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

Bachelor of Technology

SoE & Syllabus 2022

1st to 8th Semester

(Department of Computer Technology)

Artificial Intelligence and Data Science

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

Artificial Intelligence and Data Science

SoE No. 22ADS-101

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															
1	1	BS	GE/MTH	22ADS101	Calculus, Sequances & Series	T	3	1	0	3	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22ADS102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22ADS103	**Lab.:** Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22ADS104	Technical Communications	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	HS	GE/HUM	22ADS105	**Lab.:** Technical Communications	P	0	0	2	2	1		60	40	
6	1	PC	CT/CT	22ADS106	Foundations of Data Science	T	3	0	0	3	3	30	20	50	3 Hrs
7	1	PC	CT/CT	22ADS107	**Lab.:** Foundations of Data Science	P	0	0	2	2	1		60	40	
8	1	BES	CT/CT	22ADS108	Computer Programing	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	CT/CT	22ADS109	**Lab.:** Computer Programing	P	0	0	2	2	1		60	40	
					TOTAL FIRST SEM		**15**	**1**	**8**	**23**	**20**				
List of Mandatory Learning Course (MLC)															
1	1	HS	GE/HUM	GE2131	Universal Human Value	A	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	A	2	0	0	2	0				
SECOND SEMESTER															
1	2	BS	GE/MTH	22ADS201	Probability and Statistics	T	3	1	0	3	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22ADS202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22ADS203	**Lab.:** Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22ADS204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	CT/CT	22ADS205	Computer Architecture and Organization	T	3	0	0	3	3	30	20	50	3 Hrs
6	2	PC	CT/CT	22ADS206	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3 Hrs
7	2	PC	CT/CT	22ADS207	**Lab.:** Object Oriented Programming	P	0	0	2	2	1		60	40	
8	2	PC	CT/CT	22ADS208	Data Structures	T	3	0	0	3	3	30	20	50	3 Hrs
9	2	PC	CT/CT	22ADS209	**Lab.:** Data Structures	P	0	0	2	2	1		60	40	
10	2	PC	CT/CT	22ADS210	Software Lab	P	0	0	2	2	1		60	40	
					TOTAL SECOND SEM		**18**	**1**	**8**	**26**	**23**				
List of Mandatory Learning Course (MLC)															
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	A	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	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 activitied decided by course teacher, TA3 - 3 marks on class attendance

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

		June 2022	**1.00**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**

Applicable for AY 2022-23 Onwards

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

Artificial Intelligence and Data Science

SoE No. 22ADS-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Third Semester															
1	3	BS	GE	22ADS301	Discrete Mathematics & Graph Theory	**T**	3	0	0	3	3	30	20	50	3 Hours
2	3	PC	CT	22ADS302	Statistics for Data Science	**T**	3	0	0	3	3	30	20	50	3 Hours
3	3	PC	CT	22ADS303	**Lab** :Statistics for Data Science	P	0	0	2	2	1		60	40	
4	3	PC	CT	22ADS304	Computer Network	**T**	3	0	0	3	3	30	20	50	3 Hours
5	3	PC	CT	22ADS305	**Lab.:** Computer Network	P	0	0	2	2	1		60	40	
6	3	PC	CT	22ADS306	Software Engineering	**T**	3	0	0	3	3	30	20	50	3 Hours
7	3	PC	CT	22ADS307	**Lab.:** Software Engineering	P	0	0	2	2	1		60	40	
8	3	PC	CT	22ADS308	Operating Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
9	3	PC	CT	22ADS309	**Lab.** Web Technology	P	0	0	4	4	2		60	40	
10	3	PC	CV/CT	22ADS310	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL THIRD SEM		**15**	**0**	**10**	**25**	**23**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC2123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0				
2	3	BES	CT/AIDS	MLC121	Document Presentation and Computation	**A**	2	0	0	2	0				
Fourth Semester															
1	4	PC	GE	22ADS401	Linear Algebra	**T**	3	0	0	3	3	30	20	50	3 Hours
2	4	PC	CT	22ADS402	Theoretical foundation of Computer Science	**T**	3	0	0	3	3	30	20	50	3 Hours
3	4	PC	CT	22ADS403	Design & Analysis of Algorithms	**T**	3	0	0	3	3	30	20	50	3 Hours
4	4	PC	CT	22ADS404	**Lab:** Design & Analysis of Algorithms	**P**	0	0	2	2	1		60	40	
5	4	PC	CT	22ADS405	Database Management Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
6	4	PC	CT	22ADS406	**Lab:** Database Management Systems	**P**	0	0	2	2	1		60	40	
7	4	PC	CT	22ADS407	Bayesian Data Analysis	**T**	3	0	0	3	3	30	20	50	3 Hours
8	4	PC	CT	22ADS408	**Lab:** Advanced Python	**P**	0	0	2	2	1		60	40	
					TOTAL FOURTH SEM		**15**	**0**	**6**	**21**	**18**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC2124	YCCE Communication Aptitude Preparation (YCAP4)	**A**	3	0	0	3	0				
2	4	BES	CT/AIDS	MLC122	Data Visualization	**A**	2	0	0	2	0				

