictionary to count the frequency of words in a string input by the user.																		

		6e	Given a list of numbers return the indices in which a specific number occurs.
	7	7a	Write a program to create a text file as per the path and filename provided by the user and add text as input by the user.
		7b	Write a program to copy the content of a text file to another file but while copying convert all capital letters to small letters.
		7c	Create a text file to append N lines such that each line displays the Fibonacci sequence upto the term corresponding to specific line number separated by '-'. For N = 5 the text file should read. 1 1-1 1-1-2 1-1-2-3 1-1-2-3-5
		7d	Take input four values from user with respect to number of books, pens, bags and total price as follows. 36,116,23,4649 and save it as a text file Books: 36 Pens: 116 Bags : 23 Price : Rs. 4649
		7e	Write a program to create a dictionary by reading records from the text file output in program 7d. Dictionary : {"Books":36, "Pens": 116, "Bags":23, "Price": "4649"
		7f	Write a program to take inputs from user to create a dictionary for storing and displaying student data.
		7g	Store the dictionary data as a CSV file and write a function to display the data from the CSV file
		7h	Write a function to update or delete a specific record in student database csv file.
3	8	8a	Write a program to define a class "Box" and write functions to calculate its volume
		8b	Write a program to define a class "Car" and necessary functions to calculate the velocity given starting velocity (input), acceleration (member variable) and time of acceleration(input).
		8c	Write a program to define a class "Student", and record the name and marks from a CSV file and display the grade card whenever the object is called as a function using call ().
		8d	Write a program to define a class "Loan" with member variables as principle, rate of interest and duration. Write a function to output the maturity amount.
		8e	Create a class that will return the Fibonacci numbers sequentially every time it is called using iter ()
		8f	Create a class "Data" that can store data points scattered in a 2-dimensional space and belonging to three different categories. Write a function to find the centroid of each category.
4	9	9a	Write a program to take input and display the values of 2 dimensional NumPy array
		9b	Write a program to add two 2-dimensional NumPy arrays
		9c	Write a program to transpose a 2-dimensional NumPy array
		9d	Write a program to reshape a 2-dimensional NumPy array.
		9e	Write a program to find the dot-product and matrix-product of two NumPy arrays.

		9f	Write a program to find the inverse of a NumPy matrix
		9g	Write a program to calculate the Eigen value and Eigen vectors of NumPy array
		9h	Write a program to find the determinant of NumPy matrix
		9i	Write a program using numpy to solve a system of linear equations
		9j	Write a program using numpy to perform singular value decomposition of a matrix.
5	10	10a	Read a CSV file as a pandas dataframe
		10b	Fetch rows from the dataframe based on a specific attribute
		10c	Display the value of specific columns of a pandas dataframe
		10d	Find the mean and standard deviation of a specific column containing numeric data.
		10e	Save the dataframe as a JSON file
		10f	Use pandas and yfinance to read a stock market data as a series.
6	11	11a	Write a program using matplotlib to display a line plot
		11b	Write a program using matplotlib to display a scatter plot
		11c	Write a program using matplotlib to display sine wave with frequency and amplitude input by the user
		11d	Write a program to display bar-plot and histogram.
		11e	Display 4 plots as 2x2 grid using the subplot function
		11f	Write a program to plot the stock prices as computed in Ques. No. 10f.