NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute)

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

Evaluation Scheme & Syllabus

For

B. Tech in Computer Science and Engineering (Artificial Intelligence & Machine Learning) (AIML) First Year

(Effective from the Session: 2021-22)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute)

B. TECH [CSE(AI&ML)]
Evaluation Scheme
SEMESTER I

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
3 WEEKS COMPULSORY INDUCTION PROGRAM													
1	AAS0104	Mathematical Foundations- I	3	1	0	30	20	50		100		150	4
2	AAS0101A	Engineering Physics	3	1	0	30	20	50		100		150	4
3	ACSE0101	Problem Solving using Python	3	0	0	30	20	50		100		150	3
4	AASL0101	Professional Communication	2	0	0	30	20	50		100		150	2
5	AAS0151A	Engineering Physics Lab	0	0	2				25		25	50	1
6	ACSE0151	Problem Solving using Python Lab	0	0	2				25		25	50	1
7	AASL0151	Professional Communication Lab	0	0	2				25		25	50	1
8	AME0152	Engineering Graphics & Solid Modelling	0	0	3				25		25	50	1.5
9		MOOCs** (For B.Tech. Hons. Degree)											
		TOTAL										**800**	**17.5**

****List of MOOCs (Coursera) Based Recommended Courses for First Year (Semester-I) B. Tech Students**

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0001	Introduction to Artificial Intelligence (AI)	IBM	9	0.5
2	AMC0004	Python Basics	University of Michigan	36	3

Abbreviation Used:-

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA
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B. TECH [CSE(AI&ML)]

Evaluation Scheme
SEMESTER II

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	AAS0204	Mathematical Foundations – II	3	1	0	30	20	50		100		150	4
2	ACSE0203	Design Thinking-I	3	1	0	30	20	50		100		150	4
3	AEC0201	Basic Electrical and Electronics Engineering.	3	1	0	30	20	50		100		150	4
4	ACSE0202	Problem Solving using Advanced Python	3	1	0	30	20	50		100		150	4
5		Foreign Language*	2	0	0	30	20	50		50		100	2
6	AEC0251	Basic Electrical and Electronics Engineering Lab	0	0	2				25		25	50	1
7	ACSE0252	Problem Solving using Advanced Python Lab	0	0	2				25		25	50	1
8	AME0251	Digital Manufacturing Practices	0	0	3				25		25	50	1.5
9		MOOCs** (For B.Tech. Hons. Degree)											
		TOTAL										**850**	**21.5**

***Foreign Language :**

1. **AASL0202 French**
2. **AASL0203 German**
3. **AASL0204 Japanese**

****List of MOOCs (Coursera) Based Recommended Courses for First Year (Semester-II) B. Tech Students**

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0012	Human Centered Design for Inclusive Innovation	University of Toronto	14	1
2	AMC0013	Python for Data Science, AI & Development	IBM	17	1

PLEASE NOTE:-

- **Internship (3-4 weeks) shall be conducted during summer break after II semester and will be assessed during III semester**

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NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA
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B. TECH (AIML)

* AICTE Guidelines in Model Curriculum:

A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

1. For 6 to 12 Hours =0.5 Credit
2. For 13 to18 =1 Credit
3. For 19 to 24 =1.5 Credit
4. For 25 to 30 =2 Credit
5. For 31 to 35 =2.5 Credit
6. For 36 to 41 =3 Credit
7. For 42 to 47 =3.5 Credit
8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only.

The students shall be awarded Honours Degree as per following criterion.

i. If he / she secures 7.50 as above CGPA.
ii. Passed each subject of that degree program in the single attempt without any grace.
iii. Successful completion of MOOCs based 20 credits.

B. TECH. FIRST YEAR

Course Code	AAS0104	L T P	Credit
Course Title	Mathematical Foundations– I	3 1 0	4

Course objective: The objective of this course is to familiarize the graduate engineers with techniques in linear algebra, differential calculus-I, differential calculus-II and vector space. It aims to equip the students with standard concepts and tools from intermediate to advanced level that will enable them to tackle more advanced level of mathematics and applications that they would find useful in their disciplines.

Pre-requisites: Knowledge of Mathematics upto 12th standard.

Course Contents / Syllabus

UNIT-I	Matrix Algebra	8 hours

Types of Matrices: Symmetric, Skew-symmetric and Orthogonal Matrices; Complex Matrices,
Inverse and Rank of matrix using elementary transformations,System of linear equations, Characteristic equation, Cayley-Hamilton Theorem and its application, Eigen values and eigenvectors, Diagonalisation of a Matrix.

UNIT-II	Vector Space	10 hours

Vector spaces, basis,dimension, linear transformations, rank and nullity theorem, inner product spaces and Orthogonalization.

UNIT-III	Differential Calculus-I	8 hours

Successive Differentiation (nth order derivatives), Leibnitz theorem and itsapplication,Asymptotes, Curve tracing: Cartesian and Polar co-ordinates, Partial derivatives, Total derivative, Euler's Theorem for homogeneous functions.

UNIT-IV	Differential Calculus-II	8 hours

Taylor andMaclaurin's theorems for a function of one and two variables,Jacobians, Approximation oferrors.Maxima and Minima offunctions of several variables, Lagrange Method of Multipliers.

UNIT-V	Aptitude-I	8 hours

Simplification , Percentage , Profit, loss & discount , Average, Number & Series, Coding & decoding

Course outcome: After completion of this course students are able to:

CO 1	Apply the concept of matrices to solve linear simultaneous equationsand linear transformation.	K_3
CO 2	Explain the concept of vector space, linear transformation and orthogonalization.	K_2
CO 3	Apply the concept of successive differentiation and partial differentiationto solve problems of Leibnitz theorems and total derivatives .	K_3
CO 4	Apply partial differentiation for evaluating maxima, minima, series and Jacobians.	K_3
CO 5	Solve the problems of Profit, Loss, Number & Series, Coding & decoding.	K_3

Text books:	
(1) B. V. Ramana, Higher Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd..	
(2) B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher.	
(3) R K. Jain & S R K. Iyenger , Advance Engineering Mathematics, Narosa Publishing House .	
Reference Books:	
(1) E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons.	
(2) Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning.	
(3) Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas, Calculus, Eleventh Edition, Pearson.	
(4) D. Poole, Linear Algebra : A Modern Introduction, 2nd Edition, Brooks/Cole.	
(5) Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, Tata Mc-Graw-Hill; Sixth Edition.	
(6) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi.	
(7) P. Sivaramakrishna Das and C. Vijayakumari, Engineering Mathematics, 1st Edition, Pearson India Education Services Pvt. Ltd	
(8) Advanced Engineering Mathematics. Chandrika Prasad, Reena Garg.	
(9) Engineering Mathemathics – I. Reena Garg.	
(10)Quantitative Aptitude by R.S. Aggrawal.	
(11) A.R. Vasishtha, J.N. Sharma, Linear Algebra, Krishna Publication.	
Link:	
Unit 1	https://www.youtube.com/watch?v=kcL5WWJjmIU https://www.youtube.com/watch?v=VTHz4gjzsKI https://youtu.be/56dEt9EOZ_M https://www.youtube.com/watch?v=njDiwB43w80 https://www.youtube.com/watch?v=N33SOw1A5fo https://www.youtube.com/watch?v=yLi8RxqfowA www.math.ku.edu/~lerner/LAnotes/Chapter5.pdf http://www.math.hawaii.edu/~lee/linear/sys-eq.pdf https://youtu.be/41Y38WjHbtE https://www.youtube.com/watch?v=4jcvZmMK_28 https://www.youtube.com/watch?v=G4N8vJpf7hM https://www.youtube.com/watch?v=r5dIXpssvrA https://youtu.be/ZX5YnDMzwbs http://web.mit.edu/2.151/www/Handouts/CayleyHamilton.pdf https://www.youtube.com/watch?v=iKQESPLDnnI https://math.okstate.edu/people/binegar/3013-S99/3013-l16.pdf https://www.youtube.com/watch?v=kGdezES-bDU
Unit 2	https://youtu.be/0gHg5X6ng_4 https://youtu.be/zvRdbPMEMUI https://youtu.be/ERfbtPBEYVA https://youtu.be/ZFQteSfxMss

Unit 3	https://www.youtube.com/watch?v=tQxk5IX9S_8&list=PLbu_fGT0MPstS3DTIyqkUecSW_7axdxKe https://www.youtube.com/watch?v=U5sGFf0DjLs&t=34s https://www.youtube.com/watch?v=TCPPvRfHtXw https://www.youtube.com/watch?v=PkuPGKSacu0&list=PL2FUpm_Ld1Q3H00wVFuwjWOo1gtMXk1eb https://www.youtube.com/watch?v=QeWrQ9Fz3Wo&t=22s https://www.youtube.com/watch?v=5dFrWCE6bHg https://www.youtube.com/watch?v=WX6O9TiFYsA&t=110s https://www.youtube.com/watch?v=GII1ssdR2cg&list=PLhSp9OSVmeyK2yt8hdoo3Qze3O0Y67qaY
Unit 4	https://www.youtube.com/watch?v=6tQTRlbkbc8 https://www.youtube.com/watch?v=McT-UsFx1Es https://www.youtube.com/watch?v=_1TNtFqiFQo https://www.youtube.com/watch?v=X6kp2o3mGtA https://www.youtube.com/watch?v=btLWNJdHzSQ https://www.youtube.com/watch?v=jiEaKYI0ATY https://www.youtube.com/watch?v=r6lDwJZmfGA https://www.youtube.com/watch?v=Jk9xMY4mPH8 https://www.youtube.com/watch?v=fqq_UR4zhfI https://www.youtube.com/watch?v=G0V_yp0jz5c https://www.youtube.com/watch?v=9-tir2V3vYY https://www.youtube.com/watch?v=jGwA4hknYp4
Unit 5	https://www.GovernmentAdda.com

B.TECH FIRST YEAR

Course Code	AAS0101A	L T P	Credit
Course Title	Engineering Physics	3 1 0	4

Course objective:

1	To provide the knowledge of Relativistic Mechanics and their uses to engineering applications.	
2	To provide the knowledge of Quantum Mechanics and to explore possible engineering utilization.	
3	To provide the knowledge of interference and diffraction.	
4	To provide the knowledge of the phenomenon of semiconductors and its uses to engineering applications.	
5	To provide the basic knowledge of Optical Fiber and Laser which is necessary to understand the working of modern engineering tools and techniques.	

Pre-requisites: Newton's laws of motions, scalar and vectors, electricity and magnetism, basic laws of optics.

Course Contents / Syllabus

UNIT-I	Relativistic Mechanics	8 hours

Frame of reference, Inertial & non-inertial frames, Galilean transformations, Michelson Morley experiment, Postulates of special theory of relativity, Lorentz transformations, Length contraction, Time dilation, Velocity addition theorem, Variation of mass with velocity, Einstein's mass energy relation, Relativistic relation between energy and momentum, Massless particle.
Some engineering applications(qualitative): Global positioning system (GPS), Application to Satellites.

UNIT-II	Quantum Mechanics	8 hours

Introduction to wave-particle duality, de Broglie matter waves, Phase and group velocities, Heisenberg's uncertainty principle and its applications, Wave function characteristics and significance, Time-dependent and time- independent Schrödinger's wave equations, Particle in one-dimensional rigid box, Theory of Quantum excitation of the Higgs field (Higgs Boson or GOD particle)(qualitative).

UNIT-III	Wave Optics	10 hours

Coherent sources, Interference in uniform and wedge shaped thin films, Necessity of extended sources, Newton's Rings and its applications,Fraunhofer diffraction at single slit and at double slit, absent spectra, Diffraction grating, grating spectra, Rayleigh's criterion of resolution, Resolving power of grating, Optical filters.

UNIT-IV	Semiconductor Physics and Information Storage	6 hours

(a) Introduction to the concept of electrical conductivity, conductivity of conductors and semiconductors, Fermi-Dirac probability distribution function, Position of Fermi level in intrinsic semiconductors and extrinsic semiconductors, variation of Fermi level with temperature (qualitative), Photovoltaic effect, working of a solar cell on the basis of band diagrams and Applications.

(b) Basics of magnetic, and semiconductor memories		
UNIT-V	**Fiber Optics & Laser**	**8 hours**
Fiber Optics: Introduction to fiber optics, Acceptance angle, Numerical aperture, Normalized frequency, Classification of fiber, Attenuation and Dispersion in optical fibers. Laser: Absorption of radiation, Spontaneous and stimulated emission of radiation, Einstein's coefficients, Population inversion, Ruby Laser, He-Ne Laser. Recent applicationsof optical fibersandLaser(Qualitative):Laser-guided UAV (Drone).		