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		June 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

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B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

Artificial Intelligence and Data Science

SoE No. 22ADS-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Fifth Semester															
1	5	PC	CT	22ADS501	Artificial Intelligence	**T**	3	0	0	3	3	30	20	50	3 Hours
2	5	PC	CT	22ADS502	**Lab.:** Artificial Intelligence	**P**	0	0	2	2	1		60	40	
3	5	PC	CT	22ADS503	Data Mining	**T**	3	0	0	3	3	30	20	50	3 Hours
4	5	PC	CT	22ADS504	**Lab.:** Data Mining	**P**	0	0	2	2	1		60	40	
5	5	PC	CT	22ADS505	Cyber Laws and Ethics in IT	**T**	3	0	0	3	3	30	20	50	3 Hours
6	5	PC	CT	22ADS506	**Lab :** Open Source Tools	**P**	0	0	2	2	1		60	40	
7	5	STR	CT	22ADS507	Industrial training, Seminar & Report	**P**	0	0	1	1	1		60	40	
8	5	PC	CT		**Professional Elective-I**	**T**	3	0	0	3	3	30	20	50	3 Hours
9	5	PE	CT		**Professional Elective-I Lab**	**P**	0	0	2	2	1		60	40	
10	5	STR	CT		**Open Elective I**	**T**	3	0	0	3	3	30	20	50	3 Hours
11	5	OE	CT		**Open Elective II**	**T**	3	0	0	3	3	30	20	50	3 Hours
					TOTAL FOURTH SEM		**18**	**0**	**9**	**27**	**23**				

List of Professional Electives-I *

1	5	PE-I	PC	22ADS511	PE I: Digital Image Processing
2	5	PE-I	PC	22ADS512	PE I: **Lab.:** Digital Image Processing
3	5	PE-I	PC	22ADS513	PE I: Internet of Things
4	5	PE-I	PC	22ADS514	PE I: **Lab.:** Internet of Things
5	5	PE-I	PC	22ADS515	PE I : Numerical Methods
6	5	PE-I	PC	22ADS516	PE I : **Lab.:** Numerical Methods

Open Elective-I

1	5	OE-I	PC	22ADS531	OE I: Introduction to Data Science
2	5	OE-I	PC	22ADS532	OE I: Foundations of AI

Open Elective-II

1	5	OE-II	PC	22ADS551	OE II: Introduction to DBMS
2	5	OE-II	PC	22ADS552	OE II: Current Trends and Technologies

List of Mandatory Learning Course (MLC)												
1	5	HS	T&P	MLC2125	YCAP5: YCCE Communication Aptitude Preparation	A	3	0	0	3	0	
2	5	HS	R&D	MLC125	Design thinking	A	2	0	0	2	0	

