

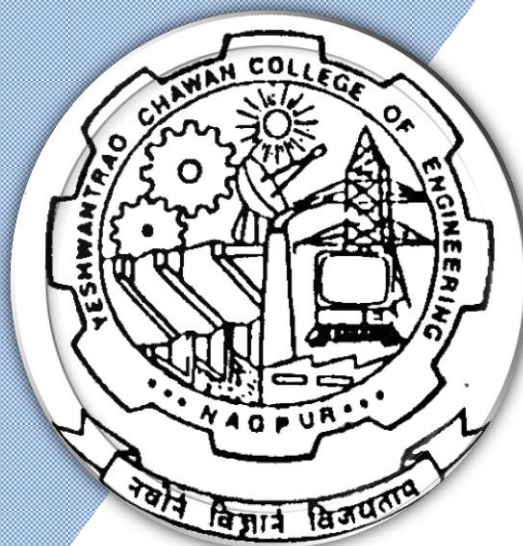
Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

(Accredited 'A++' Grade by NAAC with a score of 3.6)

Hingna Road, Wanadongri, Nagpur - 441 110



SoE No.
23ADS-101.1

Bachelor of Technology SoE & Syllabus 2023 I & II Semester

(Department of Computer Technology)

B. Tech in Artificial Intelligence and Data Science (AIDS)



Yeshwantrao Chavan College of Engineering
(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

SoE No.
23ADS-101.1

B.TECH SCHEME OF EXAMINATION 2023
(Scheme of Examination w.e.f. 2026-27 onward)
(Department of Computer Technology)
B.Tech. in Artificial Intelligence and Data Science

SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FIRST SEMESTER (GROUP-A)															
1	1	BS	GE	23GE1103	Differential Equations and Complex Analysis	T	3	0	0	3	3	30	20	50	3
2	1	BS	GE	23GE1110	Applied Physics	T	3	0	0	3	3	30	20	50	3
3	1	BS	GE	23GE1111	Lab : Applied Physics	P	0	0	2	2	1		60	40	
4	1	BES	EL	23EL1101	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3
5	1	BES	AIDS	23ADS1103	Foundations of Data Science	T	3	0	0	3	3	30	20	50	3
6	1	BES	AIDS	23ADS1104	Lab : Foundations of Data Science	P	0	0	2	2	1		60	40	
7	1	BES	AIDS	23ADS1101	C Programming	T	2	0	0	2	2	30	20	50	2
8	1	BES	AIDS	23ADS1102	Lab : C Programming	P	0	0	2	2	1		60	40	
9	1	VSEC1	GE	23GE1117	Get Set Go	---	---	---	---	---	2		60	40	
10	1	LLC1	GE		Liberal Learning Course (LLC1)	---	---	---	---	---	2		60	40	
TOTAL FIRST SEM							14	0	6	20	21				

MANDATORY LEARNING COURSES															
1	1	HS		GE2301	Disaster Management and Preparedness	A	2	0	0	2	0				

SECOND SEMESTER (GROUP-A)															
1	2	BS	GE	23GE1201	Calculus and Vector	T	3	0	0	3	3	30	20	50	3
2	2	BS	GE	23GE1206	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3
3	2	BS	GE	23GE1207	Lab : Engineering Chemistry	P	0	0	2	2	1		60	40	
4	2	HS/AEC1	GE	23GE1213	Technical Communication	T	2	0	0	2	2	30	20	50	2
5	2	HS/AEC1	GE	23GE1214	Lab : Technical Communication	P	0	0	2	2	1		60	40	
6	2	HS/IKS	GE	23GE1215	Indian Knowledge System	T	2	0	0	2	2	30	20	50	2
7	2	BES	AIDS	23ADS1205	Computer Architecture and Organization	T	3	0	0	3	3	30	20	50	3
8	2	PC	AIDS	23ADS1206	Introduction to Object Oriented Concepts	T	3	0	0	3	3	30	20	50	3
9	2	PC	AIDS	23ADS1207	Lab : Introduction to Object Oriented Concepts	P	0	0	2	2	1		60	40	
10	2	VSEC2	GE	23GE1218	Functional English	...	...	...	...	...	2		60	40	
11	2	LLC2	GE		Liberal Learning Course (LLC2)	...	...	...	...	...	2		60	40	
TOTAL FIRST SEM							16	0	6	22	23				

MANDATORY LEARNING COURSES															
1	2	HS		GE2131	Universal Human Values (UHV)	A	2	0	0	2	0				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment

TA = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activities decided by course teacher, TA3 - 3 marks on class attendance**

TA = for Practical : MSPA will be 15 marks each**

  		July, 2026	1.01	Applicable for AY 2026-27 Onwards
 Chairperson  	Dean (Acad. Matters)	Date of Release	Version	



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B.TECH SCHEME OF EXAMINATION 2023
(Scheme of Examination w.e.f. 2026-27 onward)
(Department of Computer Technology)
B.Tech. in Artificial Intelligence and Data Science

SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	

Liberal Learning Course

SN	Sem	Type	BoS /Deptt	Sub. Code	Subject
1	2	CC2	GE	LLC1201	Music (Vocal)
2	2	CC2	GE	LLC1202	Music (Instrumental)
3	2	CC2	GE	LLC1203	Indian Classical Dance
4	2	CC2	GE	LLC1204	Folk Dances
5	2	CC2	GE	LLC1205	Painting
6	2	CC2	GE	LLC1206	Theatre and acting
7	2	CC2	GE	LLC1207	Photography
8	2	CC2	GE	LLC1208	Yoga
9	2	CC2	GE	LLC1209	Chess
10	2	CC2	GE	LLC1210	Athletics
11	2	CC2	GE	LLC1211	Basket Ball
12	2	CC2	GE	LLC1212	Judo
13	2	CC2	GE	LLC1213	Elements of Japanese Language
14	2	CC2	GE	LLC1214	Elements of German Language
15	2	CC2	GE	LLC1215	Elements of French Language
16	2	CC2	GE	LLC1216	Elements of Spanish Language
17	2	CC2	GE	LLC1217	Basics of Vedic Maths
18	2	CC2	GE	LLC1218	Skilling in Microsoft Visio and Inkscape
19	2	CC2	GE	LLC1219	Art of Public Speaking

Liberal Learning Course

SN	Sem	Type	BoS /Deptt	Sub. Code	Subject
1	1	CC1	GE	LLC1101	Music (Vocal)
2	1	CC1	GE	LLC1102	Music (Instrumental)
3	1	CC1	GE	LLC1103	Indian Classical Dance
4	1	CC1	GE	LLC1104	Folk Dances
5	1	CC1	GE	LLC1105	Painting
6	1	CC1	GE	LLC1106	Theatre and acting
7	1	CC1	GE	LLC1107	Photography
8	1	CC1	GE	LLC1108	Yoga
9	1	CC1	GE	LLC1109	Chess
10	1	CC1	GE	LLC1110	Athletics
11	1	CC1	GE	LLC1111	Basket Ball
12	1	CC1	GE	LLC1112	Judo
13	1	CC1	GE	LLC1113	Elements of Japanese Language
14	1	CC1	GE	LLC1114	Elements of German Language
15	1	CC1	GE	LLC1115	Elements of French Language
16	1	CC1	GE	LLC1116	Elements of Spanish Language
17	1	CC1	GE	LLC1117	Basics of Vedic Maths
18	1	CC1	GE	LLC1118	Skilling in Microsoft Visio and Inkscape
19	1	CC1	GE	LLC1119	Art of Public Speaking

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment

TA = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance**

TA = for Practical : MSPA will be 15 marks each**

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(Department of Computer Technology)

SoE No.
23ADS-101.1

B.Tech in Artificial Intelligence and Data Science

I SEMESTER

23GE1103: Differential Equations and Complex Analysis

Course Outcomes

The students will be able to

1. Use appropriate Methods to solve first order and higher order differential equations and apply it to find solutions of engineering problems.
2. Use appropriate methods to solve partial differential equations.
3. Determine the various functions of complex numbers.
4. Evaluate the integration of function of complex variables.

Unit I: Differential Equations I

(7 Hrs.)

Linear differential equations of first order and first degree, Differential equation reducible to linear form, Exact differential equations (excluding the case of integrating factor) and their applications to various fields. (Contemporary Issues related to Topic)

Unit II: Differential Equations II

(7 Hrs.)

Higher order linear differential equations with constant coefficients, Complementary functions and Particular Integral for different cases, Method of variation of parameters, Examples on application to various fields. (Contemporary Issues related to Topic)

Unit III: Differential Equations III

(6 Hrs.)