Course outcome: After completion of this course students will be able to:

CO 1	Solve the relativistic mechanics problems	K1,K2,K3
CO 2	Apply the concept of quantum mechanics	K1,K2,K3
CO 3	Apply the laws of optics and their application in various processes	K1,K2,K3
CO 4	Define the laws of semiconductors.	K1,K2
CO 5	Explain the working of modern engineering tools and techniques of optical fiber and laser.	K1,K2

Text books

1. A. Beiser, Concepts of Modern Physics (McGraw Hill)
2. Brijlal&Subramanian,Optics (S. Chand)
3. Neeraj Mehta,Applied Physics for Engineers (PHI Learning, New)

Reference Books

1. Robert Resnick,Introductionto Special Theory of Relativity (Wiley)
2. Katiyar and Pandey,Engineering Physics: Theory and Practical (Wiley India)
3. H. K. Malik and A. K. Singh, Engineering Physics- (McGrawHill)
4. J.W. Jewett , Jr. and R. A. Serway , Physics for Scientists and Engineers with Modern Physics,7th Edn. (CENGAGE Learning)
5. C. Kittel , Solid State Physics,7th Edn. (Wiley Eastern)
6. V. Raghavan, Materials Science and Engineering (Prentice Hall, India)
7. S.O. Pillai , Solid State Physics,5th Edn (New Age International)
8. R. Booker and E. Boysen , Nanotechnology (Wiley Publ.)
9. K.Rajagopal, Engineering Physics, 2nd Edn. (PHI Learning)
10. G. Aruldhas , Engineering Physics (PHI Learning)
11. S.D. Jain and G.S. Sahasrabudhe , Engineering Physics (Universities Press)
12. L. F. Bates, Modern Magnetism, (Cambridge Univ. Press)
13. F.T.S.Yu , X.-Y.Yang, Introduction to Optical Engineering (Cambridge Univ.Press)
14. G.Keiser, Optical Communications Essentials (Tata McGrawHill)

B TECH FIRST YEAR (COMMON COURSE)

Course Code	ACSE0101	L T P	Credit
Course Title	Problem solving using Python	3 0 0	3

Course objective:

1	To impart knowledge of basic building blocks of Python programming
2	To provide skills to design algorithms for problem solving
3	To impart the knowledge of implementation and debugging of basic programs in Python
4	To disseminate the knowledge of basic data structures
5	To provide the knowledge of file system concepts and its application in data handling

Pre-requisites: Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software, and understand basic programming concepts.

Course Contents / Syllabus

UNIT-I	Basics of python programming	8 hours

Introduction: Introduction to computer system, algorithms, Ethics and IT policy in company, Feature of object-oriented programming, A Brief History of Python,Applications areas of python, The Programming Cycle for Python, Python IDE, Interacting with Python Programs. Elements of Python:keywords and identifiers, variables, data types and type conversion, operators in python, expressions in python, strings.

UNIT-II	Decision Control Statements	8 hours

Conditionals: Conditional statement in Python (if-else statement, its working and execution), Nested-if statement and elif statement in Python, Expression Evaluation & Float Representation.

Loops: Purpose and working of loops, while loop, For Loop, Nested Loops,Break and Continue, pass statement.

UNIT-III	Function and Modules	8 hours

Introduction of Function, calling a function, Function arguments, built in function, scope rules, Passing function to a function, recursion, Lambda functions

Modules and Packages: Importing Modules, writing own modules, Standard library modules, dir( ) Function, Packages in Python

UNIT-IV	BasicData structures in Python	8 hours

Strings: Basic operations, IndexingandSlicing of Strings, Comparing strings, Regular

expressions.
Python BasicData Structure: Sequence, Unpacking Sequences, Mutable Sequences, Lists,ListComprehension, Looping in lists, Tuples, Sets, Dictionaries

UNIT-V	**File and Exception handling**	**8 hours**

Files and Directories: Introduction to File Handling in Python, Reading and Writing files, Additional file methods, Working with Directories.

Exception Handling, Errors, Run Time Errors, Handling IO Exception, Try-except statement, Raise, Assert
Searching &Sorting:Simple search & Binary search,Selection Sort, Merge Sort

Course outcome: At the end of course, the student will be able to

CO 1	Write simple python programs.	K_2, K_3
CO 2	Develop python programs usingdecision control statements	K_3, K_6
CO 3	Implement user defined functions and modules in python	K_2
CO 4	Implement python data structures –lists, tuples, set, dictionaries	K_3
CO 5	Perform input/output operations with files in python and implement searching, sorting and merging algorithms	K_3, K_4

Text books

(1) Magnus Lie Hetland, "Beginning Python-From Novice to Professional"—Third Edition, Apress

(2) Python Programming using Problem solving approach by ReemaThareja OXFORD Higher education

(3) Kenneth A. Lambert, ―Fundamentals of Python: First Programs, CENGAGE Learning, 2012.

Reference Books

(1) John V Guttag, ―Introduction to Computation and Programming Using Python‘‘, Revised and expanded Edition, MIT Press , 2013

(2) Charles Dierbach, ―Introduction to Computer Science using Python: A Computational Problem Solving Focus, Wiley India Edition, 2013.

(3) Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016

(4) Robert Sedgewick, Kevin Wayne, Robert Dondero: Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd.,2016.

(5) Timothy A. Budd, ―Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.,2015.

(6) Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and

updated for Python 3.2, Network Theory Ltd., 2011.
E-book and E-Content
(1) https://www.pdfdrive.com/hacking-hacking-practical-guide-for-beginners-hacking-with-pythn-e182434771.html
(2) https://www.pdfdrive.com/python-programming-python-programming-for-beginners-python-programming-for-intermediates-e180663309.html
(3)https://www.pdfdrive.com/python-algorithms-mastering-basic-algorithms-in-the-python-language-e175246184.html
(4) https://www.pdfdrive.com/python-algorithms-mastering-basic-algorithms-in-the-python-language-e160968277.html
(5) https://docs.python.org/3/library/index.html
(6) https://www.w3schools.com/python/
(7) https://www.py4e.com/materials
Reference Links
Unit-1 https://nptel.ac.in/courses/106/106/106106182/
Unit-2 https://nptel.ac.in/courses/106/106/106106212/
Unit-3 https://nptel.ac.in/courses/106/106/106106145/
Unit-4- https://nptel.ac.in/courses/106/106/106106145/
Unit-5- https://nptel.ac.in/courses/106/106/106106145/
[Unit-2]- https://www.youtube.com/watch?v=PqFKRqpHrjw
[Unit – 3]- https://www.youtube.com/watch?v=m9n2f9lhtrw https://www.youtube.com/watch?v=oSPMmeaiQ68
[Unit 4]- https://www.youtube.com/watch?v=ixEeeNjjOJ0&t=4s
[Unit-5]- https://www.youtube.com/watch?v=NMTEjQ8-AJM
After Completing Course Student may get certification in python using following links: Link for Certification: https://swayam.gov.in/nd1_noc19_cs41/preview https://aktu.ict.iitk.ac.in/courses/python-programming-a-practical-approach/

B.TECH FIRST YEAR

Course Code	AASL0101	L T P	Credit
Course Title	**Professional Communication**	2 0 0	02

Course objective:

1	• The objective of the course is to ensure that the students can communicate effectively, in clear and correct English, in a style appropriate to the occasion.	
2	• The course provides a foundation in the four basic skills LSRW (Listening, Speaking, Reading,Writing) of language learning, aligned to an International Business English Certification.	

Pre-requisites:

- The student should be able to communicate in basic English and have control over simple grammatical structures of English.
- All the students must take an assessment exam to ascertain their level of skill in English and undergo a brief induction course in it.

Course Contents / Syllabus

UNIT-I	Introduction & Reading Skills	7 Hours

- Introduction to ESP
- Reading basics (skimming, scanning, churning, & assimilation)
- Reading comprehension
- Reading texts for paraphrasing & note making; diagram, chart, picture reading
- Critical reading of texts through suggested list of books

UNIT-II	Writing Skills	10 Hours

- Vocabulary building - word formation; root words, prefixes &suffixes; synonyms; antonyms; homophones; abbreviations; one-word substitutes
- Requisites of a good sentence
- Common errors - subject-verb agreement and concord, tenses, articles, preposition; punctuation
- Paragraph writing
- Basics of letter &email writing; notice & memo writing

UNIT-III	Listening Skills	5 Hours

- Process of listening
- Types of listening
- Overcoming barriers to listening
- Tips for effective listening
- Exercises on listening skills

UNIT-IV	Speaking Skills	8 Hours

- Skills of effective speaking

- Applied phonetics – phoneme, syllable, word accent
- Stress, rhythm& intonation in English
- Neutral accent – difficulties of non-native speakers of English
- Speaking with confidence

UNIT-V	**Public Speaking**	**10 Hours**

- Components of effective speaking in the workplace
- Public speaking – Kinesics, Chronemics, Proxemics
- Voice dynamics
- Basics of Presentation, PPT support
- Online Presentations & Etiquette
- Facing an Interview

Course outcome:

At the end of the course students will be able to

CO 1	Understand the basic objective of the course and comprehend texts for professional reading tasks in preparation for an International Certification in Business English.	
CO 2	Write professionally in simple and correct English.	
CO 3	Interpret listening tasks for better professional competence.	
CO 4	Recognize the elements of effective speaking with emphasis on applied phonetics.	
CO 5	Apply the skill of speaking at the workplace.	

Text books

1. Cambridge English Business Benchmark (Pre-intermediate to Intermediate), 2nd edition, Norman Whitby, Cambridge University Press, 2006, UK.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
3. Technical Communication – Principles and Practices by Meenakshi Raman &Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.

Reference Books

1. Talbot, Fiona. *Improve Your Global Business English* Kogan Page, 2012.
2. Leech Geoffrey.*Communicative Grammar ofEnglish*PearsonEducationHarlow, United Kingdom, 1994.
3. Sethi J. Course in Phonetics and Spoken EnglishPrentice Hall India Learning Private Limited; 2 edition (1999)
4. Rebecca Corfield. *Preparing the Perfect CV*. Kogan Page Publishers, 2009.
5. Anderson, Paul V. *Technical communication*. 8th ed. Cengage Learning, 2011.
6. IELTS 11: General Training with answers. Cambridge English

B. TECH FIRST YEAR			
Course Code	**AAS0151A**	**L T P**	**Credit**
Course Title	**Engineering Physics Lab**	**0 0 2**	**1**

Suggested list of Experiment

Sr. No.	Name of Experiment (Minimum Ten experiments should be performed)
1	To determine the wavelength of monochromatic light by Newton's ring.
2	To determine the focal length of two lenses by nodal slide and to verify the formula for the focal length of combination of two lenses.
3	To determine the specific rotation of cane sugar solution using Polarimeter.
4	To determine the wavelength of spectral lines using plane transmission Grating.
5	To determine the specific resistance of a given wire using Carey Foster's bridge.
6	To study the variation of magnetic field along the axis of current carrying - Circular coil and then to estimate the radius of the coil.
7	To verify Stefan's Law by electrical method.
8	To Study the Hall effect and determine the Hall Coefficient, carrier density and mobility of a given semiconductor material using hall effect setup.
9	To determine the energy band gap of a given semiconductor material.
10	To determine the coefficient of viscosity of a liquid.
11	Calibration of a voltmeter using potentiometer.
12	Calibration of a ammeter using potentiometer.
13	To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
14	To determine the magnetic susceptibility of a ferromagnetic salt ($FeCl_3$) by using Quincke's tube method.
15	To study the hysteresis curve and then to estimate the retentively and coercivity of a given ferromagnetic material.
16	To determine the angle of divergence of laser beam using He-Ne Laser.
17	To determine the wavelength of laser using diffraction grating.
18	To determine the numerical aperture of optical fiber.

Lab Course Outcome: After completion of this course students willbeable to:

CO 1	Apply the practical knowledge of the phenomenon of interference, diffraction and polarization.
CO 2	Understand energy band gap and resistivity.
CO 3	Develop the measurement techniques of magnetism.
CO 4	Analyze the flow of liquids.