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SoE No. 22ADS-101

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							L	T	P	Hrs		MSEs*	TA**	ESE	
Sixth Semester															
1	6	GE	GE/HUM	22ADS601	Management Studies	**T**	3	0	0	3	3	30	20	50	3 Hours
2	6	PC	CT	22ADS602	Business Analytics	**T**	3	0	0	3	3	30	20	50	3 Hours
3	6	PC	CT	22ADS603	**Lab:** Business Analytics	P	0	0	2	2	1		60	40	
4	6	PC	CT	22ADS604	Machine Learning	**T**	3	0	0	3	3	30	20	50	3 Hours
5	6	PC	CT	22ADS605	**Lab:** Machine Learning	P	0	0	2	2	1		60	40	
6	6	PC	CT	22ADS606	**Lab :** Advanced Web Technolgy	P	0	0	2	2	1		60	40	
7	6	PE	CT		**Professional Elective-II**	**T**	3	0	0	3	3	30	20	50	3 Hours
8	6	PE	CT		**Open Elective III**	**T**	3	0	0	3	3	30	20	50	3 Hours
9	6	PR	CT		**Open Elective IV**	**T**	3	0	0	3	3	30	20	50	3 Hours
10	6	OE	CT	22ADS607	Project Phase I	P	0	0	4	4	2		60	40	
					TOTAL SIXTH SEM		**18**	**0**	**10**	**28**	**23**				

List of Professional Electives- II

Professional Electives-II

1	6	PE-II	CT	22ADS611	PE-II : Computer Vision
2	6	PE-II	CT	22ADS612	PE-II : Natural Language Processing
3	6	PE-II	CT	22ADS613	PE-II : Robotics
4	6	PE-II	CT	22ADS614	PE-II : Data Analytics for Industry 4.0
5	6	PE-II	CT	22ADS615	PE-II : Social Media Analytics
6	6	PE-II	CT	22ADS616	PE-II : Optimization Techniques

Open Elective-III

1	6	OE-III	CT	22ADS631	OE III: Introduction to Data Science
2	6	OE-III	CT	22ADS632	OE III: Foundations of AI

Open Elective-IV

1	6	OE-IV	CT	22ADS651	OE IV: Introduction to DBMS
2	6	OE-IV	CT	22ADS652	OE IV: Current Trends and Technologies

List of Mandatory Learning Course (MLC)

1	6	HS		MLC2126	**YCAP6:**	**A**	3	0	0	3	0

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

		June 2022	**1.00**	**Applicable for AY 2022-23 Onwards**
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B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

Artificial Intelligence and Data Science

SoE No. 22ADS-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Seventh Semester															
1	7	PC	CT	22ADS701	Deep Learning	**T**	3	0	0	3	3	30	20	50	3 Hours
2	7	PE	CT	22ADS702	**Lab :** Deep Learning	P	0	0	2	2	1		60	40	
3	7	PE	CT	22ADS703	Big Data and Hadoop	**T**	3	0	0	3	3	30	20	50	3 Hours
4	7	PE	CT	22ADS704	**Lab:** Big Data and hadoop	P	0	0	2	2	1		60	40	
4	7	PE	CT	22ADS705	Computational Logic	**T**	3	0	0	3	3	30	20	50	3 Hours
4	7	PE	CT		**Professional Elective-III**	**T**	3	0	0	3	3	30	20	50	3 Hours
4	7	PE	CT		**Professional Elective-IV**	**T**	3	0	0	3	3	30	20	50	3 Hours
4	7	PE	CT		**Professional Elective-V**	**T**	3	0	0	3	3	30	20	50	3 Hours
4	7	PE	CT	22ADS706	**Lab:** High Performance Computing	P	0	0	2	2	1		60	40	
5	7	PE	CT	22ADS707	Project Phase-II	**P**	0	0	10	10	5		60	40	
7	7	STR	CT	22ADS708	Campus Recruitment Training (CRT)	**P**	0	0	0	0	2		100		
					TOTAL SEVENTH SEM		**18**	**0**	**16**	**34**	**28**				

List of Professional Electives-III,IV & V

Professional Electives -III

1	7	PE-III	CT	22ADS721	PE III: Data Modeling and Simulation
2	7	PE-III	CT	22ADS722	PE III: Sensor Networks and Data Analysis
3	7	PE-III	CT	22ADS723	PE III: Data Warehousing