Cauchy's homogeneous linear differential equations, Legendre's linear differential equations, Applications of differential equations to various fields (only up to second order). (Contemporary Issues related to Topic)

Unit IV: Partial Differential Equations

(6 Hrs.)

Partial Differential Equations of first order, first degree i.e. Lagrange's form, linear homogeneous equations of higher order with constant coefficient. Application of variable separable method to solve first and second order partial differential equations. (Contemporary Issues related to Topic)

Unit V: Complex Number

(7 Hrs.)

Basic concepts of complex numbers and its various forms. Separation of real and imaginary parts, De Moivre's theorem, Application of De Moivre's theorem, Exponential function of complex numbers, Circular function of complex numbers, Hyperbolic function and their inverse, Logarithm of a complex number. (Contemporary Issues related to Topic)

Unit VI: Complex Variables

(6 Hrs.)

Analytic function, Cauchy-Riemann conditions, Harmonic functions, Finding Harmonic conjugates, Taylor's and Laurent's Theorem (statement only), Examples on Taylor's and Laurent's Theorem, Evaluation integral by using Residue theorem. (Contemporary Issues related to Topic)

Total Lecture 39 Hours

			July, 2026	1.00	Applicable for AY 2026-27 Onwards
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B.Tech in Artificial Intelligence and Data Science

Textbooks:

1. Erwin Kreyzig, Advance Engineering Mathematics, 6th Edition, John Wiley and Sons, INC.
2. H.K. Dass, Engineering Mathematics, 11th revised edition, S. Chand, Delhi.
3. H.K. Dass, Advanced Engineering Mathematics, 8th revised edition, S. Chand, Delhi.
4. Dr. B.S. Grewal, Higher Engineering Mathematics, 42th edition, Khanna Publishers.
5. P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan.

Reference Books:

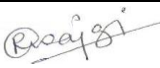
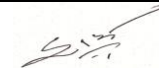
1. G B Thomas and R L Finney, Calculus and Analytical Geometry, 9th edition, Addison-Wesley, 1999.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 10th edition, Laxmi Prakashan.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

- 1 <http://103.152.199.179/YCCE/Supported%20file/Supported%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/>

MOOCs Links and additional reading, learning, video material

1. <https://nptel.ac.in/courses/111103070>
2. https://onlinecourses.nptel.ac.in/noc19_ma28/preview
3. <https://nptel.ac.in/courses/111/106/111106100/>

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B.Tech in Artificial Intelligence and Data Science

I SEMESTER

23GE1110 : Applied Physics

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Correlate fundamentals of quantum mechanics to solve problems dealing with quantum particles.
2. Justify the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
3. Analyze the motion of charged particles in electric and magnetic field and its applications to electron optic devices.
4. Examine the intensity variation of light due to Laser and its application.
5. Illustrate working principles of optical fibers for their use in the field of industry.

Unit I: Quantum Physics

(6 Hrs.)

Wave particle duality, Davisson and Germer experiment, Wave packet, Heisenberg's uncertainty principle, thought experiment, Significance, Applications. **(Contemporary Issues related to Topic)**

Unit II: Introduction to Quantum Computing

(7 Hrs.)

Introduction of complex numbers, operators, Eigen values, Eigen functions. Wave function and its probability interpretation, Schrodinger Equation, Particle in infinite and finite potential well, quantum tunneling, Introduction to Bits and Qubits. **(Contemporary Issues related to Topic)**

Unit III: Band Theory of Solids

(7 Hrs.)

Formation of energy bands in solids; Classification of solids, Energy band diagram of Si and Ge, Intrinsic and extrinsic semiconductors, Conductivity, Law of mass action, Hall effect, Direct and Indirect band gap semiconductors. **(Contemporary Issues related to Topic)**

Unit IV: Electron Ballistics and Devices

(7 Hrs.)

Motion of a charged particle in uniform electric and magnetic field, Cross field configuration; Electron refraction, Electron lens. Cathode ray oscilloscope and its application. **(Contemporary Issues related to Topic)**

Unit V: Lasers

(7 Hrs.)

Coherence and its types, Interaction of radiation with matter, Population Inversion, Pumping: methods and schemes, Optical resonant cavity, Ruby laser, He-Ne laser, diode laser, Properties and engineering applications of laser. **(Contemporary Issues related to Topic)**

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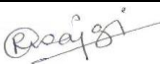
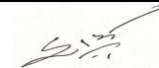
Unit VI: Optical Fibres	(6 Hrs.)
Principle, structure and classification, Acceptance angle, Numerical aperture, Losses in optical fibers, Applications as sensors. (Contemporary Issues related to Topic)	
Total Lecture	40 Hours

Textbooks	
1	M. N. Avadhanulu, P. G. Kshirsagar, A Textbook of Engg. Physics, S. Chand and Company.
2	Hitendra K Malik, A K Singh, Engineering Physics, 2nd Edition, Tata McGraw Hill Education Private Limited,

Reference Books	
1	David Halliday, Robert Resnick and Jerle Walker, John-Wiley India, Fundamentals of Physics, 10 th John Wiley & Sons Inc.
2	Brijlal and Subramanyam, Text Book of Optics, Revised edition, S. Chand and Company.
3	M.N. Avadhanulu, 2 nd Edition, Laser, S.Chand and Company.
4	A. Beiser, Concept of Modern Physics, 6 th Edition, Laser, Tata McGraw-Hill.
5	Thyagarajan K. and Ghatak A.K, LASERS: Theory and Applications, 2 nd Edition, Macmillan Publication
6	S. O. Pillai, Solid State Physics, 9 th Edition, New Edge International Publishers.
7	Palanisamy, Solid State Physics, 8 th Edition, New Edge International Publishers.
8	C. Kittel, Solid State Physics, 8 th Edition, Willey Publication.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	chrome-http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/Eisberg%20&%20Resnick%20-%20Quantum%20Physics.pdf
2	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/2016_Book_ThePhysicsOfSemiconductors.pdf

MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/115106066 - Quantum Physics
2	https://archive.nptel.ac.in/courses/115/105/115105121/ -CRO
3	www.digimat.in/nptel/courses/video/115102124/L36.html - Laser

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(Department of Computer Technology)

SoE No.
23ADS-101.1

B.Tech in Artificial Intelligence and Data Science

I SEMESTER

23GE1111 : Lab. Applied Physics

Course Outcomes:

Upon successful completion of the course the students will be able to

1. Correlate fundamentals of quantum mechanics to solve problems dealing with quantum particles.
2. Justify the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
3. Analyze the motion of charged particles in electric and magnetic field and its applications to electron optic devices.
4. Examine the intensity variation of light due to Laser and its application.
5. Illustrate working principle of optical fibers for their use in the field of industry.

List of Experiments :

Sr. No.	Experiments based on
1	Determination of Planck's Constant
2	Study of Tunnel Diode.
3	Determination of Hall coefficient and density of charge carriers using Hall effect.
4	Dependence of Hall coefficient on temperature.
5	The study of V-I characteristics of a semiconductor diode (Germanium and silicon) in forward and reverse bias mode.
6	Determination of Band gap in a semiconductor by four probe method.
7	Determination of Band gap in a semiconductor using reverse biased p-n junction diode.
8	Determination of wavelength of laser using diffraction grating.
9	Determination of divergence of laser beam.
10	Determination of Acceptance angle and numerical aperture of a given optical fiber.
11	To measure the phase shift introduced by a phase shift network using Dual beam CRO.
12	Determination of amplitude and frequency of sinusoidal signal using CRO.

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B.Tech in Artificial Intelligence and Data Science

I SEMESTER

23EL1101 : Basic Electrical and Electronics Engineering

Course Outcomes:

1. Understand the fundamental concepts of Analog Electronic and Electrical Circuits
2. Apply the concepts of Electrical and Electronic Circuits to obtain the desired parameter
3. Analyze analog Electrical Circuits for given application.
4. Analyze analog Electronic Circuits for given application

Unit I: Circuit Elements and Energy Sources

(7 Hrs.)

Circuit Elements, Series and Parallel Combination of Resistances, Inductance and Capacitances, Energy Sources, Source Transformation, Sources with Periodic Waveforms, A.C. in Inductance and Capacitance, Star-Delta Connection. **(Contemporary Issues related to Topic)**

Unit II: Analysis of Network

(7 Hrs.)

Kirchhoff's Laws, Current Division, Voltage Division, Nodal and Mesh Analysis of Electric Circuits, Thevenin's Theorem **(Contemporary Issues related to Topic)**

Unit III: Generator and Motors

(7 Hrs.)

Introduction to Generator, Construction, working principle, Types of Generators, Introduction to DC Motor, Working Principle of DC Motor, Types of Motors. **(Contemporary Issues related to Topic)**

Unit IV: Diode and Transistor

(6 Hrs.)