Link:

Unit 1	https://www.youtube.com/watch?v=lzBKlY4f1XA&list=PL10WTjZXSIlHKMnU4UCxpPsH-yAf_n1O6&index=11
Unit 2	http://nptel.ac.in/ , http://www.mit.edu/

Unit 3	https://www.youtube.com/watch?v=bWTxf5dSUBE **,**http://ocw.mit.edu/ http://nptel.ac.in/
Unit 4	https://www.youtube.com/watch?v=6vyYRnLvnqI
Unit 5	https://www.youtube.com/watch?v=0GD-18Jqnro, https://www.youtube.com/watch?v=dQhhcgn8YZo

B. TECH FIRST YEAR			
Lab Code	**ACSE0151**	**L T P**	**Credit**
Lab Title	Problem Solving using Python Lab	**0 0 2**	**1**

Course outcome: At the end of course, the student will be able to

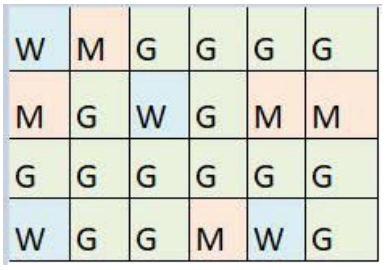
CO 1	Write simple python programs.	K_2, K_3
CO 2	Implement python programs usingdecision control statements	K_3, K_6
CO 3	Writing python programs using user defined functions and modules	K_2
CO 4	Implement programs using python data structures –lists, tuples, set, dictionaries	K_3
CO 5	Write programs to perform input/output operations on files	K_3, K_4

List of Experiment:

List of Fundamental Programs		
S.N.	**Program Title**	**Catagory**
1	Python Program to print "Hello Python"	Basic
2	Python Program to read and print values of variables of different data types.	Basic
3	Python Program to perform arithmetic operations on two integer numbers	Basic
4	Python Program to Swap two numbers	Basic
5	Python Program to convert degree Fahrenheit into degree Celsius	Operators
6	Python Program to demonstrate the use of relational operators.	Operators
7	Python Program to understand the working of bitwise and logical operators.	Operators
8	Python Program to calculate roots of a quadratic equation.	Conditional
9	Python Program to check whether a year is leap year or not.	Conditional
10	Python Program to find smallest number among three numbers.	Conditional
11	Python Program to make a simple calculator.	Conditional
12	Python Program to find the factorial of an integer number.	Loop
13	Python Program to find the reverse of an integer number.	Loop
14	Python Program to find and print all prime numbers in a list.	Loop
15	Python Program to Find the Sum of 'n' Natural Numbers	Loop
16	Python Program to print sum of series: - 1/2 + 2/3+ 3/4 + ...+n/(n+1)	Loop
17	Python Program to print pattern using nested loop	Loop
18	Python Program to Display the multiplication Table of an Integer	Loop
19	Python Program to Print the Fibonacci sequence	Loop
20	Python Program to Check Armstrong Number	Loop
21	Python Program to Find Armstrong Number in an Interval	Loop
22	Python Program to check Using function whether a passed string is palindrome or not	Function

23	Python Program using function that takes a number as a parameter, check whether the number is prime or not.	Function
24	PythonProgram using function that computes gcd of two given numbers.	Function
25	Python Program to Find LCM of two or more given numbers.	Function
26	Python Program to Convert Decimal to Binary, Octal and Hexadecimal	Function
27	Python Program To Find ASCII value of a character	Basic
28	Python Program to Display Calendar	Loop
29	Python Program to Add Two Matrices	Loop
30	Python Program to Multiply Two Matrices	Loop
31	Python Program to Transpose a Matrix	Loop
32	Python Program to Sort Words in Alphabetic Order	Sorting
33	Python Program to Display Fibonacci Sequence Using Recursion	Recursion
34	Python Program to Find Factorial of Number Using Recursion	Recursion
35	Python Program that implements different string methods.	String
36	Python Program that validates given mobile number. Number should start with 7, 8 or 9 followed by 9 digits.	String
37	Python Program to implement various methods of a list.	List
38	Python Program that has a nested list to store toppers details. Edit the details and reprint them.	List
39	Python Program to swap two values using tuple assignment.	Tuple
40	Python Program that has a set of words in English language and their corresponding Hindi words. Define dictionary that has a list of words in Hindi language and their corresponding Hindi Sanskrit. Take all words from English language and display their meaning in both languages.	Dictionary
41	Python Program that inverts a dictionary.	Dictionary
42	Python Program that reads data from a file and calculates percentage of white spaces, lines, tabs, vowels and consonants in that file.	File
43	Python Program that fetches data from a given url and write it in a file.	File
44	Python Program to understand the concept of Exception Handling	Exception Handling
45	Python Program to implement linear and binary search	Searching
46	Python Program to sort a set of given numbers using Bubble sort	Sorting

S.No.	**Word Problem Experiments**
1.	**String Rotation** **Problem Description** Rotate a given String in the specified direction by specified magnitude. After each rotation make a note of the first character of the rotated String, after all rotation are performed the accumulated first character as noted previously will form another string, say FIRSTCHARSTRING. Check If FIRSTCHARSTRING is an Anagram of any substring of the Original string.

	If yes print "YES" otherwise "NO". Input The first line contains the original string s. The second line contains a single integer q. The ith of the next q lines contains character d[i] denoting direction and integer r[i] denoting the magnitude. **Constraints** 1 <= Length of original string <= 30 1<= q <= 10 **Output** YES or NO **Explanation** **Example 1** **Input** carrace 3 L 2 R 2 L 3 **Output** NO **Explanation** After applying all the rotations, the FIRSTCHARSTRING string will be "rcr" which is not anagram of any sub string of original string "carrace".
2.	**Jurassic Park** **Problem Description** Smilodon is a ferocious animal which used to live during the Pleistocene epoch (2.5 mya–10,000 years ago). Scientists successfully created few smilodons in an experimental DNA research. A park is established and those smilodons are kept in a cage for visitors. This park consists of Grasslands(G), Mountains(M) and Waterbodies(W) and it has three gates (situated in grasslands only). Below is a sample layout.  Before opening the park, club authority decides to calculate Safety index of the park. The procedure of the calculation is described below. Please help them to calculate. Safety Index calculation Assume a person stands on grassland(x) and a Smilodon escapes from the cage situated on grassland(y). If the person can escape from any of those three gates before the Smilodon able to catch him, then the grassland(x) is called safe else it is unsafe. A person and a

Smilodon both take 1 second to move from one area to another adjacent area(top, bottom, left or right) but a person can move only over grasslands though Smilodon can move over grasslands and mountains.

If any grassland is unreachable for Smilodon(maybe it is unreachable for any person also), to increase safe index value Club Authority use to mark those grasslands as safe land. Explained below

For the above layout, there is only one gate at (4,6)

Y is the position of Smilodon's cage

X is not safe area

Z is a safe area as is it not possible for smilodon to reach z

Safety index=(total grassland areas which are safe*100)/total grassland area

Constraints

i. 3<= R,C<= 10^3
ii. Gates are situated on grasslands only and at the edge of the park
iii. The cage is also situated in grassland only
iv. The position of the cage and the position of three gates are different

Input Format

The first line of the input contains two space-separated integers R and C, denoting the size of the park (R*C)

The second line contains eight space-separated integers where

First two integers represent the position of the first gate

3rd and 4th integers represent the position of second gate

5th and 6th integers represent the position of third gate respectively

The last two integers represent the position of the cage

Next R lines, each contains space separated C number of characters. These R lines represent the park layout.

Output

Safety Index accurate up to two decimal places using Half-up Rounding method

Explanation

Example 1

Input

4 4

1 1 2 1 3 1 1 3

G GGG

G W W M

G G W W

	M G M M **Output** 75.00
3.	**Bank Compare** **Problem Description** There are two banks; Bank A and Bank B. Their interest rates vary. You have received offers from both bank in terms of annual rate of interest, tenure and variations of rate of interest over the entire tenure. You have to choose the offer which costs you least interest and reject the other. Do the computation and make a wise choice. The loan repayment happens at a monthly frequency and Equated Monthly Installment (EMI) is calculated using the formula given below : EMI = loanAmount * monthlyInterestRate/(1 - 1 / (1 +monthlyInterestRate)^(numberOfYears * 12)) **Constraints** i. 1 <= P <= 1000000 ii. 1 <=T <= 50 iii. 1<= N1 <= 30 iv. 1<= N2 <= 30 **Input Format** First line : P – principal (Loan Amount) Second line : T – Total Tenure (in years). Third Line : N1 is number of slabs of interest rates for a given period by Bank A. First slab starts from first year and second slab starts from end of first slab and so on. Next N1 line will contain the interest rate and their period. After N1 lines we will receive N2 viz. the number of slabs offered by second bank. Next N2 lines are number of slabs of interest rates for a given period by Bank B. First slab starts from first year and second slab starts from end of first slab and so on. The period and rate will be delimited by single white space. **Output** Your decision – either Bank A or Bank B. **Explanation** **Example 1** **Input** 10000 20 3 5 9.5 10 9.6 5 8.5 3 10 6.9

	5 8.5 5 7.9 **Output** Bank B
4.	**Cross Words** **Problem Description** A crossword puzzle is a square grid with black and blank squares, containing clue numbers (according to a set of rules) on some of the squares. The puzzle is solved by obtaining the solutions to a set of clues corresponding to the clue numbers. The solved puzzle has one letter in each of the blank square, which represent a sequence of letters (consisting of one or more words in English or occasionally other languages) running along the rows (called "Across", or "A") or along the columns (called "Down" or "D"). Each numbered square is the beginning of an Across solution or a Down solution. Some of the across and down solutions will intersect at a blank square, and if the solutions are consistent, both of them will have the same letter at the intersecting square. In this problem, you will be given the specifications of the grid, and the solutions in some random order. The problem is to number the grid appropriately, and associate the answers consistently with the clue numbers on the grid, both as Across solutions and as Down solutions, so that the intersecting blank squares have the same letter in both solutions. Rules for Clue Numbering The clue numbers are given sequentially going row wise (Row 1 first, and then row2 and so on) Only blank squares are given a clue number A blank square is given a clue number if either of the following conditions exist (only one number is given even if both the conditions are satisfied) It has a blank square to its right, and it has no blank square to its left (it has a black square to its left, or it is in the first column). This is the beginning of an Across solution with that number It has a blank square below it, and no blank square above it (it has a black square above it or it is in the first row). This is the beginning of a Down solution with that number **Constraints** i. 5<=N<=15 ii. 5<=M<=50 **Input Format** The input consists of two parts, the grid part and the solution part The first line of the grid part consists of a number, N, the size of the grid (the overall grid is N x N) squares. The next N lines correspond to the N rows of the grid. Each line is comma separated, and has number of pairs of numbers, the first giving the position (column) of the beginning of a black square block, and the next giving the length of the block. If there are no black squares in a row, the pair "0,0" will be specified. For example, if a line contains "2,3,7,1,14,2", columns 2,3,4 (a block of 3 starting with 2), 7 (a block of 1 starting with 7) and 14,15 (a block of 2 starting with 14) are black in the corresponding

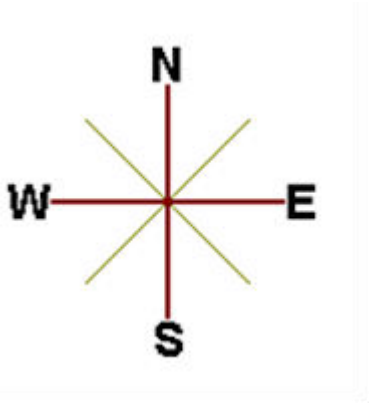
	row. The solution part of the input appears after the grid part. The first line of the solution part contains M, the number of solutions. The M subsequent lines consist of a sequence of letters corresponding to a solution for one of the Across and Down clues. All solutions will be in upper case (Capital letters) **Output** The output is a set of M comma separated lines. Each line corresponds to a solution, and consists of three parts, the clue number, the letter A or D (corresponding to Across or Down) and the solution in to that clue (in upper case) The output must be in increasing clue number order. Ifa clue number has both an Across and a Down solution, they must come in separate lines, with the Across solution coming before the Down solution. **Explanation** **Example 1** **Input** 5 5,1 1,1,3,1,5,1 0,0 1,1,3,1,5,1 1,1 5 EVEN ACNE CALVE PLEAS EVADE **Output** 1,A,ACNE 2,D,CALVE 3,D,EVADE 4,A,PLEAS 5,A,EVEN
5.	**Skateboard** **Problem Description** The amusement park at Patagonia has introduced a new skateboard competition. The skating surface is a grid of N x N squares. Most squares are so constructed with slopes that it is possible to direct the skateboard in any of up to three directions of the possible four (North ,East, South or West, represented by the letters N, E, S and W respectively). Some squares however have a deep drop from the adjacent square from which it is impossible to

go to any adjacent square. These are represented by D (for Drop) in that square. The objective is to maneuver the skateboard to reach the South East corner of the grid, marked F.

Each contestant is given a map of the grid, which shows where the Drop squares are (marked D), where the Final destination is (marked F), and, for each other square, the directions it is possible to maneuver the skateboard in that square.