Professional Electives -IV

1	7	PE-IV	CT	22ADS741	PE IV: Data Visulization
2	7	PE-IV	CT	22ADS742	PE IV: Cloud Computing
3	7	PE-IV	CT	22ADS743	PE IV: AI for Medical Diagnosis
4	7	PE-IV	CT	22ADS744	PE IV: Distributed Systems

Professional Electives -V

1	7	PE-V	CT	22ADS761	PE V: Data Security
2	7	PE-V	CT	22ADS762	PE V: Time series analysis and Forecasting
3	7	PE-V	CT	22ADS763	PE V: Video Analytics
4	7	PE-V	CT	22ADS764	PE V: Optimization Techniques

Eighth Semester															
1	**8**	**STR**		22ADS801	Internship - training / Seminar & Report	P	0	0	12	12	3		60	40	
2	**8**	**STR**		22ADS802	Extra Curricular Activity Evaluation	P	0	0	0	0	2		100		
					TOTAL EIGHTH SEM		**0**	**0**	**12**	**12**	**5**				
					GRAND TOTAL		**117**	**2**	**79**	**196**	**163**				

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Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

1st Semester

(Department of Computer Technology)

Artificial Intelligence and Data Science

28 June 2019

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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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	
FIRST SEMESTER															
1	1	BS	GE/MTH	22ADS101	Calculus, Sequances & Series	T	3	1	0	3	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22ADS102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22ADS103	**Lab.:** Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22ADS104	Technical Communications	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	HS	GE/HUM	22ADS105	**Lab.:** Technical Communications	P	0	0	2	2	1		60	40	
6	1	PC	CT/CT	22ADS106	Foundations of Data Science	T	3	0	0	3	3	30	20	50	3 Hrs
7	1	PC	CT/CT	22ADS107	**Lab.:** Foundations of Data Science	P	0	0	2	2	1		60	40	
8	1	BES	CT/CT	22ADS108	Computer Programing	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	CT/CT	22ADS109	**Lab.:** Computer Programing	P	0	0	2	2	1		60	40	
					TOTAL FIRST SEM		**15**	**1**	**8**	**23**	**20**				
List of Mandetory Learning Course (MLC)															
1	1	HS	GE/HUM	GE2131	Universal Human Value	A	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	A	2	0	0	2	0				
SECOND SEMESTER															
1	2	BS	GE/MTH	22ADS201	Probability and Statistics	T	3	1	0	3	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22ADS202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22ADS203	**Lab.:** Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22ADS204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	CT/CT	22ADS205	Computer Architecture and Organization	T	3	0	0	3	3	30	20	50	3 Hrs
6	2	PC	CT/CT	22ADS206	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3 Hrs
7	2	PC	CT/CT	22ADS207	**Lab.:** Object Oriented Programming	P	0	0	2	2	1		60	40	
8	2	PC	CT/CT	22ADS208	Data Structures	T	3	0	0	3	3	30	20	50	3 Hrs
9	2	PC	CT/CT	22ADS209	**Lab.:** Data Structures	P	0	0	2	2	1		60	40	
10	2	PC	CT/CT	22ADS210	Software Lab	P	0	0	2	2	1		60	40	
					TOTAL SECOND SEM		**18**	**1**	**8**	**26**	**23**				
List of Mandetory Learning Course (MLC)															
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	A	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	A	2	0	0	2	0				

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Chairperson	Dean (Acad. Matters)	Date of Release	Version

Applicable for AY 2022-23 Onwards

I SEMESTER

22ADS101: Calculus, Sequences and Series

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Apply the knowledge of differentiation, sequence and series to solve engineering problems. 2. Determine the expansion and derivatives of functions of several variables and use it to find extreme values of functions. 3. Evaluate the improper integrals, multiple integrals and apply it to compute the area and volume of various structures. 4. Solve higher order differential equations and its applications.