Introduction to Semiconductor, P-N junction diodes, Biasing & Characteristics of diodes. Diode Circuits - Half wave rectifier, full wave rectifier, bridge rectifier. Introduction to BJT- NPN and PNP, Modes of operation,. **(Contemporary Issues related to Topic)**

Unit V: Operational Amplifier and Its Application

(7 Hrs.)

Introduction to Op-Amp, Inverting and Non-Inverting Amplifier, Linear Applications of OP-AMP like adder, Subtractor, integrator, differentiator and non-linear application using Comparator. **(Contemporary Issues related to Topic)**

Unit VI: Electronics Measurement

(6 Hrs.)

Introduction to Measurement System, Generalized block diagram of Measurement System, Static & dynamic characteristics of measurement system, Types of errors & their sources, Statistical analysis. **(Contemporary Issues related to Topic)**

Total Lecture 40 Hours

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Textbooks:

1.	Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford Higher Education, First Edition 2005
2.	Electronics Devices and circuits, Millman Jacob, McGraw Hill Education, Fourth Edition (2015)
3.	Circuit Theory (Analysis and Synthesis) , by A. Chakrabarti, Dhanpat Rai & Co., Reprint Edition 2014

Reference Books:

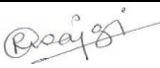
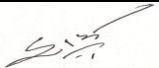
1.	OP-AMP and Linear Integrated Circuit, by Ramakant A. Gayakwad, Prentice Hall India Learnin Private Limited, Published in 2002
2.	Electrical & Electronic measurement & Instrument, A. K. Sawhney, Dhanpat Rai & Co., 18th edition 2008

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	http://link.springer.com/openurl?genre=book&isbn=978-1-4613-6193-0
2	https://onlinelibrary.wiley.com/doi/book/10.1002/9780470168042

MOOCs Links and additional reading, learning, video material

1.	https://onlinecourses.nptel.ac.in/noc22_ee113/preview
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B.Tech in Artificial Intelligence and Data Science

I SEMESTER

23ADS1103 : Foundations of Data Science

Course Outcomes :

Upon successful completion of the course the students will be able to

1. To interpret the data analysis task
2. To use the statistical techniques to prepare and present the data for analysis
3. To use the probability theory to handle uncertainty in the applications
4. To interpret the applications of data analysis.

Unit I:	(7 Hrs.)
Introduction to Data Science; role of data scientist, Types of Data, tool boxes for data scientists, introduction to R studio (Contemporary issues related to topic)	
Unit II:	(7 Hrs.)
Understanding different data sets Introduction to Data analysis, Types of Data analysis, Applications. Technologies involved in the data analysis (Contemporary issues related to topic)	
Unit III:	(7 Hrs.)
Preparing data for analysis: reading data from files, web, databases, Grouping and Displaying Data to Convey Meaning. Measure of central tendency, dispersion (Contemporary issues related to topic)	
Unit IV:	(7 Hrs.)
Probability theory: basic concepts, applications, types. Bayes theorem (Contemporary issues related to topic)	
Unit V:	(7 Hrs.)
Probability distribution, Binomial distribution, Poisson distribution, Normal distribution. random variable. (Contemporary issues related to topic)	
Unit VI:	(7 Hrs.)
Application domains of data analysis. Case studies in various application domains. (Contemporary issues related to topic)	
Total Lecture 42 Hours	

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SoE No.
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B.Tech in Artificial Intelligence and Data Science

Textbooks:

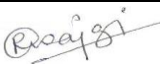
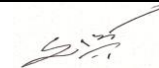
1. "Statistics for Management", Richard I. Levin & David S. Rubin, 7th Edition, Pearson Education.

Reference Books:

1. "Practical Statistics for Data Scientists, 50 Essential Concepts", Peter Bruce & Andrew Bruce, O'Reilly Media
2. "An Introduction to Statistical Learning with Applications in R", Gareth James, Daniela Witten, Trevor Hastie & Robert Tibshirani, Springer Press

MOOCs Links and additional reading, learning, video material

1. <https://nptel.ac.in/courses/106106179>
2. <https://www.youtube.com/watch?v=wrIvuizi56oQ>

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Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

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(Department of Computer Technology)

SoE No.
23ADS-101.1

B.Tech in Artificial Intelligence and Data Science

I SEMESTER

23ADS1104: Lab. Foundations of Data Science

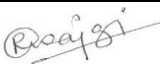
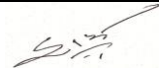
Course Outcomes

Upon successful completion of the course the students will be able to

1. To interpret the data analysis task
2. To use the statistical techniques to prepare and present the data for analysis
3. To use the probability theory to handle uncertainty in the applications
4. To interpret the applications of data analysis

Minimum Eight Practical's to be performed from the list as below

SN	Program based on
1	Introduction to R and excel
2	Extraction of data using R
3	Handling and understanding data using R
4	Implementations of conditional statements in R
5	Implementation of Loops in R
6	Introduction to data visualization in R
7	Implementing probability functions
8	Data Handling using Excel
9	Project activity on standard data set

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B.Tech in Artificial Intelligence and Data Science

I SEMESTER

23ADS1101 : C Programming

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Describe the basics of computer system components and operation, write algorithms and draw flowcharts.
2. Write programs using flow control statements.
3. Use functions to write modular programs.
4. Use linear data structures such as arrays and structures in programs.

Unit I:

6 Hrs.

Computer System Basics: Introduction to components of a computer system (disks, memory, processor), how program is executed, understanding of concepts such as compilers, source and object programs, etc. Introduction to algorithms and flowcharts, types of programming errors.
Basic building blocks of C: Character set, variables, identifiers & keywords, Data types, Operators: arithmetic, logical and relational operators, precedence of operators

Unit II:

6 Hrs.

Expressions, sizeof() operator, constants, typedef statement, basic input/output statements and functions (scanf, printf, getch, putch, gets, puts), Introduction to library functions, writing straight line programs. Decision control statements: if, if - else and nested if-else statements, else-if ladder statement, switch-case control statement.

Unit III:

6 Hrs.

Loop Structures: While, do while and for loops, break and continue statement, "goto" statement, bitwise operators

Unit IV:

6 Hrs.

Modular programming: Concept of functions, user defined functions, function prototypes, formal parameters, actual parameters, return types, call by value, Recursive functions, comparing recursion against iteration, Concepts of a pointer, call by reference.

Unit V:

6 Hrs.

Arrays: One dimensional array, array manipulation, insertion, deletion of an element, searching techniques- Linear and binary search, sorting techniques – Bubble sort , and selection sort. Two-dimensional arrays: matrix representation, basic matrix operations such as addition, multiplication and transpose, Array as function arguments. Strings: string representation and string handling functions

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Unit VI:	6 Hrs.
Structure: Introduction, defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures.	
	Total Lecture 36 Hours

Textbooks:

1.	Computer Science: A Structured Programming Approach Using C, 3 rd , B.A.Forouzan and R.F. Gilberg, Cengage Learning
2.	The C Programming Language, 2 nd , Brian Kernighan and Dennis Ritchie, Prentice Hall

Reference Books:

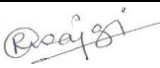
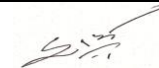
1.	Let Us C, 15th, Yashavant Kanetkar, BPB
2.	Computer Programming and Data Structures, 4th, E Balagurusamy, Tata McGraw Hill

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

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MOOCs Links and additional reading, learning, video material

1.	https://onlinecourses.nptel.ac.in/noc22_cs40/preview
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B.Tech in Artificial Intelligence and Data Science

I SEMESTER

23ADS1102 : Lab. C Programming

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Describe the basics of computer system components and operation, write algorithms and draw flowcharts.
2. Write programs using flow control statements.
3. Use functions to write modular programs.
4. Use linear data structures such as arrays and structures in programs.