The contestant draws lots to determine which of the squares on the boundaries of the grid on the North or the West of the grid (the top or the left in the diagram) he or she should start in. Then, using a map of the grid, he or she needs to try to reach the South East corner destination by maneuvering the skateboard.

ES	ES	SE	ES	ES	S
SE	ES	SE	ES	ES	S
ES	ES	SE	ES	SE	S
ES	SE	ES	SE	E	D
SE	ES	D	WSE	NES	NS
E	E	NE	E	E	F



In some cases, it is impossible to reach the destination. For example, in the diagram above, if one starts at the North East corner (top right in the diagram), the only way is to go is South, until the Drop square is reached (three squares South), and the contestant is stuck there.

A contestant asks you to figure out the number of squares at the North or West boundary (top or left boundary in the map) from which it is feasible to reach the destination.

Constraints

i. 5<=N<=50

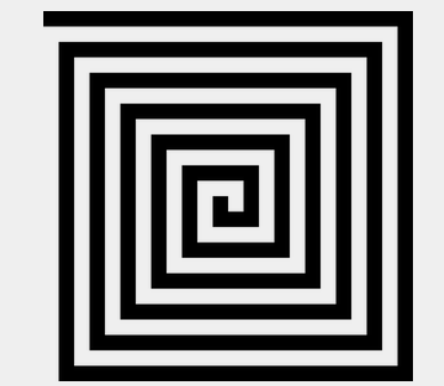
Input Format

The first line of the input is a positive integer N, which is the number of squares in each side of the grid.

The next N lines have a N strings of characters representing the contents of the map for that corresponding row. Each string may be F, representing the Final destination, D, representing a drop square, or a set of up to three of the possible four directions (N,E,S,W) in some random order. These represent the directions in which the contestant can maneuver the skateboard when in that square.

Output

The output is one line with the number of North or West border squares from which there is a safe way to maneuver the skateboard to the final destination.

	Explanation **Example 1** **Input** 6 ES,ES,SE,ES,ES,S SE,ES,SE,ES,ES,S ES,ES,SE,ES,SE,S ES,SE,ES,SE,E,D SE,ES,D,WSE,NES,NS E,E,NE,E,E,F **Output** 9
6.	**Chakravyuha** **Problem Description** During the battle of Mahabharat, when Arjuna was far away in the battlefield, Guru Drona made a Chakravyuha formation of the Kaurava army to capture YudhisthirMaharaj. Abhimanyu, young son of Arjuna was the only one amongst the remaining Pandava army who knew how to crack the Chakravyuha. He took it upon himself to take the battle to the enemies. Abhimanyu knew how to get power points when cracking the Chakravyuha. So great was his prowess that rest of the Pandava army could not keep pace with his advances. Worried at the rest of the army falling behind, YudhisthirMaharaj needs your help to track of Abhimanyu's advances. Write a program that tracks how many power points Abhimanyu has collected and also uncover his trail A Chakravyuha is a wheel-like formation. Pictorially it is depicted as below  Fig 1. Chakravyuha A Chakravyuha has a very well-defined co-ordinate system. Each point on the co-ordinate system is manned by a certain unit of the army. The Commander-In-Chief is always located at the centre of the army to better co-ordinate his forces. The only way to crack the Chakravyuha is to defeat the units in sequential order. A Sequential order of units differs structurally based on the radius of the Chakra. The radius can be thought of as length or breadth of the matrix depicted above. The structure

i.e. placement of units in sequential order is as shown below

1	2	3	4	5
16	17	18	19	6
15	24	25	20	7
14	23	22	21	8
13	12	11	10	9

Fig 2. Army unit placements in Chakravyuha of size 5

The entry point of the Chakravyuha is always at the (0,0) co-ordinate of the matrix above. This is where the 1st army unit guards. From (0,0) i.e. 1st unit Abhimanyu has to march towards the center at (2,2) where the 25th i.e. the last of the enemy army unit guards. Remember that he has to proceed by destroying the units in sequential fashion. After destroying the first unit, Abhimanyu gets a power point. Thereafter, he gets one after destroying army units which are multiples of 11. You should also be a in a position to tell YudhisthirMaharaj the location at which Abhimanyu collected his power points.

Input Format:

First line of input will be length as well as breadth of the army units, say N

Output Format:

- Print NxN matrix depicting the placement of army units, with unit numbers delimited by (\t) Tab character
- Print Total power points collected
- Print coordinates of power points collected in sequential fashion (one per line)
- Constraints: 0 < N <=100

Sample Input and Output

S. NO.	Input	Output
1	2	1 2 4 3 Total Power points : 1 (0,0)
2	5	1 2 3 4 5 16 17 18 19 6 15 24 25 20 7 14 23 22 21 8 13 12 11 10 9 Total Power points : 3 (0,0) (4,2)

				(3,2)	

7. Exam Efficiency

Problem Description

In an examination with multiple choice questions, the following is the exam question pattern.

- X1 number of One mark questions, having negative score of -1 for answering wrong
- X2 number of Two mark questions, having negative score of -1 and -2 for one or both options wrong
- X3 number of Three mark questions, having negative score of -1, -2 and -3 for one, two or all three options wrong
- Score Required to Pass the exam : Y
- For 1,2 and 3 mark questions, 1,2 and 3 options must be selected. Simply put, once has to attempt to answer all questions against all options.

Identify the minimum accuracy rate required for each type of question to crack the exam.
Calculations must be done up to 11 precision and printing up to 2 digit precision with ceil value

Input Format:

First line contains number of one mark questions denoted by X1,
Second line contains number of two mark questions denoted by X2
Third line contains number of three mark questions denoted by X3
Fourth line contains number of marks required to pass the exam denoted by Y.

Output Format:

Minimum Accuracy rate required for one mark question is 80%
Minimum Accuracy rate required for Two mark question is 83.33%
Minimum Accuracy rate required for Three mark question is 90%

Note: - If the mark required to pass the exam can be achieved by attempting without attempting any particular type of question then show message similar to, One mark question need not be attempted, so no minimum accuracy rate applicable

Sample Input and Output

S.No.	Input	Output	Explanation

	1	20 30 30 120	One mark questions need not be attempted, so no minimum accuracy rate applicable. Minimum Accuracy rate required for Two mark question is 58.33% Minimum Accuracy rate required for Three mark question is 72.23%	If one got full marks in two marks question and three marks question then total accuracy can be 0 in one mark question In same way it will be done for two marks and three marks question	
	2	20 30 30 170	Minimum Accuracy rate required for one mark question is 100% Minimum Accuracy rate required for Two mark question is 100% Minimum Accuracy rate required for Three mark question is 100%	If one got full marks in two marks question and three marks question then total accuracy should be 100% in one mark question to pass the exam. In same way it will be done for two marks and three marks question	

8. Calculate Salary and PF

Problem Description

Calculate the Final Salary & Final Accumulated PF of an Employee working in ABC Company Pvt. Ltd. The Company gives two Increments (i.e. Financial Year Increment & Anniversary Increment) to an Employee in a Particular Year.

The Employee must have Completed 1 Year to be Eligible for the Financial Year Increment. The Employee who are joining in the month of Financial Year Change (i.e. April) are considered as the Luckiest Employee's, because after completion of 1 Year, they get Two Increments

(Financial Year Increment & Anniversary Increment).

Rate of Interest for the Financial Year Increment = 11%.

Rate of Interest for the Anniversary Increment = 12%.

From 4th Year, the Financial Year Increment will be revised to 9%.

From 8th Year, the Financial Year Increment will be revised to 6%.

The Company is giving special Increment for the Employee who have completed 4 years & 8 years respectively.

So, the Anniversary Increment of the Employee for the 4th Year will be 20% and the Anniversary Increment of the Employee for the 8th year will be 15%.

Calculate the Final Salary after N number of Years as well as Calculate the Accumulated PF of the Employee after N number of Years.

Please Note that, the Rate of Interest for calculating PF for a Particular Month is 12%. Moreover, take the upper Limit of the amount if it is in decimal (For e.g. - If any Amount

turns out to be 1250.02, take 1251 for the Calculation.)

Input Format:

i. Joining Date in dd/mm/yy format
ii. Current CTC.
iii. Number of Years for PF & Salary Calculation.

Output Format:

i. Salary after the Specified Number of Years (i.e. CTC after N number of Years) in the following format
Final Salary =
ii. Accumulated PF of the Employee after N number of Years in the following format
Final Accumulated PF =

Constraints:

Calculation should be done upto 11-digit precision and output should be printed with ceil value

Sample Input and Output

S.No.	Input	Output
1	5 01/01/2016 10000 2	Final Salary = 13924 Final Accumulated PF = 2665
2	19/01/2016 6500 4	Final Salary = 14718 Final Accumulated PF = 4343

9.

ISL Schedule

Problem Description

The Indian Soccer League (ISL) is an annual football tournament.

The group stage of ISL features N teams playing against each other with following set of rules:

i. N teams play against each other twice - once at Home and once Away
ii. A team can play only one match per day
iii. A team cannot play matches on consecutive days
iv. A team cannot play more than two back to back Home or Away matches
v. Number of matches in a day has following constraints
   a. The match pattern that needs to be followed is -
      - Day 1 has two matches and Day 2 has one match,
      - Day 3 has two matches and Day 4 has one match and so on
   b. There can never be 3 or more matches in a day
vi. Gap between two successive matches of a team cannot exceed floor(N/2) days where floor is the mathematical function floor()
vii. Derby Matches (any one)

a. At least half of the derby matches should be on weekend
b. At least half of the weekend matches should be derby matches

Your task is to generate a schedule abiding to above rules.

Input Format:

First line contains number of teams (N).

Next line contains state ID of teams, delimited by space

Output Format:

Match format: Ta-vs-Tb

where Ta is the home team with id a and Tb is the away team with id b.

For each day print the match(es) in following format:-

Two matches:- "#D Ta-vs-Tb Tm-vs-Tn"

One match:- "#D Tx-vs-Ty"

where D is the day id and [a, b, m, n, x, y] are team ids.

Constraints:

i. 8 <= N <= 100

Note :

- Team ids are unique and have value between 1 to N
- Day id starts with 1
- Every 6th and 7th day are weekends
- Derby is a football match between two teams from the same state

Sample Input and Output

S.No.	Input	Output
1	8 1 2 5 4 3 1 6 6	#1 T1-vs-T6 T3-vs-T5 #2 T7-vs-T4 #3….and so on

Note: - There can be multiple correct answers for the same test cases. For better understanding of test case refer this PDF. This PDF contains one of the correct answer for a test case.

Explanation:

There are 8 teams with following information: -

Team ID	1	2	3	4	5	6	7	8
State ID	1	2	5	4	3	1	6	6

10. **Longest Possible Route**

Problem Description

Given an MxN matrix, with a few hurdles arbitrarily placed, calculate the cost of longest possible route from point A to point B within the matrix.

Input Format:

i. First line contains 2 numbers delimited by whitespace where, first number

M is number of rows and second number N is number of columns

ii. Second line contains number of hurdles H followed by H lines, each line will contain one hurdle point in the matrix.

iii. Next line will contain point A, starting point in the matrix.

iv. Next line will contain point B, stop point in the matrix.

Output Format:

Output should display the length of the longest route from point A to point B in the matrix.

Constraints:

i. The cost from one position to another will be 1 unit.

ii. A location once visited in a particular path cannot be visited again.

iii. A route will only consider adjacent hops. The route cannot consist of diagonal hops.

iv. The position with a hurdle cannot be visited.

v. The values MxN signifies that the matrix consists of rows ranging from 0 to M-1 and columns ranging from 0 to N-1.

vi. If the destination is not reachable or source/ destination overlap with hurdles, print cost as -1.

Sample Input and Output

S. No.	Input	Output	Explanation
1	3 10 3 1 2 1 5 1 8 0 0 1 7	24	Here matrix will be of size 3x10 matrix with a hurdle at (1,2),(1,5) and (1,8) with starting point A(0,0) and stop point B(1,7) 3 10 3 -- (no. of hurdles) 1 2 1 5 1 8 0 0 -- (position of A) 1 7 -- (position of B) (->) count is 24. So final answer will be 24. No other route longer than this one is possible in this matrix.
2	2 2 1 0 0 1 1 0 0	-1	No path is possible in this 2*2 matrix so answer is -1

11. **Min Product array**

Problem Description

The task is to find the minimum sum of Products of two arrays of the same size, given that

k modifications are allowed on the first array. In each modification, one array element of the first array can either be increased or decreased by 2.

Note- the product sum is Summation (A[i]*B[i]) for all i from 1 to n where n is the size of both arrays

Input Format:

i. First line of the input contains n and k delimited by whitespace
ii. Second line contains the Array A (modifiable array) with its values delimited by spaces
iii. Third line contains the Array B (non-modifiable array) with its values delimited by spaces

Output Format:

Output the minimum sum of products of the two arrays

Constraints:

i. $1 \leq N \leq 10^5$
ii. $0 \leq |A[i]|, |B[i]| \leq 10^5$
iii. $0 \leq K \leq 10^9$

Sample Input and Output

S.No.	Input	Output
1	3 5 1 2 -3 -2 3 -5	-31
2	5 3 2 3 4 5 4 3 4 2 3 2	25

Explanation for sample 1:

Here total numbers are 3 and total modifications allowed are 5. So we modified A[2], which is -3 and increased it by 10 (as 5 modifications are allowed). Now final sum will be
(1 * -2) + (2 * 3) + (7 * -5)
-2 + 6 - 35
-31
-31 is final answer.

Explanation for sample 2:

Here total numbers are 5 and total modifications allowed are 3. So we modified A[1], which is 3 and decreased it by 6 (as 3 modifications are allowed).
Now final sum will be
(2 * 3) + (-3 * 4) + (4 * 2) + (5 * 3) + (4 * 2)
6 - 12 + 8 + 15 + 8
25
25 is final answer.

12. **Consecutive Prime Sum**

Problem Description

Some prime numbers can be expressed as a sum of other consecutive prime numbers. For example, 5 = 2 + 3, 17 = 2 + 3 + 5 + 7, 41 = 2 + 3 + 5 + 7 + 11 + 13. Your task is to find out how many prime numbers which satisfy this property are present in the range 3 to N subject to a constraint that summation should always start with number 2.

Write code to find out the number of prime numbers that satisfy the above-mentioned property in a given range.

S. No.	Input	Output	Comment
1	20	2	(Below 20, there are 2 such members: 5 and 17) 5 = 2+3 17 = 2+3+5+7
2	15	1	

Input Format:

First line contains a number N

Output Format:

Print the total number of all such prime numbers which are less than or equal to N.

Constraints:

2<N<=12,000,000,000

13.

kth largest factor of N

Problem Description

A positive integer d is said to be a factor of another positive integer N if when N is divided by d, the remainder obtained is zero. For example, for number 12, there are 6 factors 1, 2, 3, 4, 6, 12. Every positive integer k has at least two factors, 1 and the number k itself.Given two positive integers N and k, write a program to print the kth largest factor of N.

Input Format:

The input is a comma-separated list of positive integer pairs (N, k)

Output Format:

The kth highest factor of N. If N does not have k factors, the output should be 1.

Constraints:

1<N<10000000000. 1<k<600.You can assume that N will have no prime factors which are larger than 13.

Example 1

Input:

12,3

Output:

4

Explanation:

	N is 12, k is 3. The factors of 12 are (1,2,3,4,6,12). The highest factor is 12 and the third largest factor is 4. The output must be 4
14.	**Coins Distribution Question (or Coins Required Question)** **Problem Description** Find the minimum number of coins required to form any value between 1 to N, both inclusive. Cumulative value of coins should not exceed N. Coin denominations are 1 Rupee, 2 Rupee and 5 Rupee. Let's understand the problem using the following example. Consider the value of N is 13, then the minimum number of coins required to formulate any value between 1 and 13, is 6. One 5 Rupee, three 2 Rupee and two 1 Rupee coins are required to realize any value between 1 and 13. Hence this is the answer. However, if one takes two 5 Rupee coins, one 2 rupee coins and two 1 rupee coins, then to all values between 1 and 13 are achieved. But since the cumulative value of all coins equals 14, i.e., exceeds 13, this is not the answer. **Input Format** A single integer value **Output Format** Four Space separated Integer Values 1st – Total Number of coins 2nd – number of 5 Rupee coins. 3rd – number of 2 Rupee coins. 4th – number of 1 Rupee coins. **Constraints** 0<n<1000 **Sample Input:** 13 **Sample Output:** 6 1 3 2
S. NO.	**Debugging Experiments**
1.	Write error/output in the following code. # abc.py deffunc(n): return n + 10 func('Hello')
2.	Write the output of the following code. if not a or b:

	print 1
	elif not a or not b and c:
	print 2
	elif not a or b or not b and a:
	print 3
	else:
	print 4

3.	Write error/output in the following code. count = 1 defdoThis(): global count for i in (1, 2, 3): count += 1 doThis() print count

4.	Write the output of the following code.
	
	check1 = ['Learn', 'Quiz', 'Practice', 'Contribute']
	check2 = check1
	check3 = check1[:]
	
	check2[0] = 'Code'
	check3[1] = 'Mcq'
	
	count = 0
	for c in (check1, check2, check3):
	if c[0] == 'Code':
	count += 1
	if c[1] == 'Mcq':
	count += 10
	
	print count

5.	What is the output of the following program? D = dict()

	for x in enumerate(range(2)):
	  D[x[0]] = x[1]
	  D[x[1]+7] = x[0]
	print(D)

6.	What is the output/error in the following program? D = {1 : 1, 2 : '2', '1' : 1, '2' : 3} D['1'] = 2 print(D[D[D[str(D[1])]]])
7.	What is the output/error in the following program? D = {1 : {'A' : {1 : "A"}, 2 : "B"}, 3 :"C", 'B' : "D", "D": 'E'} print(D[D[D[1][2]]], end = " ") print(D[D[1]["A"][2]])

8.	What is the output/error in the following program?
	
	D = dict()
	for i in range (3):
	  for j in range(2):
	  D[i] = j
	print(D)

9.	What is the output/error in the following program? x = ['ab', 'cd'] for i in x: x.append(i.upper()) print(x)

10.	What is the output/error in the following program?
	
	i = 1
	while True:
	  if i%3 == 0:
	  break
	  print(i)
	i + = 1

Course Code	AASL0151	L T P	Credit
Course Title	**Professional Communication Lab**	0 0 2	1

Suggested list of Experiment	
Sr. No.	**Name of Experiment**
1	Extempore speech& Jam Sessions (4 hrs)
2	Group Discussion (4 hrs)
3	Presentations (Individual and group) (4 hrs)
4	Listening Practice (2 hrs)
5	News/ Book Review (Presentation based) (4 hrs)

Lab Course Outcome:

At the end of the course students will be able to -

CO 1	Learn to use English language for communicating ideas.
CO 2	Develop interpersonal skills and leadership abilities.
CO 3	Practice their public speaking skills and gain confidence in it.
CO 4	Realize the importance of analytical listening during communication.
CO 5	Apply critical thinking skills in interpreting texts and discourses.

B. TECH FIRST YEAR

Course Code	AME0152	L T P	Credit
Course Title	Engineering Graphics & Solid Modelling	0 0 3	1.5

Course objective:

1	To familiarize the students with the concepts of Engineering Graphics and provide understanding of the drafting, principles, instruments, standards, conventions of drawings, scales, curves etc.	
2	To impart knowledge about projections of point, lines and planes.	
3	To make the students able tounderstandorthographic projections of simple solids and their sections and development of curves for lateral surfaces	
4	To make them capable to prepare engineering drawing using CAD software.	
5	To make them capable to prepare engineering drawing using CREO software.	

Pre-requisites: Knowledge of basic geometry.

Course Contents / Syllabus

UNIT-I	Introduction	6 hours

Introduction to engineering graphics, Convention for Lines and their uses, Symbols for different materials and surface finish, Methods of dimensioning, Scales, Cycloidal curves and involutes. (1 Sheet)

UNIT-II	Projection of points, lines and planes	6 hours

Projection of points, lines and planes. (1 Sheet)

UNIT-III	Projection of solids and Sections of solids and Development of surfaces	6 hours

Orthographic projections of regular solids. Projection of section of regular solids. Development of lateral surfaces of regular solids(2 sheet)

UNIT-IV	Introduction to CAD	9 hours

Introduction to Computer Aided Drawing: Drawing practice using various commands (Array, block, scale, fillet, chamfer, hatch etc.), Absolute coordinate systems, Polar coordinate systems and relative coordinate systems, Drawing practice using dimensioning, Drawing of 2D planes; circle, polygons, ellipse etc, Drawing practice using 3D primitives; Drawing of cone Prism, pyramid etc.; Create solids using extrude, revolve commands, Working drawings of various mechanical systems. (4 Sheets)

UNIT-V	Introduction to CREO	9 hours

Introduction to CREO Parametric, features of CREO, concepts- modeling, parametric, associative, feature based, sketch entities- inference lines, center lines, circle, arc, ellipse, rectangle, slots, polygon, etc, sketch tools- fillet, chamfer, offset, trim, extend, split, mirror, move, copy, rotate, scale, stretch etc. dimensioning (4 Sheets)

Course outcome: **After completion of this course students will be able to**

CO 1	Apply the basic principles of engineering graphics to draw various types of Scales, Cycloidal and involutes curves.	K_1, K_2

CO 2	Draw and develop the projections of points lines and planes.	K_1, K_2
CO 3	Draw orthographic projection of solids and their sections and draw the lateral surfaces.	K_3
CO 4	Apply CAD software to draw 2D and 3D drawing.	K_2
CO 5	Apply CREO software to draw 2D and 3D drawing.	K_2, K_3

Text books

A Textbook of Engineering Drawing- Dr R.K. Dhawan, S.Chand Publication, Revised edition-2015

Engineering Graphics and Design- P.S. Gill, Katson books, Revised edition-2018

Reference Books

(1) **Engineering Drawing** - N.D. Bhatt & V.M. Panchal, 48thedition, 2005- Charotar Publishing House, Gujarat.

(2) **Computer Aided Engineering Drawing** - S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rdrevised edition-2006

Video links

Unit 1

https://www.youtube.com/watch?v=uojN7SOHPBw

https://youtu.be/w2-a_EzO4-Q

https://www.youtube.com/watch?v=n9iQcttWHAo

Unit 2

https://www.youtube.com/watch?v=fK4h5gM73w8&list=PLIhUrsYr8yHxEk_Jv8yOatnDcr6KYK3j

https://www.youtube.com/watch?v=FtugLo9DMw8&list=PLIhUrsYr8yHz_FkG5tGWXaNbIxVcibQvV

https://www.youtube.com/watch?v=AoNIOxnxDO0&list=PLIhUrsYr8yHx7TVB51jN3HZVyW3R6RiBg

Unit 3

https://www.youtube.com/watch?v=YV4RZNQ2yB8&list=PLIhUrsYr8yHxARPzEFz1nXgt8j6xF_tEm

https://www.youtube.com/watch?v=vlYAGkWmiW8&list=PLIhUrsYr8yHwdB96ft6c0Uwc4SDCLuG1v&index=5

https://www.youtube.com/watch?v=Vo9LC9d7FQA&list=PLIhUrsYr8yHxVky7bfrnbRcdXcHjT_K83&index=1

youtube.com/watch?v=t9gepMkey0w&list=PLItCiRV7ABU4SUL7gYOSiwmMlN1t_-gQl&index=2

Unit 4

https://www.youtube.com/watch?v=ifM0JQ6-Nus

https://www.youtube.com/watch?v=tHrfxjgFQt8

https://www.youtube.com/watch?v=c1kGuiYEHh0

https://www.youtube.com/watch?v=UKpCFYWK7q4&t=14s

https://www.youtube.com/watch?v=R8Hd7DUZcF0

https://www.youtube.com/watch?v=rzXWDgfcxec

https://www.youtube.com/watch?v=QnN8A1mIUYY

https://www.youtube.com/watch?v=Gx3yy5lKumA

https://www.youtube.com/watch?v=tnylweRokkw

Unit 5
https://www.youtube.com/watch?v=sVWsUS_7V6s
https://www.youtube.com/watch?v=KsMil9ND5E8
https://www.youtube.com/watch?v=GGxmUWBoqcg

B. TECH FIRST YEAR			
Course Code	**AME0152**	**L T P**	**Credit**
Course Title	**Engineering Graphics & Solid Modelling**	**0 0 3**	**1.5**

Suggested list of Experiment

Sheet No.	Experiment No.	Name of Experiment
1.	1	To draw plain scale and diagonal scale.
2.	1	To draw projection of points, lines and planes.
3.	1	To draw orthographic projection of regular solids.
	2	To draw section of regular solids.
4.	1	To draw development of lateral surfaces of simple solids.
	2	To draw cycloidal or involute curve.
5.	1	Initiating the Graphics Package; Setting the paper size, space; setting the limits, units; use of snap and grid commands in AutoCAD
6.	1	To create 2D view of a center pin with given dimensions in AutoCAD.
	2	To create 2D view of abase plate with given dimensions in AutoCAD.
	3	To create 2D view of a bush with given dimensions in AutoCAD.
7.	1	To create 3D view of a washer in AutoCAD.
	2	To create 3D view of a guide pin in AutoCAD.
	3	To create 3D view of a lock nut in AutoCAD.
8.	1	To create drawings of given machine components in AutoCAD.
9.	1	To understand basic of CREO
	2	To understand basic sketching in CREO
10.	1	To understand basic par modelling in CREO using different options aiding constructions like extrude, hole, ribs, shell etc.
11.	1	Introduction to CREO Parametric ‘sketch features’ (revolve, sweep, helical sweep, sweep blend etc.
12.	1	Introduction to CREO Parametric ‘edit features’ (group, copy, mirror tool) and ‘place features’ (holes, shells and drafts).