Minimum Eight Practical's to be performed from the list as below

Sr.	Problem Statements																												
1 A	Introduction to Linux Operating system & it's different commands.																												
1 B	Introduction to Vi editor, Compilation and Execution of a program in Linux																												
2 A	1) Write a C program to display Your Name, Address and City in different lines. 2) Write a C program to convert centigrade into Fahrenheit. Formula: $C = (F - 32) / 1.8$.																												
2 B	1) Write program using conditional operators to evaluate the following function and print the value of y. $y = 2.4x + 3$, for $x \leq 2$ $y = 3x - 5$, for $x > 2$																												
3	Write a program to implement the following table, which tries to predict if a customer would buy a product. In particular, you need to ask for inputs Age, Gender and City, and print one of the three outputs Yes, No or Cannot Say. <table><tr><th>Age</th><th>Gender</th><th>City</th><th>Will Buy?</th></tr><tr><td>25-30</td><td>M</td><td>Chennai</td><td>Yes</td></tr><tr><td>33-45</td><td>F</td><td>Bangalore</td><td>Yes</td></tr><tr><td>57-80</td><td>F</td><td>Chennai</td><td>No</td></tr><tr><td>25-30</td><td>F</td><td>Hyderabad</td><td>No</td></tr><tr><td>13-19</td><td>M</td><td>Bangalore</td><td>Yes</td></tr><tr><td>16-20</td><td>M</td><td>Chennai</td><td>No</td></tr></table>	Age	Gender	City	Will Buy?	25-30	M	Chennai	Yes	33-45	F	Bangalore	Yes	57-80	F	Chennai	No	25-30	F	Hyderabad	No	13-19	M	Bangalore	Yes	16-20	M	Chennai	No
Age	Gender	City	Will Buy?																										
25-30	M	Chennai	Yes																										
33-45	F	Bangalore	Yes																										
57-80	F	Chennai	No																										
25-30	F	Hyderabad	No																										
13-19	M	Bangalore	Yes																										
16-20	M	Chennai	No																										
4	Write a menu driven program to perform following operations. 1) To display maximum number among inputted three number. 2) To display the final prize based on assumption that if total purchase price is above 2500 rs then discount is 25% and if total prize is above 5000 then discount is 30% else 40% discount. 3) To Display percentage of 2 nd number to 1 st number if two number is entered by the user. 4) Exit.																												
5	Write a program print whether entered number is Prime or not																												
6	Write a program to print the sum of exponential series $e(x) = 1 + x/1! + x^2 / 2! + x^3 / 3! + \dots$																												

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7	Write a program to print following pyramid <pre> 1 1 2 3 1 2 3 4 5 1 2 3 4 5 6 7 </pre>
8	i) Write a program in C that will scan a number N and then output the sum of the powers from 1 to N. thus, if the input is 4, the output should be 288. E.g. $(1)^1 + (2)^2 + (3)^3 + (4)^4 = 1 + 4 + 27 + 256 = 288$ [1,2,3,4] Use power function to calculate the power of number. ii) Write a recursive function to print Factorial of a entered number.
9	Write a program to sort an elements using bubble Sort.
10	Produce a multiplication table. Top left hand corner will show 1x1 and bottom right shows 12x12, as below. <pre> 1 2 3 4 5 6 7 8 9 10 11 12 2 4 6 8 10 12 14 16 18 20 22 24 3 6 9 12 15 18 21 24 27 30 33 36 4 8 12 16 20 24 28 32 36 40 44 48 5 10 15 20 25 30 35 40 45 50 55 60 6 12 18 24 30 36 42 48 54 60 66 72 7 14 21 28 35 42 49 56 63 70 77 84 8 16 24 32 40 48 56 64 72 80 88 96 9 18 27 36 45 54 63 72 81 90 99 108 10 20 30 40 50 60 70 80 90 100 110 120 11 22 33 44 55 66 77 88 99 110 121 132 12 24 36 48 60 72 84 96 108 120 132 144 </pre>
11	Write a program To copy one string to another string without using library function
12	Define a structure for a student having name, roll number and marks obtained in six, subjects. Write a program to input the details for 20 students and print the same.
13	Write a program that copies a file to another file. The names of two files should be sent as command line arguments.

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B.Tech in Artificial Intelligence and Data Science

I SEMESTER

23GE1117-Get Set Go

Course Outcomes:

Upon successful completion of the course the students will be able to

1. Students will understand the importance of building trust in communication and learn how to use the 3Vs of communication (Visual, Vocal, Verbal) to energize their interactions.
2. The course will focus on leadership principles and styles, emphasizing how effective communication can motivate others and gain willing cooperation. Students will participate in activities like skits and team presentations to demonstrate their leadership skills.
3. The course will equip students with team management and organization skills, enabling them to lead and participate in team-building activities effectively.

Unit:1	Build a foundation for success	6 Hours
Explain the Importance of Process of improvement, stating your Name with Impact, Recall and Use Names, Name Remembering Formula o LIRA o PACE – Individual Activity o BRAMMS o Chaining Method, Introduce “My Vision” Communication Fundamentals for Building Trust- Be a good listener, use conversation links, show genuine interest Hi-Five of Success ♣ Build on Memory Skills and Enhance Relationships ♣ PEG words ♣ Explain Permanent PEG Memory System, energize our Communications – Explain 3Vs of communication – Visual-Vocal-Verbal Activity – Practice Conversations, Pause-Part-Punch, Group Activity		
Unit:2	Increase Self Confidence	6 Hours
Use our experiences to communicate more confidently • Communicate with clarity and conciseness • Discover how past experiences influence behaviour ,Motivate Others and Enhance Relationships- • Learning Objectives • Explain Gain Willing Cooperation Principles • Group Presentation • Explain Demonstration of Leadership Principles • Explain “Evidence” critical in establishing credibility Individual Activity – Sharing of defining moment, Skit to demonstrate Leadership Principles, Stranded on Island .		
Unit:3	Fundamentals of Communication	6 Hours
Fundamentals of Communication (Earn the right – Excite -Eagerness) ♣ Elevator Pitch ♣ Develop more Flexibility, ♣ Recap and Summarize Activities - – Individual Presentation, Flexibility Drills, Individual Presentations – My Vision Assignment		
Unit:4	Team Management and Organization skills	5 Hours
Team Management and Organization skills, Leadership Styles, Effective Communication Activity- Team Presentation, Team building activities.		
EVALUATION	1 Hour	EVALUATION
WRITTEN TEST		
Total Lecture Hours		24 Hours

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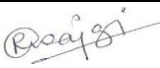
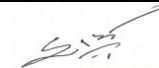
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B.Tech in Artificial Intelligence and Data Science

Reference Books

- | | |
|---|---|
| 1 | Soft Skills - Enhancing Employability: Connecting Campus with Corporate. - M S Rao |
| 2 | Soft Skills Training: A Workbook to Develop Skills for Employment - Frederick H Wentz |
| 3 | Soft Skills: Know Yourself and Know the World - Alex |

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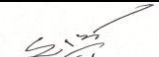
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B.Tech in Artificial Intelligence and Data Science

I SEMESTER

Audit Course

GE2301 - Disaster Management and Preparedness

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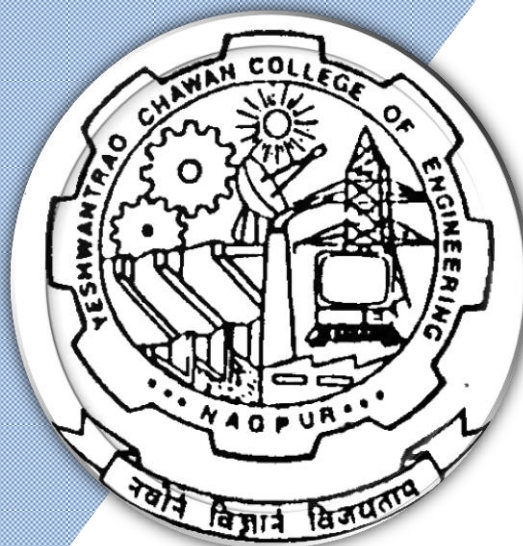
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(Accredited 'A++' Grade by NAAC with a score of 3.6)

Hingna Road, Wanadongri, Nagpur - 441 110



Bachelor of Technology SoE & Syllabus 2023 II-Semester

(Department of Computer Technology)

B. Tech in Artificial Intelligence and Data Science (AIDS)



Yeshwantrao Chavan College of Engineering
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SoE No.
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B.TECH SCHEME OF EXAMINATION 2023
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(Department of Computer Technology)
B.Tech. in Artificial Intelligence and Data Science

SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
FIRST SEMESTER (GROUP-A)															
1	1	BS	GE	23GE1103	Differential Equations and Complex Analysis	T	3	0	0	3	3	30	20	50	3
2	1	BS	GE	23GE1110	Applied Physics	T	3	0	0	3	3	30	20	50	3
3	1	BS	GE	23GE1111	Lab : Applied Physics	P	0	0	2	2	1		60	40	
4	1	BES	EL	23EL1101	Basic Electrical and Electronics Engineering	T	3	0	0	3	3	30	20	50	3
5	1	BES	AIDS	23ADS1103	Foundations of Data Science	T	3	0	0	3	3	30	20	50	3
6	1	BES	AIDS	23ADS1104	Lab : Foundations of Data Science	P	0	0	2	2	1		60	40	
7	1	BES	AIDS	23ADS1101	C Programming	T	2	0	0	2	2	30	20	50	2
8	1	BES	AIDS	23ADS1102	Lab : C Programming	P	0	0	2	2	1		60	40	
9	1	VSEC1	GE	23GE1117	Get Set Go	---	---	---	---	---	2		60	40	
10	1	LLC1	GE		Liberal Learning Course (LLC1)	---	---	---	---	---	2		60	40	
TOTAL FIRST SEM							14	0	6	20	21				