B. TECH FIRST YEAR

Course Code	AAS0204	L	T	P	Credit
Course Title	MATHEMATICAL FOUNDATIONS -II	3	1	0	4

Course objective: The objective of this course is to familiarize the engineering students with techniques of solving Ordinary Differential Equations, Partial Differential Equation, Laplace Transform and Function of complex variable and its application in real world. It aims to equip the students with adequate knowledge of mathematics that will enable them in formulating problems and solving problems analytically.

Pre-requisites: Knowledge of Engineering Mathematics –I and Mathematics upto 12^{th} standard.

Course Contents / Syllabus

UNIT-I	Multivariable Calculus	8 hours

Multiple integration: Double integral, Triple integral, Change of order of integration, Change of variables, Application: Areas and volume,Improper integrals, Beta & Gama function and their properties, Dirichlet's integral and its applications.

UNIT-II	Ordinary Differential Equation of Higher Order	10 hours

Linear differential equations of nth order with constant coefficients, Complementary function and Particular integral, Simultaneous linear differential equations, Solution of second order differential equations by changing dependent & independent variables, Method of variation of parameters, Application of ordinary differential equation.

UNIT-III	Partial Differential Equation	8 hours

Solution of first order Lagrange's linear partial differential equations, Second order linear partial differential equations with constant coefficients(homogeneous and non-homogeneous),classification of second order partial differential equations.

UNIT-IV	Laplace Transform	8 hours

Laplace transform, Existence theorem, Laplace transforms of derivatives and integrals, Initial and final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem, Application to solve simple linear and simultaneous differential equations.

UNIT-V	Aptitude-II	8 hours

Ratio, Proportion & Partnership, Problem of ages, Allegation & Mixture, Direction, Blood relation , Simple & Compound interest

Course outcome:

CO 1	Apply multiple integral to find area and volume.	K_3

CO 2	Apply the concept of differentiation to solve differential equations.	K_3
CO 3	Illustrate the solution of partial differential equation of second order.	K_2
CO 4	Apply the Laplace transform to solve ordinary differential equations	K_3
CO 5	Solve the problems of Proportion & Partnership, Problem of ages, Allegation & Mixture, Direction, Blood relation , Simple & Compound interest	K_3

Text books

(1) B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd..

(2) B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher.

Reference Books

1. E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons.

2. Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning.

3. Maurice D. Weir, Joel Hass, Frank R.Giordano, Thomas, Calculus, Eleventh Edition, Pearson.

4. G.B Thomas, R L Finney, Calculus and Analytical Geometry, Ninth Edition Pearson.

5. James Ward Brown and Ruel V Churchill, Fourier Series and Boundary Value Problems, 8th Edition-Tata McGraw-Hill

6. D. Poole, Linear Algebra : A Modern Introduction, 2nd Edition, Brooks/Cole.

7. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi.

8. Charles E Roberts Jr, Ordinary Diffrential Equations, Application, Model and Computing, CRC Press T&F Group.

9. Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, 6th Edition, Tata McGraw-Hill.

10. P. Sivaramakrishna Das and C. Vijayakumari, Engineering Mathematics, 1st Edition, Pearson India Education Services Pvt. Ltd.

11. Advanced Engineering Mathematics By Chandrika Prasad, Reena Garg Khanna Publishing House, Delhi.

12. Quantitative Aptitude by R.S. Aggrawal.

Link:

Unit 1	https://www.youtube.com/watch?v=3BbrC9JcjOU https://www.youtube.com/watch?v=-DduB46CoZY https://www.youtube.com/watch?v=VvKAuFBJLs0 https://www.youtube.com/watch?v=4rc3w1sGoNU https://www.youtube.com/watch?v=X6kp2o3mGtA&t=1003s https://www.youtube.com/watch?v=wtY5fx6VMGQ&t=1151s https://www.youtube.com/watch?v=-I3HUeHi1Ys&t=1933s https://www.youtube.com/watch?v=kfv9h3c46CI

	https://www.youtube.com/watch?v=9_m36W3cK74 https://www.youtube.com/watch?v=HQM7XMd5QQo
Unit 2	https://www.youtube.com/watch?v=Ql42qcOLKfo&t=7s https://www.youtube.com/watch?v=qIyx1kFTqT8 https://www.youtube.com/watch?v=n_3ZmnVnrc4 https://www.youtube.com/watch?v=19Vt7ds8Lvw
Unit 3	https://youtu.be/NmRQ3sjp8Eo https://youtu.be/gG_bDhPibQo
Unit 4	https://youtu.be/nmp-5tSp-UY https://youtu.be/6ANT4eD6fII https://youtu.be/c9NibpoQjDk https://www.youtube.com/playlist?list=PLNOGlXC4kCBT8G5pWCrH71hmwaAvwsBY3
Unit 5	https://www.GovernmentAdda.com

B. TECH FIRST YEAR			
Course Code	**ACSE0203**	**L T P**	**Credits**
Course Title	**Design Thinking I**	**3 1 0**	**4**

Course Objectives:

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Pre-requisites: None

Course Contents / Syllabus

UNIT-I	Introduction	8 HOURS

Introduction to design thinking, traditional problem solving versus design thinking, history of design thinking, wicked problems. Innovation and creativity, the role of innovation and creativity in organizations, creativity in teams and their environments, design mindset. Introduction to elements and principles of design, 13 Musical Notes for Design Mindset, Examples of Great Design, Design Approaches across the world

UNIT-II	Ethical Values and Empathy	8 HOURS

Understanding humans as a combination of I (self) and body, basic physical needs up to actualization, prosperity, the gap between desires and actualization. Understanding culture in family, society, institution, startup, socialization process. Ethical behavior: effects on self, society, understanding core values and feelings, negative sentiments and how to overcome them, definite human conduct: universal human goal, developing human consciousness in values, policy, and character. Understand stakeholders, techniques to empathize, identify key user problems. Empathy tools- Interviews, empathy maps, emotional mapping, immersion and observations, customer journey maps, and brainstorming, Classifying insights after Observations, Classifying Stakeholders, Do's &Don'ts for Brainstorming, Individual activity- 'Moccasin walk'

UNIT-III	Problem Statement and Ideation	10 HOURS

Defining the problem statement, creating personas, Point of View (POV) statements. Research-identifying drivers, information gathering, target groups, samples, and feedbacks. Idea Generation-basic design directions, Themes of Thinking, inspirations and references, brainstorming, inclusion, sketching and presenting ideas, idea evaluation, double diamond approach, analyze – four W's, 5 why's, "How Might We",Defining the problem using Ice-Cream Sticks, Metaphor & Random Association Technique, Mind-Map,ideation activity games - six thinking hats, million-dollar idea, introduction to visual collaboration and brainstorming tools - Mural, JamBoard

UNIT-IV	Critical Thinking	6 HOURS

Fundamental concepts of critical thinking, the difference between critical and ordinary thinking, characteristics of critical thinkers, critical thinking skills- linking ideas, structuring arguments, recognizing incongruences, five pillars of critical thinking, argumentation versus rhetoric, cognitive

bias, tribalism, and politics. Case study on applying critical thinking on different scenarios.

UNIT-V	**Logic and Argumentation**	**8 HOURS**

The argument, claim, and statement, identifying premises and conclusion, truth and logic conditions, valid/invalid arguments, strong/weak arguments, deductive argument, argument diagrams, logical reasoning, scientific reasoning, logical fallacies, propositional logic, probability, and judgment, obstacles to critical thinking. Group activity/role plays on evaluating arguments

Course outcome: After completion of this course, students will be able to

CO 1	Develop a strong understanding of the design process and apply it in a variety of business settings	K2,K3
CO 2	Analyze self, culture, teamwork to work in a multidisciplinary environment and exhibit empathetic behavior	K3
CO 3	Formulate specific problem statements of real time issues and generate innovative ideasusing design tools	K3,K6
CO 4	Apply critical thinking skills in order to arrive at the root cause from a set of likely causes	K3
CO 5	Demonstrate an enhanced ability to apply design thinking skills for evaluation of claims and arguments	K3,K4

Textbooks

1. Arun Jain, UnMukt : Science & Art of Design Thinking, 2020, Polaris
2. Jeanne Liedta, Andrew King and Kevin Benett, Solving Problems with Design Thinking – Ten Stories of What Works,2013,Columbia Business School Publishing
3. RR Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, First Edition, 2009, Excel Books: New Delhi

Reference Books

1. Vijay Kumar, 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization, 2013, John Wiley and Sons Inc, New Jersey
2. BP Banerjee, Foundations of Ethics and Management, 2005, Excel Books
3. Gavin Ambrose and Paul Harris, Basics Design 08: Design Thinking, 2010, AVA Publishing SA
4. Roger L. Martin, Design of Business: Why Design Thinking is the Next Competitive Advantage, 2009, Harvard Business Press, Boston MA

NPTEL/ YouTube/ Web Link

Unit I

https://nptel.ac.in/courses/110/106/110106124/

https://nptel.ac.in/courses/109/104/109104109/

https://designthinking.ideo.com/

https://blog.hypeinnovation.com/an-introduction-to-design-thinking-for-innovation-managers

https://www.creativityatwork.com/design-thinking-strategy-for-innovation/

https://www.youtube.com/watch?v=GFffb2H-gK0

Unit II

https://aktu.ac.in/hvpe/

http://aktu.uhv.org.in/ https://nptel.ac.in/courses/110/106/110106124/ https://swayam.gov.in/nd1_noc19_mg60/preview
Unit III https://nptel.ac.in/courses/110/106/110106124/ https://swayam.gov.in/nd1_noc19_mg60/preview https://www.udemy.com/course/design-thinking-for-beginners/ https://www.designthinking-methods.com/en/ https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them
Unit IV https://www.forbes.com/sites/sap/2016/08/25/innovation-with-design-thinking-demands-critical-thinking/#340511486908 https://www.criticalthinking.org/pages/defining-critical-thinking/766
Unit V https://www.udemy.com/course/critical-thinker-academy/ https://swayam.gov.in/nd2_aic19_ma06/preview

B. TECH FIRST YEAR

Course Code	AEC0201	L T P	Credits
Course Title	Basic Electrical and Electronics Engineering	3 1 0	4

Course objective:

1. To provide the basics of DC and AC analysis of (Single phase and Three phase) electrical circuits.
2. To study the basics of transformer and calculate its efficiency.
3. To impart elementary knowledge of Power System Components, Earthing, and Energy Consumption.
4. To provide the knowledge of Diode, Display devices, Op-Amp, Sensors, IoT and its application.

Pre-requisites: Basic knowledge of 12th Physics and Mathematics

Course Contents / Syllabus

UNIT-I	**D.C CIRCUIT ANALYSIS AND NETWORK THEOREMS** Concept of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, source transformation, Kirchoff's Law: loop and nodal methods of analysis, star delta transformation, network theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem.	**10**
UNIT-II	**STEADY STATE ANALYSIS OF AC CIRCUIT** **Single phase AC circuit**: AC fundamentals, concept of phasors, phasor representation of sinusoidally varying voltage and current, analysis of series and parallel RLC circuits, j-notation, Different types of power, power factor, resonance in series and parallel circuits. **Three phase AC circuit:** Advantages of three phase circuit, voltage and current relations in star and delta connections.	**10**
UNIT-III	**SINGLE PHASE TRANSFORMER AND ELEMENTS OF POWER SYSTEM** **Single Phase Transformer**: Principle of operation, construction, EMF equation, equivalent circuit, losses and efficiency. **Introduction to Elements of Power System:** General layout of Power system, Components of Distribution system: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Importance of Earthing, Elementary calculations for energy consumption, Battery Backup.	**09**

UNIT-IV	**SEMICONDUCTOR DIODE AND THEIR APPLICATIONS** Introduction of Semiconductors: Intrinsic and Extrinsic, P-N Junction Diode: Depletion layer, V-I characteristics, Half and Full Wave rectification, Clippers, Breakdown Mechanism: Zener and Avalanche, Zener Diode as Shunt Regulator. **Display Devices** Liquid Crystal Display (LCD), Light Emitting Diode (LED), Organic-Light Emitting Diode (O-LED), 7- segment display.	**10**
UNIT-V	**OPERATIONAL AMPLIFIERS** Introduction, Op-Amp Basic, Practical Op-Amp Circuits (Inverting Amplifier, Noninverting Amplifier, Summing Amplifier, Integrator, Differentiator). **Electronic Instrumentation** Digital Multimeter (DMM), Types of sensor, Introduction to IoT and its application.	**09**

Course outcome: After successful completion of this course students will be able to

CO 1	Apply the principle of KVL/KCL and network theorems for analysis of D.C circuit.	
CO 2	Analyze the steady state behavior of single phase and three phase AC electrical circuits.	
CO 3	Illustrate and analyze the working principles of a single phase transformer, efficiency, and components of Power system, Earthing, and energy calculation.	
CO 4	Explain the construction, working principle, and application of PN junction diode, Zener diode and Display devices.	
CO 5	Explain the concept of Op-Amp, Digital multimeter, Sensors,IoT and its applications.	

Text books (Atleast3)

1. D. P. Kothari and I. J. Nagrath, "*Basic Electrical Engineering*", Tata McGraw Hill.
2. D. C. Kulshreshtha, "*Basic Electrical Engineering*", McGraw Hill.
3. C.L. Wadhwa, *Basic Electrical Engineering*, Pearson Education
4. J.B. Gupta, *Basic Electrical Engineering*, Kataria& Sons
5. Robert L. Boylestad **/** Louis Nashelsky*"Electronic Devices and Circuit Theory*", Latest Edition, Pearson Education.
6. H S Kalsi, "*Electronic Instrumentation*", Latest Edition, TMH Publication.

Reference Books (Atleast 3)

1. E. Hughes, "*Electrical and Electronics Technology*", Pearson, 2010.
2. L. S. Bobrow, "*Fundamentals of Electrical Engineering*", Oxford University Press.
3. V. D. Toro, "*Electrical Engineering Fundamentals*", Pearson India.
4. David A. Bell, "*Electronic Devices and Circuits",*Latest Edition, Oxford University Press.
5. Jacob Millman, C.C. Halkias, Stayabratajit, "*Electronic Devices and Circuits*", Latest Edition, TMH.

NPTEL/Youtube/ Faculty Video Link:	
Unit 1	1. **https://youtu.be/FjaJEo7knF4** 2. **https://youtu.be/UsLbB5k9iuY** 3. https://youtu.be/1QfNg965OyE 4. **https://youtu.be/wWihXHCOmUc**
Unit 2	5. **https://youtu.be/ulGKCeOoR88** 1. https://youtu.be/YLGrugmDvc0 2. **https://youtu.be/0f7YkVorOmY** 3. **https://youtu.be/LM2G3cunKp4** 6. **https://youtu.be/S5464NnKOq4**
Unit 3	1. https://youtu.be/GgckE4H5AJE 2. **https://youtu.be/OKkOif2JYRE** 3. https://youtu.be/qSyUFp3Qk2I 4. **https://youtu.be/GROtUE6ILc4** 7. **https://youtu.be/k_FqhE0uNEU**
Unit 4	1. https://youtu.be/EdUAecpYVWQ?list**=PLwjK_iyK4LLBj2yTYPYKFKdF6kIg0ccP2** 2. https://youtu.be/MZPeRlst8rQ 3. **https://youtu.be/qQucInufX-s** 4. https://youtu.be/tPFI2_PdCYA 8. **https://youtu.be/zA-UtZ-s9GA**
Unit 5	1. **https://youtu.be/AuZ00cQ0UrE?list=PLwjK_iyK4LLDBB1E9MFbxGCEnmMMOAXOH** 2. https://youtu.be/aU24RWIgJVs?list=PLwjK_iyK4LLDBB1E 3. https://youtu.be/c5NeTnp_poA 4. https://youtu.be/KLGbPgls18k 5. **https://youtu.be/UFJzQH3G1Ko?list=PLVrieKUj5RceFRq5MKy-f-EHdumStFPLt**

B. TECH FIRST YEAR

Course Code	ACSE0202	L T P	Credit
Course Title	Problem solving using Advanced Python	3 1 0	4

Course objective: The objective of the course is to make its students able

1	To learn the Object Oriented Concepts in Python
2	To learn the concept of reusability through inheritance and polymorphism
3	To impart the knowledge of functional programming
4	To learn the concepts of designing graphical user interfaces
5	To explore the knowledge of standard Python libraries

Pre-requisites: Students are expected to have basic knowledge of programming concepts of python programming.

Course Contents / Syllabus

UNIT-I	Classes and Objects	8 hours

Introduction: Python Classes and objects, User-Defined Classes, Encapsulation, Data hiding , Class Variables and Instance Variables, Instance methods, Class method, static methods, constructor in python, parametrized constructor, Magic Methods in python, Object as an argument, Instances as Return Values, namespaces

UNIT-II	Object Oriented Concepts	8 hours

Introduction to the Specialization, Inheritance, Types of inheritance, Invoking the Parent Class's Method, Method overriding, abstract class, MRO and super ( ), Polymorphism
Introspection: Introspecting types, Introspecting objects, Introspecting scopes, inspect modules, introspect tools

UNIT-III	Functional Programming	8 hours

Map, filter, Reduce, Comprehensions, Immutability, Closures and Decorators, generators, Co-routines, iterators, Declarative programming

UNIT-IV	GUI Programming	8 hours

Ipywidgets Package, Numeric Widgets, Boolean Widgets, Selection Widgets, String Widgets, Date Picker, Color Picker, Container Widgets, Creating a GUI Application, Tkinter, button, canvas.

UNIT-V	Libraries in Python	8 hours

NumPy: Basic Operation, Indexing, slicing and Iterating, multidimensional arrays, NumPy Data types, Reading and writing data on Files,**Pandas :** Series and Data Frames, Grouping, aggregation, Merge Data Frames, Generate summary tables, Group data into logical pieces, Manipulation of data. **SciPy:** Introduction to SciPy, Create function, modules of SciPy. **Matplotlib:** Scatter plot, Bar charts, histogram, Stack charts, Legend title Style, Figures and subplots, Plotting function in pandas, Labelling and arranging figures, Save plots. **Seaborn:** style function, color palettes, distribution plots, category plot, regression plot.

Course outcome: At the end of course, the student will be able to

CO 1	Define classes and create instances in python	K_1, K_2
CO 2	Implement concept of inheritance and polymorphism using python	K_3
CO 3	Implement functional programming in python	K_2
CO 4	Create GUI based Python application	K_3
CO 5	Applythe concept of Python libraries to solve real world problems	K_3, K_6

Text books

(1) Magnus Lie Hetland, "Beginning Python-From Novice to Professional"—Third Edition, Apress

(2) Peter Morgan, Data Analysis from Scratch with Python, AI Sciences

(3) Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016

(4) Miguel Grinberg, Developing Web applications with python, OREILLY

Reference Books

(1) Dusty Phillips, Python 3 Object-oriented Programming - Second Edition, O'Reilly

(2) Burkhard Meier, Python GUI Programming Cookbook - Third ,Packt

(3) DOUG HELLMANN, THE PYTHON 3 STANDARD LIBRARY BY EXAMPLE, :Pyth 3 Stan Libr Exam _2 (Developer's Library) 1st Edition, Kindle Edition.

(4) Kenneth A. Lambert, ―Fundamentals of Python: First Programs‖, CENGAGE Learning, 2012.

E-books& E-Contents:

(1)https://www.pdfdrive.com/a-python-book-beginning-python-advanced-python-and-python-exercises-e125280.html

(2)https://www.pdfdrive.com/a-python-book-beginning-python-advanced-python-and-python-e9236005.html

(3)https://www.pdfdrive.com/learn-python-in-one-day-and-learn-it-well-python-for-beginners-with-hands-on-project-the-only-book-you-need-to-start-coding-in-python-immediately-e183833259.html

(4)https://www.pdfdrive.com/python-programming-python-programming-for-beginners-python-programming-for-intermediates-d180663309.html

(5)https://www.pdfdrive.com/python-programming-python-programming-for-beginners-python-programming-for-intermediates-d180663309.html

(6) https://realpython.com/tutorials/advanced/

Reference Links

Unit 1-https://nptel.ac.in/courses/106/106/106106145/

Unit-2-https://www.python-course.eu/python3_inheritance.php

Unit -3 https://realpython.com/courses/functional-programming-python/

Unit-4: https://realpython.com/python-gui-tkinter/

Unit-5: https://nptel.ac.in/courses/106/107/106107220/
https://nptel.ac.in/courses/106/106/106106212/

https://nptel.ac.in/courses/106/105/106105152/
https://www.youtube.com/watch?v=98YeQpmQeH8
https://www.youtube.com/watch?v=u9x475OGj_U
https://www.youtube.com/watch?v=HFW7eA9wUxY
https://www.youtube.com/watch?v=byHcYRpMgI4
https://www.youtube.com/watch?v=9N6a-VLBa2I
https://www.youtube.com/watch?v=Ta1bAMOMFOI
https://www.youtube.com/watch?v=FsAPt_9Bf3U
https://www.youtube.com/watch?v=LwPTfwlry1s
https://www.youtube.com/watch?v=YXPyB4XeYLA
https://www.youtube.com/watch?v=dVr7r7QgLrk&t=21s
Students may follow Links given below to get certification in course of Advanced python
Link for Certification in Python https://swayam.gov.in/nd1_noc20_cs36/preview https://swayam.gov.in/nd1_noc20_cs46/preview

B.TECH FIRST YEAR(Foreign Language)			
Course Code	**AASL0202**	**L T P**	**Credit**
Course Title	**French**	**2 0 0**	**02**

Course objective:

1	An introduction to French language and culture - Students will learn to understand and articulate in day to day, real-life situations.	
2	The course provides a foundation in the four basic skills LSRW (Listening, Speaking, Reading, and Writing) of language learning.	

Pre-requisite:

- The student should be able to communicate in English.

Course Contents / Syllabus

UNIT-I	**Introduction to French**	**7 Hours**

- ➢ Basic greetings and introductions
- ➢ Differences and similarities between English and French alphabets
- ➢ Recognize and spell simple words and phrases in French
- ➢ Commonly used nouns and adjectives

UNIT-II	**Vocabulary Building**	**8 Hours**

- ➢ Introduce oneself and others
- ➢ Identify, speak and understand the days of the week/ months/ seasons/colours
- ➢ Speak and understand simple weather expressions
- ➢ Understand, ask and answer about date of birth/ important dates and age
- ➢ Identify, understand and write numbers from 1 – 60
- ➢ Use the masculine and feminine of regular nouns and adjectives (petit/ grand/ blond/ rouge/ sympa)

UNIT-III	**Everyday Common Simple Sentences**	**7 Hours**

➢ In the city/ naming places and buildings ➢ Means of transport / basic directions ➢ Listen to, understand, and respond to everyday conversation ➢ Respond to questions about ourselves and family members ➢ Use the singular and plural of regular nouns (-s).		
UNIT-IV	**Reading**	**10 Hours**
➢ Food, drink, groceries and meal ➢ Everyday life/ telling time ➢ Making appointments ➢ Use definite and indefinite articles.		
UNIT-V	**Writing**	**8 Hours**
➢ Fill in a simple form (fiched'inscription/ carte d' identité) ➢ Describe pictures (Speak and Write) ➢ Write a short text on oneself		
Course outcome At the end of the course students will be able to		
CO 1	Recognize the basic sounds, letters, numbers, words and phrases of French.	
CO 2	Develop basic French vocabulary	
CO 3	Use simple phrases in real life conversations	
CO 4	Read simple sentences	
CO 5	Write simple sentences and fill in a form	

B.TECH FIRST YEAR (Foreign Language)			
Course Code	**AASL0203**	**L T P**	**Credit**
Course Title	**German**	**2 0 0**	**02**
Course objective:			
1	An introduction to German language and culture. Students will learn to understand and articulate in day to day real-life situations.		
2	The course provides a foundation in the four basic skills LSRW (Listening, Speaking, Reading, and Writing) of language learning.		
Pre-requisites: The student should be able to communicate in basic English.			
Course Contents / Syllabus			
UNIT-I	**Introduction to German**		**5 Hours**
➢ Introducing ourselves and others, ➢ Grammar: W questions, ➢ personal pronouns, ➢ simple sentence, ➢ verb conjugation			
UNIT-II	**Vocabulary building**		**6 Hours**
➢ Vocabulary building – the alphabet, ➢ hobbies, ➢ numbers, months, seasons ➢ Grammar : articles, singular and plural forms			
UNIT-III	**Everyday common simple sentences**		**5 Hours**
In the city / naming places and buildings, means of transport, basic directions Grammar: definite and indefinite articles; negation - kein and nicht; imperative			
UNIT-IV	**Reading**		**7 Hours**

food, drink, family / groceries and meals
Grammar: the accusative
Everyday life, telling time, making appointments
Grammar: prepositions am, um, von. bis; modal verbs, possessive articles
Leisure activity, celebrations
Grammar: separable verbs, the accusative, past tense of to have and to be