MANDATORY LEARNING COURSES															
1	1	HS		GE2301	Disaster Management and Preparedness	A	2	0	0	2	0				

SECOND SEMESTER (GROUP-A)															
1	2	BS	GE	23GE1201	Calculus and Vector	T	3	0	0	3	3	30	20	50	3
2	2	BS	GE	23GE1206	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3
3	2	BS	GE	23GE1207	Lab : Engineering Chemistry	P	0	0	2	2	1		60	40	
4	2	HS/AEC1	GE	23GE1213	Technical Communication	T	2	0	0	2	2	30	20	50	2
5	2	HS/AEC1	GE	23GE1214	Lab : Technical Communication	P	0	0	2	2	1		60	40	
6	2	HS/IKS	GE	23GE1215	Indian Knowledge System	T	2	0	0	2	2	30	20	50	2
7	2	BES	AIDS	23ADS1205	Computer Architecture and Organization	T	3	0	0	3	3	30	20	50	3
8	2	PC	AIDS	23ADS1206	Introduction to Object Oriented Concepts	T	3	0	0	3	3	30	20	50	3
9	2	PC	AIDS	23ADS1207	Lab : Introduction to Object Oriented Concepts	P	0	0	2	2	1		60	40	
10	2	VSEC2	GE	23GE1218	Functional English	...	...	...	...	...	2		60	40	
11	2	LLC2	GE		Liberal Learning Course (LLC2)	...	...	...	...	...	2		60	40	
TOTAL FIRST SEM							16	0	6	22	23				

MANDATORY LEARNING COURSES															
1	2	HS		GE2131	Universal Human Values (UHV)	A	2	0	0	2	0				

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment

TA = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activities decided by course teacher, TA3 - 3 marks on class attendance**

TA = for Practical : MSPA will be 15 marks each**

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SN	Sem	Type	BoS/Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	

Liberal Learning Course

SN	Sem	Type	BoS /Deptt	Sub. Code	Subject
1	2	CC2	GE	LLC1201	Music (Vocal)
2	2	CC2	GE	LLC1202	Music (Instrumental)
3	2	CC2	GE	LLC1203	Indian Classical Dance
4	2	CC2	GE	LLC1204	Folk Dances
5	2	CC2	GE	LLC1205	Painting
6	2	CC2	GE	LLC1206	Theatre and acting
7	2	CC2	GE	LLC1207	Photography
8	2	CC2	GE	LLC1208	Yoga
9	2	CC2	GE	LLC1209	Chess
10	2	CC2	GE	LLC1210	Athletics
11	2	CC2	GE	LLC1211	Basket Ball
12	2	CC2	GE	LLC1212	Judo
13	2	CC2	GE	LLC1213	Elements of Japanese Language
14	2	CC2	GE	LLC1214	Elements of German Language
15	2	CC2	GE	LLC1215	Elements of French Language
16	2	CC2	GE	LLC1216	Elements of Spanish Language
17	2	CC2	GE	LLC1217	Basics of Vedic Maths
18	2	CC2	GE	LLC1218	Skilling in Microsoft Visio and Inkscape
19	2	CC2	GE	LLC1219	Art of Public Speaking

Liberal Learning Course

SN	Sem	Type	BoS /Deptt	Sub. Code	Subject
1	1	CC1	GE	LLC1101	Music (Vocal)
2	1	CC1	GE	LLC1102	Music (Instrumental)
3	1	CC1	GE	LLC1103	Indian Classical Dance
4	1	CC1	GE	LLC1104	Folk Dances
5	1	CC1	GE	LLC1105	Painting
6	1	CC1	GE	LLC1106	Theatre and acting
7	1	CC1	GE	LLC1107	Photography
8	1	CC1	GE	LLC1108	Yoga
9	1	CC1	GE	LLC1109	Chess
10	1	CC1	GE	LLC1110	Athletics
11	1	CC1	GE	LLC1111	Basket Ball
12	1	CC1	GE	LLC1112	Judo
13	1	CC1	GE	LLC1113	Elements of Japanese Language
14	1	CC1	GE	LLC1114	Elements of German Language
15	1	CC1	GE	LLC1115	Elements of French Language
16	1	CC1	GE	LLC1116	Elements of Spanish Language
17	1	CC1	GE	LLC1117	Basics of Vedic Maths
18	1	CC1	GE	LLC1118	Skilling in Microsoft Visio and Inkscape
19	1	CC1	GE	LLC1119	Art of Public Speaking

MSEs* = Two MSEs of 15 Marks each will conducted and marks of these 2 MSEs will be considered for Continuous Assessment

TA = for Theory : TA1-5 marks on Proctored Online Exam, TA2-12 marks on activitied decided by course teacher, TA3 - 3 marks on class attendance**

TA = for Practical : MSPA will be 15 marks each**

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B.Tech in Artificial Intelligence and Data Science

II SEMESTER

23GE1201: Calculus and Vector

Course Outcomes :

The students will be able to

1. Apply the knowledge of differentiation to solve the Engineering problems.
2. Determine the derivatives of functions of several variables and develop the relations among the derivatives of variables.
3. Apply the knowledge of Beta and Gamma functions to find area, volume and mass.
4. Discuss Calculus of Scalar and vector point function and use appropriate theorems to evaluate integrals of functions of single and multiple variables.

Unit I: Differential Calculus

(6 Hrs.)

Successive differentiation, n^{th} derivative of rational function, Trigonometrical transformations, n^{th} derivative of the product of two functions (Leibnitz's theorem), Taylor's theorem, Use of Maclaurin's theorem for one variable, standard expansions, Examples on Taylor's Theorem. **(Contemporary Issues related to Topic)**

Unit II: Partial Differentiation

(7 Hrs.)

Functions of several variables, First and higher order derivatives, Homogeneous functions, Euler's theorem on homogeneous function, Chain rule and total differential coefficient of composite functions. Jacobians. **(Contemporary Issues related to Topic)**

Unit III: Integral Calculus

(6 Hrs.)

Improper integrals: Gamma and Beta functions, applications of integral calculus in computing area, length, volumes, and surface of solids of revolutions. **(Contemporary Issues related to Topic)**

Unit IV: Multiple integrals

(6 Hrs.)

Double integral, change of order of integral, change of variables, triple integrals and its applications. **(Contemporary Issues related to Topic)**

Unit V: Vector Calculus

(7 Hrs.)

Vector fields, Vector differentiation, Gradient, Divergence and Curl, Directional derivatives with physical interpretation, Solenoidal and irrotational motions. **(Contemporary Issues related to Topic)**

Unit VI: Vector Integration & Applications

(7 Hrs.)

Vector integration: Line, surface and volume integrals, Statement of Stoke's theorem, Gauss divergence theorem and Green's theorem (without proof), Simple applications of these theorems. **(Contemporary Issues related to Topic)**

Total Lecture 39 Hours

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SoE No.
23ADS-101.1

B.Tech in Artificial Intelligence and Data Science

Textbooks:

- | | |
|----|--|
| 1. | Erwin Kreyzig, Advance Engineering Mathematics, 10 th Edition, John Wiley and Sons, INC. |
| 2. | H.K. Dass, Engineering Mathematics, 11 th revised edition, S. Chand, Delhi. |
| 3. | H.K. Dass, Advanced Engineering Mathematics, 8 th revised edition, S. Chand, Delhi. |
| 4. | Dr. B.S. Grewal, Higher Engineering Mathematics, 42 th edition, Khanna Publishers. |
| 5. | P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4 th Edition, Vidyarthi GrihaPrakashan. |

Reference Books:

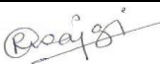
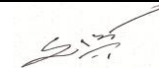
- | | |
|----|--|
| 1. | G B Thomas and R L Finney, Calculus and Analytical Geometry, 9th edition, Addison-Wesley, 1999. |
| 2. | Michael Spivak and Tom Apostol, Calculus, Vol I & Vol II 2 nd edition, Wiley. |
| 3. | N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 10 th edition, Laxmi Prakashan. |

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

- | | |
|---|---|
| 1 | http://103.152.199.179/YCCE/Supported%20file/Supported%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/ |
|---|---|

MOOCs Links and additional reading, learning, video material

- | | |
|----|---|
| 1. | https://nptel.ac.in/courses/111/106/111106146/ |
| 2. | https://nitkkr.ac.in/docs/5-Multiple%20Integrals%20and%20their%20Applications.pdf |