UNIT-V	**Writing**	**7 Hours**

Contacts, filling basic information and forms
Grammar: dative
A short text about oneself.
Grammar: changing prepositions
Professions
Grammar: perfect tense
Clothes Health and the body
Grammar: perfect tense and dative
Grammar: the imperative and modal verbs

Course outcome:
At the end of the course students will be able to

CO 1	Understand and be familiar with basic German and the culture	
CO 2	Recognise the foundational vocabulary	
CO 3	Use simple phrases in everyday conversations	
CO 4	Read simple sentences	
CO 5	Write simple sentences	
Text books		

1. NETZWERK Deutsch alsFremdsprache A1(Goyal, New Delhi, 2015)

2. Lagune 1

3. Schulz-Griesbach: Deutsch alsFremdsprache. Grundstufe in einem Band (for Grammar)

Online Practice Material

1- https://www.goethe.de/en/spr/kup/prf/prf/sd1/ueb.html

2 - http://www.deutschkurse.passau.de/JM/images/stories/SKRIPTEN/a1_skript_gr.pdf

3 - https://www.schubert-verlag.de/aufgaben/arbeitsblaetter_a1_z/a1_arbeitsblaetter_index_z.htm

B.TECH FIRST YEAR (Foreign Language)

Course Code	AASL0204	L T P	Credit
Course Title	**Japanese**	2 0 0	02

Course objective:

1	An introduction to Japanese language and culture. Students will learn to understand and articulate in day to day real-life situations.
2	The course provides a foundation in the four basic skills LSRW (Listening, Speaking, Reading, and Writing) of language learning.

Pre-requisites:

The student should be able to communicate in basic English.

The student should be keen to learn the language.

Course Contents / Syllabus

UNIT-I	Introduction to Japanese	8 Hours

Introduction to Japanese alphabet (Hirangana), phonetics and pronunciation.

- Introducing ourselves and others,
- Introduction to Japanese Language
- Types of Japanese scripts- HIRANGANA, KATAKANA,
- Basic pronunciation rules
- Time and numbers – telling and asking the time, counting cardinal numbers,
- Grammar - different types of verbs, nouns – number & gender, pronouns, present and simple past tense.

UNIT-II	Vocabulary building	8 Hours

Use simple sentences to answer basic personal questions

- Expressing gratitude
- Invitations
- Talking about plans
- Holidays
- Hotels & restaurants
- Town & country

Word order – sentence, question, negative

UNIT-III	Everyday common simple sentences	8 Hours

- Customer and shopkeeper
- Making a request
- Home/ Relatives/ Fruits/ Vegetables/Animals
  Grammar- Singular vs. Plural
  Question formation

UNIT-IV	**Reading**	**8 Hours**

- Transportation
- Week /Month names
- Shopping
  Basic Japanese grammar rules – particles: か (ka), は (wa), の (no), と (to), を (o),に (ni),も(mo), が (ga), や (ya).
  Grammar- Present, Past, Future

UNIT-V	**Writing**	**8 Hours**

- Write short text on oneself

Grammar- Pronouns – subject, object, possessive,
Modal verbs

Course outcome:

At the end of the course students will be able to

CO1	understand the basics of Japanese Language and its script.
CO2	recognise the foundational vocabulary.
CO3	use simple phrases in everyday conversations.
CO4	read simple sentences.
CO5	write simple sentences

References:

- https://www.youtube.com/watch?v=6p9Il_j0zjc&ab_channel=LearnJapanesewithJapanesePod101.com
- https://books.google.co.in/books?id=4nHnMa4ZwMC&newbks=0&printsec=frontcover&dqminna+no+nihongo&hl=en&source=newbks_fb&redir_esc=y#v=onepage&q=minna%20no%20nihongo&f=false

B. TECH FIRST YEAR			
Course Code	**AEC0251**	**L T P**	**Credit**
Course Title	Basic Electrical And Electronics Engineering Lab	**0 0 2**	**01**

Suggested list of Experiment

Sr. No.	Name of Experiment	CO
1	To Verify Kirchhoff's laws of a circuit	1
2	To Verify Superposition Theorem of a circuit	1
3	To Verify Thevenin's Theorem of a circuit	1
4	To Verify Norton's Theorem of a circuit	1
5	To Verify Maximum Power Transfer Theorem of a circuit	1
6	Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor	2
7	Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.	2
8	Determination of efficiency by load test on a single phase transformer having constant input voltage using stabilizer.	3
9	Study and Calibration of single phase energy meter.	3
10	To design half wave rectifier circuits using diode.	4
11	To generate random numbers using 7-Segment display.	4
12	Study of Cathode Ray Oscilloscope and measurement of different parameters using CRO.	4
13	To design and perform Adder and Subtractor circuit using Op-Amp.	5
14	To understand the concept of Wireless Home Automation System based on IoT for controlling lights and fans.	5
15	To calculate and draw different electrical parameter using MATLAB/Simulink for a circuit.	1,4
16	Energy audit of labs and rooms of different blocks.	3

Lab Course Outcome: After successful completion of this course students will be able to:

CO 1	Apply the principle of KVL/KCL and theorem to analysis DC Electric circuits.
CO 2	Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.
CO 3	Calculate efficiency of a single phase transformer and energy consumption.
CO 4	Understand the concept and applications of diode, Op-Amp,sensors and IoT.

NPTEL/ YouTube/ Faculty Video Link:

1. Virtual Lab Website"http://www.vlab.co.in/

B.TECH FIRST YEAR			
Lab Code	**ACSE0252**	**L T P**	**Credit**
Lab Title	Problem Solving using Advanced Python Lab	**0 0 2**	**1**

Course outcome: At the end of course, the student will be able to

CO 1	Write programs to create classes and instances in python	K_1, K_3
CO 2	write programs to Implement concept of inheritance and polymorphism using python	K_2, K_3
CO 3	Write programs using functional programming in python	K_4
CO 4	write programs to create GUI based Python application	K_3, K_4
CO 5	Developing real life applications using python libraries to solve real world problems	K_4, K_6

List of Experiment :

S.No.	Name of Experiment
	Class and Methods
1	Python program to demonstrate instantiating a class.
2	Python program to demonstrate use of class method and static method
3	Python program to implement constructors.
4	Python program to show that the variables with a value assigned in the class declaration, are class variables and variables inside methods and constructors are instance variables.
5	Python program to create Bank-account class with deposit, withdraw function
	Inheritance
6	Python program to demonstrate single inheritance
7	Python program to demonstrate multilevel inheritance
8	Python program to demonstrate multiple inheritance
9	Python program to demonstrate hierarchical inheritance
10	Python program to demonstrate hybrid inheritance
	Polymorphism
11	Python program to demonstrate in-built polymorphic function
12	Python program to demonstrate user defined polymorphic functions
13	Python program to demonstrate method overriding
	Functional Programming
14	Python program to demonstrate working of map
15	Python program to demonstrate working of filter
16	Python program to demonstrate working of reduce
17	Python program to demonstrate immutable data types
18	Python program to demonstrate Monkey Patching in Python

19	Python program to demonstrate decorators with parameters in python
20	Python program to demonstrate conditional decorators
21	Python program to demonstrate nested decorators
22	Python program to demonstrate chain multiple decorators
23	Python program to demonstrate use of generators
24	Python program to demonstrate working of iterators
25	Write a Python program to create a table and insert some records in that table. Finally selects all rows from the table and display the records.
	GUI Programming
26	Python Program to understand working of various Tkinter widgets
27	Create a Distance-time GUI calculator using Tkinter
28	Write a NumPy program to calculate the difference between the maximum and the minimum values of a given array along the second axis.
29	Write a Python program to create a 2-D array with ones on the diagonal and zeros elsewhere. Now convert the NumPy array to a SciPy sparse matrix in CSR format.
30	Write a Python program to add, subtract, multiple and divide two Pandas Series.
31	Write a program to Create Your Plot using python. Also add and delete axes.
32	Write a program to plot data using seaborn and show the plot.

B. TECH FIRST YEAR

Course Code	AME0251	L T P	Credit
Course Title	Digital Manufacturing Practices	0 0 3	1.5

Course objective:

1	To impart knowledge to students about the latest technological developments in manufacturing technology.
2	To make the students capable to identify and use primary machine tools for manufacturing of job/product.
3	Tomake the students understand constructional features, principle and coding/ programming of CNC machines.
4	To explain current and emerging 3D printing technologies in industries.
5.	To impart fundamental knowledge of Automation and Robotics.

Pre-requisites: Basic knowledge about materials and their properties

Course Contents / Syllabus

UNIT-I	**Basics of Manufacturing processes**	**3 Hours**
Introduction to workshop layout, engineering materials, mechanical properties of metals, introduction to manufacturing processes, concept of Industry 4.0.		
UNIT-II	**Machining processes**	**5 Hours**
Introduction to conventional and CNC machines, machining parameters and primary operations, CNC programming- G& M Codes		
UNIT-III	**Additive manufacturing (3D printing)**	**3 Hours**
Introduction to additive manufacturing, 3D printing technologies, reverse engineering, introduction to injection moulding.		
UNIT-IV	**Automation and Robotics**	**3 Hours**
Introduction to basics of automation and robotics, classification based on geometry and path movements. PTP motion using robot arm.		

Total hours :14

Course outcome: After completion of this course students will be able to

CO 1	Understand various manufacturing process which are applied in the industry.	K_1, K_2
CO 2	Demonstrate the construction and working of conventional machine tools and computer controlled machine tools.	K_1, K_2
CO 3	Understand the programming techniques of CNC machines and Robotic	K_1, K_2

	arms.	
CO 4	Use the different 3D printing techniques.	K_1, K_2

Text books

A course in Workshop technology by B.S. Raghuwanshi, Vol I & II, Dhanpat Rai & sons, New Delhi **(30%)**

Industrial automation and Robotics by A.K. Gupta., S K Arora, Laxmi publication **(30%)**

CNC Fundamentals and Programming by P.M Agarwal, V.J Patel, Charotar Publication **(25%)**

Reference Books

(1) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.**(80% syllabus)**

(2) Rapid Product Development, Kimura Fumihiko**(25% syllabus)**

(3) CNC Machines by M.Adhitan, B.S Pabla; New age international. **(25% syllabus)**

(4) CAD/CAM, by Groover and Zimmers, Prentice Hall India Ltd**(25% syllabus)**

NPTEL/Youtube /Faculty video links:

Unit 1	https://youtu.be/b1U9W4iNDiQ , https://youtu.be/QZdY3ZRY9RA, https://youtu.be/KX1_NqNTIqw , https://youtu.be/deAIYwPns6w
Unit2	https://youtu.be/jF4F8Zr2YO8 , https://youtu.be/bDpfTzV6StA, https://youtu.be/6G3sHym7YSo
Unit3	https://youtu.be/TZmYTfPfhNE , https://youtu.be/yW4EbCWaJHE
Unit4	https://youtu.be/K-Zg1-fR9kU , https://youtu.be/xrwz9IxpMJg , https://youtu.be/j8vYClEnyk0

B.TECH FIRST YEAR			
Course Code	**AME0251**	**L T P**	**Credit**
Course Title	**Digital Manufacturing Practices**	**0 0 3**	**1.5**

Suggested list of Experiments
(At least 10 experiments to be performed)

Sr. No.	Name of Experiments
1	To perform facing, turning, taper turning, knurling, grooving and threading operations as per given drawing on lathe machine.
2	To prepare a T-Shape and U-shape work piece by filing, sawing, drilling in Fitting shop.
3	To cast a component using a single piece pattern in foundry shop,
4	To study the G-M Codes for CNC machine and to perform different machining operations including facing, turning, grooving etc on CNC lathe.
5	To cut a slot on CNC milling machine as per given drawing.
6	To make a hole of given diameter on CNC drilling machine.
7	To study construction and working of FDM 3D printing machine.
8	To study construction and working of SLA 3D printing machine.
9	To study the development of drawings using 3D scanner.
10	To make an air tight bottle cap by using injection moulding.
11	. To study construction and working of six axis robot (KUKA Sim Pro 3.0.4).
12	Practice on pneumatic control system using single acting cylinder.