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II SEMESTER

23GE1206 : Engineering Chemistry

Course Outcomes:

Upon successful completion of the course students will be able to

1. **Illustrate** qualitative and quantitative aspects of water for industrial and domestic applications. (L3)
2. **Apply** concepts of electrochemistry for energy storage devices and corrosion. (L3)
3. **Explain** basic principles of spectroscopy and its applications. (L3)
4. **Establish** insight into advanced engineering materials. (L3)

Unit:1	Water Chemistry Introduction, Potable water quality parameters. Hardness, Types of hardness. Sterilization. Desalination of water by R.O. Softening of water by Zeolite process and Ion Exchange Process (principle, advantages, and limitations). Numerical based on Hardness and Zeolite process. Boiler trouble (Scale and sludge). Contemporary issues related to the topic	7 Hours
Unit:2	Electrochemistry Introduction, metallic and electrolytic conductance. Electrode and electrode potential. Nernst Equation, numericals and applications. Faraday's laws and numericals. Industrial applications: Electroplating, Electrolytic refining, Corrosion- Definition, Causes, theories of corrosion- dry, wet and differential aeration. Contemporary issues related to the topic	7 Hours
Unit:3	Energy storage device Introduction, Characteristics, and general applications. Lithium-ion battery, Glass battery, H ₂ -O ₂ Fuel cell. Differences between battery and a fuel cell. Supercapacitors: Definition, types, characteristics, and application. H₂ as a green fuel: Introduction, production, storage, and utilization. Contemporary issues related to the topic	6 Hours
Unit:4	Drugs & Polymer chemistry Drugs: Introduction, types of drugs, synthesis of commonly used drug molecules such as aspirin and paracetamol. Polymer: Introduction, Classification of polymers, Use and disposal of polymers. Properties of polymers - Solubility, Molecular Weight, Crystallinity, Glass transition temperature. Contemporary issues related to the topic	6 Hours

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Unit:5	Spectroscopic Techniques and Applications Introduction, fundamentals, types, principles, and selection rules of spectroscopy. Basic principle and applications of UV- Visible, IR, NMR Spectroscopy and numericals. Contemporary issues related to the topic	6 Hours
Unit :6	Advanced Materials Nanomaterials: Definition, Carbon Nanotubes and types. Applications of Nanomaterials in electronics, environment and medicine. Chemical sensors: Types and application. Liquid Crystal Polymers: Introduction, General properties and applications. Polymers in electronic industries: Introduction, Piezo, Pyroelectric, Ferroelectric polymers. Smart materials: Introduction, Properties and applications of Chromoactive, Photoactive and Magneto rheological materials. Contemporary issues related to the topic	7 Hours
Total Lecture Hours		39 Hours

Text books

- 1 S S. Dara, A Textbook of Engineering Chemistry, S. Chand & Co New Delhi. Eleventh Edition.
- 2 P.C. Jain and Monica Jain, Engineering Chemistry, Dhanpat Rai & sons New Delhi, Sixteenth Edition.
- 3 P. W. Atkins, Physical Chemistry, Oxford Publications, Eighth edition.
- 4 Y.R. Sharma, Elementary organic spectroscopy, S. Chand and company private limited.

Reference Books

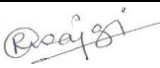
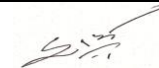
- 1 B.K.Sharma Krishna, Engineering Chemistry, Prakashan media private LTD. 1st Edition, 2014.
- 2 CNR Rao, Chemistry of Advanced Materials, Willey Publications, 1993.
- 3 Fred. Billmeyer Jr., A textbook of polymer science, Wiley India, 2nd Edition.
- 4 Robert B Leighou , Chemistry of Engineering Materials ,Hill Book Company, Inc New York
- 5 C.N. Banwell ,Fundamentals of Molecular Spectroscopy ,Mc Graw hill education , 4th Edition
- 6 William C. O'Mara, Robert B. Herring, Handbook of Semiconductor Silicon Technology ,Noyes Publications Park Ridge, NJ, USA.1st Edition.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

- 1 <http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/SERIES%20WISE%20BOOKS/CHEMISTRY/>

MOOCs Links and additional reading, learning, video material

- 1 <https://www.youtube.com/watch?v=XTt3gXB0a84>
- 2 <https://www.youtube.com/watch?v=i1hYXx79QiE>
- 3 <https://www.youtube.com/watch?v=JfJ7MIP9Dco>
- 4 <https://www.youtube.com/watch?v=L2VSOccUrSk>
- 5 <https://www.youtube.com/watch?v=p5pk4Um6lsk>
- 6 <https://www.youtube.com/watch?v=zVDMgoffmC0>

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B.Tech in Artificial Intelligence and Data Science

II SEMESTER

23GE1207 : Lab. Engineering Chemistry

Course Outcomes:

Upon successful completion of the course the students will be able to

1. **Illustrate** qualitative and quantitative aspects of water for industrial and domestic applications. (L3)
2. **Apply** concepts of electrochemistry for energy storage devices and corrosion. (L3)
3. **Explain** basic principles of spectroscopy and its applications. (L3)
4. **Establish** insight into advanced engineering materials. (L3)

Total 10 experiments are to be performed.

(4 each from Phase I and Phase II and two demonstration experiments)

SN	Experiments based on
	List of Experiments-Phase I
1	Determination of total hardness of water sample.
2	Determination of alkalinity present in the water sample.
3	Estimation of Fe^{2+} ions by redox titration
4	Determination of copper by iodometric titration
5	Estimation of Nickel.
6	To determine the strength of a given potassium dichromate solution with N/20 sodium thiosulphate solution
7	Determination of COD of water sample.
8	Synthesis of urea formaldehyde & phenol formaldehyde resin.
9	Determination of rate of the reaction of hydrolysis of ethyl acetate at room temperature and analysis of experimental data using Computational Software.
	List of Experiments-Phase II
1	Determination of viscosity of lubricating oil by Redwood Viscometer I or II
2	Determination of Cation exchange capacity of an ion exchange resin
3	Determination of molecular weight of a polymer.
4	Oil Testing for Flash Point / Cloud Point/Pour Point/Aniline Point
5	Proximate analysis of coal
6	Determination of surface tension of liquids using stalagmometer.
7	Determination of electrochemical equivalence of copper using Faradays Law
8	To determine the heat of solution of potassium nitrate calorimetrically.

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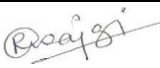
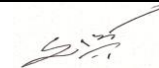
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9	Determination of strength of the given acid conductometrically.
10.	To verify Beer-Lambert law for KMnO_4 colorimetrically and determine the concentration of the given solution of KMnO_4 .
	List of Demonstration Experiments
1	Determination of pH of water sample by pH meter
2	Synthesis of polyaniline.

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B.Tech in Artificial Intelligence and Data Science

II SEMESTER

23GE1213 : Technical Communication

Course Outcomes :

Upon successful completion of the course the students will be able to:

1. Apply different modes for effective communication
2. Produce competently the Phonology of English language
3. Apply nuances of LSRW skills
4. Practice Communication through different channels

Unit I: Basics of Communication	(6 Hrs.)
Process of Communication, Levels of Communication, Flow of Communication, Networks of Communication, Barriers to communication- Intrapersonal, Interpersonal, Organizational	
Unit II: English Phonetics	(7 Hrs.)
Speech Mechanism, Organs of speech, Consonant and Vowels sounds symbols, word stress rules	
Unit III: Presentation & Visual Communication , Reading & Listening Skills	(6 Hrs.)
Presentation-Purpose, Analysing Audience & Locale, Organizing Contents, Nuances of presentation- Kinesics, Proxemics, Chronemics, Vocalics, Modes of Presentation, Visual Communication –Introduction & importance, Role & Psychology of color in visual communication, Listening Skills -definition types and traits	
Unit IV: Research Paper & Technical Communication	(7 Hrs.)
Research Paper - Characteristics, components, Title, Abstract, Introductory Paragraph, Body of Presentation Conclusion, Acknowledgements , List of Symbols, References Memo- Objectives, Types, Structure and Layout Email-Etiquette s, acronyms	
Total Lecture 26 Hours	

Textbooks:

1.	Meenakshi Raman & Sangeeta Sharma, Technical Communication, Raman & Sharma, Oxford University Press Orford University Press
2.	T. Balasubramaniam, Textbook of English Phonetics for Indian Students, Macmillan India Ltd

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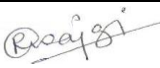
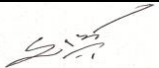
B.Tech in Artificial Intelligence and Data Science

Reference Books:

1.	Dale Carnegie ,How to Develop Self – Confidence & Influence People by Public Speaking
2.	AshaKaul, Communication Skills
3.	Allen Peas ,Body Language
4.	Gerson's Gerson, Technical Communication

MOOCs Links and additional reading, learning, video material

1.	https://dl.uswr.ac.ir/bitstream/Hannan/141245/1/9781138219120.pdf
2.	https://www.pdfdrive.com/word-power-made-easy-the-complete-handbook-for-building-a-superiorvocabulary-e157841139.html
3.	https://www.pdfdrive.com/improve-your-communication-skills-present-with-confidence-write-with-stylelearn-skills-of-persuasion-e156963640.html
4.	https://www.pdfdrive.com/21-days-of-effective-communication-everyday-habits-and-exercises-to-improveyour-communication-skills-and-social-intelligence-e158273760.html

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B.Tech in Artificial Intelligence and Data Science

II SEMESTER

23GE1214 : Lab. Technical Communication

Course Outcomes :

Upon successful completion of the course the students will be able to:

1. Apply different modes for effective communication
2. competently use the phonology of English language
3. Apply nuances of LSRW skills
4. Communicate through different channels

Lab I	(2 Hrs.)
Handson for Consonants and vowel sounds (Contemporary issues related to topic)	
Lab II	(2 Hrs.)
Identifying the pragmatic meaning of the text (Contemporary issues related to topic)	
Lab III	(2 Hrs.)
Sessions for Interview (Contemporary issues related to topic)	
Lab IV	(2 Hrs.)
Grooming session for effective use of body language (Contemporary issues related to topic)	
Lab V	(2 Hrs.)
Visual Media – preparing poster boards, advertising product (Contemporary issues related to topic)	
Lab VI	(2 Hrs.)
Group Discussion (Contemporary issues related to topic)	
Total Lecture	12 Hours

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Textbooks:

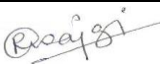
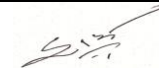
1.	Technical Communication, 3 rd Edition, Raman & Sharma, Oxford University Press
2.	Textbook of English Phonetics for Indian Students, 3 rd Edition, T. Balasubramaniam, Macmillan India Ltd

Reference Books:

1.	How to Develop Self – Confidence & Influence People by Public Speaking, 1st Edition, Dale Carnegie
2.	Communication Skills, 2nd Edition, Asha Kaul
3.	Body Language, 1st Edition, Allen Peas
4.	Technical Communication, January 2003, Gerson's Gerson

MOOCs Links and additional reading, learning, video material

1.	https://youtu.be/XoVLa6Dqd5I
2.	https://youtu.be/45uNWLmAZR8

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II SEMESTER

23GE1215 : Indian Knowledge System

Course Outcomes:

Upon successful completion of the course the students will be able to

1. Apply primary requirements pertaining towards awareness of Indian Knowledge System.
2. Analyze various Indian society, culture and literature to enhance their traditions.
3. Evaluate structure of Indian art.
4. Understand Indian heritage and architectural skills.

Unit:1	Introduction to Indian Civilization	6 Hours
Development of Human Civilization with specific reference: Stone age: Tool Technology and Cultural Development, Indus Valley civilization, Vedic Civilization. (Contemporary Issues related to Topic)		
Unit:2	Indian Society, Culture and Literature	6 Hours
Society and its types, Culture and its Characteristics, Foundational Literature. (Contemporary Issues related to Topic)		
Unit:3	Tradition of Indian Art and Painting	7 Hours
Indian Traditional Painting, Art style folk, mural with Gandhara and Mathura school of art. (Contemporary Issues related to Topic)		
Unit:4	Indic Traditions of Architecture, Design and Planning	7 Hours
Monumental studies of architectural skill: Rock Cut Caves, Stupa and Temple Architecture, The Ancient cities of Indus Saraswati region. Town Planning and drainage system. (Contemporary Issues related to Topic)		
Total Lecture Hours		26 Hours

Textbooks

1	Reader's Digest: Vanished Civilizations, THE READER'S DIGEST ASSOCIATION LIMITED, LONDON,NEWYORK.
2	Qaiser Zoha Alam ; Language and Literature Divers Indian Experience
3	Bal Ram Singh (Author), Nath Girish (Author) ; Science and Technology in Ancient Indian Texts
4	NCERT Books

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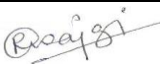
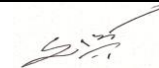
1	B S Harishankar; Art and Archaeology of India: Stone Age to the Present, 2003.
2	Gupte R S and Mahajan B D; Ajanta, Ellora and Aurangabad, 1962.
3	Dharampal, Some Aspects of Earlier Indian Society and Polity and Their Relevance Today, New Quest Publications, Pune, 1987.
4	Michel Lorblanchet, "Rock Art In The Old World" IGNCA series, in India
5	Percy Brown, "Indian Architecture" D. B. Taraporevala sons & co. Pvt. Ltd. Bombay(1959).

PPT's/Research papers

1	https://www.researchgate.net/publication/360889208_STONE_AGE_TOOL_TECHNOLOGY_and_CULTURAL_DEVELOPMENT
2	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=iT1KSV8AAAAJ&sortby=pubdate&citation_for_view=iT1KSV8AAAAJ:UeHWp8X0CEIC

MOOCs Links and additional reading, learning, video material

1	https://prepp.in/news/e-492-indian-architecture-art-and-culture-notes
2	https://www.artzolo.com/blog/most-famous-indian-painting-styles
3	https://www.researchgate.net/publication/360889332_Stone_Age_Tool_Technology_Cultural_Development
4	https://testbook.com/ias-preparation/ancient-history-16-mahajanapadas

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II SEMESTER

23ADS1205 : Computer Architecture and Organization

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Relate & Identify the function and design of the various units of computers that process data and store the information.
2. Analyze and write control signal for executing machine instructions for different processors.
3. Explain & Design the organization of memory, memory hierarchy, other peripheral devices, and estimate the cost of computation.
4. Compare among different types of I/O operation

Unit I:

(7 Hrs.)

Binary Systems: Digital Systems, Binary Numbers, Binary Codes, Computer Arithmetic Number Base Conversions, Octal and Hexadecimal – conversions. Basic Logic Gates, Universal gates (NAND and NOR gates), other gates (XOR, XNOR gates). Boolean identities, De Morgan's Laws. k-map

Unit II:

(7 Hrs.)

Combinational and sequential circuits: (Simple block diagrams, truth tables and IC packages only required). Flip-flops: RS, clocked RS, JK, D and T flip flops, Master slave flip flops, Registers, latches and Tristate buffers. Basic Memory Organization

Unit III:

(7 Hrs.)

Von-Neuman architecture, Functional units, addressing methods, addressing modes, Execution of complete instructions, Bus organizations, sequencing of Control signals, Processor Design, hard wired control, Microprogrammed Control: Microinstructions, Grouping of control signals, Microprogram sequencing, Micro Instructions with next Address field, perfecting microinstruction.

Unit IV:

(7 Hrs.)

Arithmetic (Fixed and Floating point): Number Representation, Addition of Positive numbers, Logic Design for fast adders, Addition and Subtraction, Arithmetic and Branching conditions, Multiplications of positive numbers, Signed- Operand multiplication, fast Multiplication, Booth's Algorithm

Unit V:

(7 Hrs.)

Integer Division, Floating point numbers and operations. The Main Memory: Basic concepts, Memory Hierarchy, Speed Size and Cost, Cache Memory, Performance Considerations.

Unit VI:

(7 Hrs.)

Pipelining: Basic Concepts, Data Hazards, Instruction Hazards Computer Peripherals: I/O Devices, I/O transfers – program controlled, interrupt driven and DMA, Interrupt handling.

Total Lecture 42 Hours

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B.Tech in Artificial Intelligence and Data Science

Textbooks:

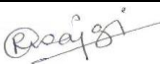
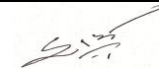
1.	Computer Organization , 5th edition, V.Carl Hamacher, Zvonko Vranesic, McGraw Hill Publications.
2.	Computer Architecture & Organization , 3rd edition , J.P. Hayes , McGraw Hill Publications
3.	Modern Digital Electronics,,3rd Edition, R. P. Jain, McGraw Hill

Reference Books:

1.	Computer Organization and Architecture , 6th edition , William Staling , Pearson Education
2.	Computer Architecture: A Quantitative approach , 6th edition, John L. Hennessy, David A. Patterson , MK series in computer architecture and design

MOOCs Links and additional reading, learning, video material

1.	https://onlinecourses.nptel.ac.in/noc23_cs67/preview
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			July,2026	1.00	Applicable for AY 2026-27 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech SoE and Syllabus 2023
(Scheme of Examination w.e.f. 2023-24 onward)
(Department of Computer Technology)

SoE No.
23ADS-101.1

B.Tech in Artificial Intelligence and Data Science

II SEMESTER

23ADS1206 : Introduction to Object Oriented Concepts

Course Outcomes :

Upon successful completion of the course the students will be able to

1. Understand the concept of object-oriented programming and modelling
2. Apply the knowledge of object-oriented programming to solve the given problem
3. Analyze the problem to provide the objectoriented solution using advanced programming concepts

Unit I: Introduction to C++

(6 Hrs.)

Difference between C and C++- Evolution of C++- The Object-Oriented Technology-Disadvantage of Conventional Programming- Key Concepts of Object-Oriented Programming, Advantage of OOP- Object Oriented Language.

Unit II: Classes and Objects & Constructors and Destructor

(7 Hrs.)

Classes in C++-Declaring Objects- Access Specifiers and their Scope- Defining Member Function-Overloading Member Function- Nested class, Constructors and Destructors, Introduction- Constructors and Destructor- Characteristics of Constructor and Destructor- Application with Constructor- Constructor with Arguments (parameterized Constructor-Destructors- Anonymous Objects

Unit III: Operator Overloading and Type Conversion & Inheritance

(7 Hrs.)

The Keyword Operator- Overloading Unary Operator- Operator Return Type- Overloading Assignment Operator (=)- Rules for Overloading Operators, Inheritance, Reusability- Types of Inheritance- Virtual Base Classes- Object as a Class Member- Abstract Classes- Advantages of Inheritance-Disadvantages of Inheritance.

Unit IV: Pointers & Binding Polymorphisms and Virtual Functions

(7 Hrs.)

Pointer, Features of Pointers- Pointer Declaration- Pointer to Class- Pointer Object- The this Pointer- Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Introduction- Binding in C++- Virtual Functions- Rules for Virtual Function- Virtual Destructor.

Unit V: Generic Programming with Templates & Exception Handling

(7 Hrs.)

Generic Programming with Templates, Need for Templates- Definition of class Templates- Normal Function Templates- Over Loading of Template Function-Bubble Sort Using Function Templates- Difference Between Templates and Macros- Linked Lists with Templates, Exception Handling- Principles of Exception Handling- The Keywords try to throw and catch- Multiple Catch Statements –Specifying Exceptions.

Unit VI: Overview of Standard Template Library

(6 Hrs.)

Overview of Standard Template Library- STL Programming Model- Containers- Sequence Containers- Associative Containers- Algorithms- Iterators- Vectors- Lists- Maps.

Total Lecture 40 Hours

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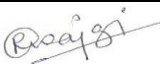
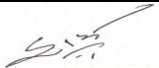
1.	Object Oriented Programming with C++, 5th edition , Bal Gurusamy, McGraw Hill Publications.
2.	Object Oriented Programming in C++ , 3rd edition , Lafore,R , Sams Publication

Reference Books:

1.	The C++ Programming Language, 6th edition , Stroustrup.B , Pearson Education
2.	C++ The Complete Reference , 6th edition , Schildt, H , McGraw Hill Publications

MOOCs Links and additional reading, learning, video material

1.	https://nptel.ac.in/courses/106105153
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II SEMESTER

23ADS1207: Lab. Introduction to Object Oriented Concepts

Course Outcomes

Upon successful completion of the course the students will be able to

4. Understand the concept of object-oriented programming and modelling
5. Apply the knowledge of object-oriented programming to solve the given problem
1. Analyze the problem to provide the object oriented solution using advanced programming concepts

Minimum Eight Practical's to be performed from the list as below

SN	Program based on
1	Implement the concept of Class and its data members and member functions
2	Implement the concept of function overloading
3	Implement the concept of passing object as a function argument
4	Implement the concept of friend function
5	Implement the concept of constructor and its type.
6	Implement the concept of operator overloading
7	Implement the concept of single inheritance.
8	Implement the concept of multilevel Inheritance
9	Implement the concept of each access specifiers (Private, Public and Protected).
10	Implement the concept of run time polymorphism
11	Implement the concept of Files
12	Implement the concept of command line arguments
13	Implement the concept of function templates
14	Implement the concept of Class templates.
15	Implement the concept of exception.

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II SEMESTER

23GE1218 : Functional English

Course Outcomes:

Upon successful completion of the course the students will be able to

1. Understand the concept of FE (Functional English) and its application in various real-life scenarios.
2. Develop basic interactive communication skills, including greetings, asking for information, stating opinions, and providing feedback.
3. Acquire knowledge of social networking, texting, instant messaging, blogs, and discussion boards, along with the ethical considerations associated with online communication.
4. Successfully complete quizzes and assignments assessing knowledge in the covered topics of FE, social media, tenses, and effective communication.

Unit:1	Introduction to Functional English	6 Hours
What is FE? And Areas of application. Basic Interactive sentences - Greetings & Replies, Asking for information, Telling people what you do, Asking somebody's opinion, Giving your opinion, Saying someone is correct, Saying that someone is wrong, Apologizing, Praising someone's work, Saying goodbye. Introduction & Basics of Common Expressions – Offer, Request, Gratitude, Apology. Modal Verbs - Words used often: Can- could, Will – would, Shall – should, Ought to-Must, May-might. Practice exercises, Practice Conversations, Script Activity		
Unit:2	Internet & Social Media Communication	6 Hours
Introduction & Basics to Social Networking, Texting & Instant messaging, Blogs & Discussion Board- discussion with examples, Ethics of social media & communication Topic: Introduction to Creative Ads Why Ads, What's in it for me? Characteristics of ads. Assignment Quiz on the above Topics, Exercises for Evaluation		
Unit:3	TENSES	6 Hours
Introduction & Basics, Simple Tense (Past, Present, Future), Continuous Tense (Past, Present, Future) – discussion with examples. Introduction & Basics, Perfect Tense (Past, Present, Future), Perfect Continuous Tense (Past, Present, Future) – discussion with examples Introduction to Movie Magic, Learn English with films, Film Vocabulary, Describing a film, Types of Films Assessment – Letter and Email Writing, Tenses – Quiz		
Unit:4	Written Communication	5 Hours
Introduction & Basics of Writing, five methods of communication, Mind your grammar, Commonly confusing words Letters – Format, Parts of a business letter, When does communication fail?, Things to remember, Positive language not negative language, Active voice not passive voice Effective emailing -How to make an effective e-mail, Few common e-mail habits that cause problems, Parts of an e-mail, Some other important aspects.		

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Assignment Presentation on Mad Ads, Quiz on Tenses and social media-Internet Communication
Topic: Activity Extempore

EVALUATION			1 Hour
WRITTEN TEST	TA=60	ESE=40	TOTAL=100
Total Lecture Hours			24 Hours

Reference Books

- 1 How to win friends & influence people – Dale Carnegie
2. Functional English for Communication - Ujjwala Kakarla
- 3 Functional English for Technical Students – Dr Prathibha Mahato & Dr Dora Thompson

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B.Tech in Artificial Intelligence and Data Science

Liberal Learning Course (LLC2)

Liberal Learning Course					
SN	Sem	Type	BoS /Deptt	Sub. Code	Subject
1	2	CC2	GE	LLC1201	Music (Vocal)
2	2	CC2	GE	LLC1202	Music (Instrumental)
3	2	CC2	GE	LLC1203	Indian Classical Dance
4	2	CC2	GE	LLC1204	Folk Dances
5	2	CC2	GE	LLC1205	Painting
6	2	CC2	GE	LLC1206	Theatre and acting
7	2	CC2	GE	LLC1207	Photography
8	2	CC2	GE	LLC1208	Yoga
9	2	CC2	GE	LLC1209	Chess
10	2	CC2	GE	LLC1210	Athletics
11	2	CC2	GE	LLC1211	Basket Ball
12	2	CC2	GE	LLC1212	Judo
13	2	CC2	GE	LLC1213	Elements of Japanese Language
14	2	CC2	GE	LLC1214	Elements of German Language
15	2	CC2	GE	LLC1215	Elements of French Language
16	2	CC2	GE	LLC1216	Elements of Spanish Language
17	2	CC2	GE	LLC1217	Basics of Vedic Maths
18	2	CC2	GE	LLC1218	Skilling in Microsoft Visio and Inkscape
19	2	CC2	GE	LLC1219	Art of Public Speaking

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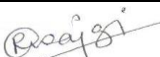
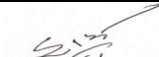
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II SEMESTER

Audit Course

GE2131 : Universal Human Values (UHV)

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