Unit I: Sequence and Series	**(6 Hrs.)**
Sequence, types of sequence, test of convergence of sequences, Cauchy sequence, infinite series, power series, Alternating series, tests of convergence and absolute convergence of series. **(Contemporary Issues related to Topic)**	
Unit II: Ordinary Differentiation	**(7 Hrs.)**
Successive differentiation; Leibnitz theorem, Taylor's and Maclaurin's series for functions of single variable and its applications. **(Contemporary Issues related to Topic)**	
Unit III: Partial Differentiation	**(7 Hrs.)**
First and higher order derivatives of Functions of several variables, Euler's theorem, Chain Rule, Jacobians Maxima and minima and saddle point of functions of two variables. **(Contemporary Issues related to Topic)**	
Unit IV: Curve Tracing and Improper Integrals	**(6 Hrs.)**
Tracing of curves, Beta, Gamma functions and its applications. **(Contemporary Issues related to Topic)**	
Unit V: Multiple integrals	**(7 Hrs.)**
Elementary double integrals, Change of variables (simple transformations), Coordinate Transformation, Change of order of integration (Cartesian and polar), Elementary triple integrals and Applications to find area, volume. **(Contemporary Issues related to Topic)**	
Unit VI: Differential Equations	**(7 Hrs.)**
Higher order differential equations with constant coefficients. Cauchy's and Legendre's homogeneous differential equations, Applications of differential equations. **(Contemporary Issues related to Topic)**	
Total Lecture	**40 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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.	Michael Spivak and Tom Apostol, Calculus, VolI & Vol II 2nd edition, Wiley.
3.	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/Suported%20file/Supprted%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

I SEMESTER

22ADS102: Engineering Chemistry

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Illustrate different thermodynamic functions and chemical reaction rates. (L3) 2. Apply concepts of electrochemistry for energy storage devices. (L3) 3. Discuss drug molecules synthesis. (L2) 4. Establish insight into engineering materials. (L3)

Unit I : Energetics	**(7 Hrs.)**
Introduction, Internal energy, enthalpy, Gibb's free energy, Free energy change and chemical equilibrium. Spontaneous and non-spontaneous processes. I and II law of thermodynamics. Entropy and its significance. Numerical on Internal energy and enthalpy change. Thermodynamic applications to physical and chemical equilibrium. **(Contemporary issues related to topic)**	

Unit II: Electrochemistry	**(6 Hrs.)**
Introduction, metallic and electrolytic conductance, resistance, specific resistance, conductance, specific conductance, equivalent and molar conductance. Variation of conductance with dilution. Electrode and electrode potentials. Nernst Equation. Faraday's laws and Numerical. Industrial applications: Electroforming, Electro winning, Electrolytic refining. **(Contemporary issues related to topic)**	

Unit III: Energy Storage Devices Basic concepts	**(6 Hrs.)**
Primary and secondary battery. Energy density, power density, energy efficiency, cycle life, shelf life. Secondary battery: Ni-metal hydride battery, Lithium-ion battery. H2-O2 Fuel cell: Principle, working, advantages, disadvantages, applications. Differences between battery and a fuel cell. Supercapacitors: Definition, types, characteristics, and application. **(Contemporary issues related to topic)**	

Unit IV: Chemical Kinetics	**(6 Hrs.)**
Introduction, Rate of reaction and factors influencing rate of reaction, order & molecularity of reaction. Kinetic equations of different orders: Zero Order, First Order, Second Order and numerical. **(Contemporary issues related to topic)**	

Unit V: Organic reactions and synthesis of drug molecules	**(7 Hrs.)**
Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction with examples. Drugs: Introduction, types of drugs, Synthesis of commonly used drug molecules such as Ibuprofen, Aspirin and Paracetamol. Challenges in chemical synthesis. Applications of Artificial Intelligence in Chemistry. **(Contemporary issues related to topic)**	

Unit VI: Advanced Materials	(7 Hrs.)
Nanomaterials: Definition of nanomaterials, nano scale. Carbon Nanotubes and types. **Application of Nanomaterials**: Applications of nanomaterials in medicine, environment, and electronics. Nanotechnology for waste reduction and improved energy efficiency. Elementary ideas and applications of Nano biopolymers, Nano fertilizers and Nano ceramics. **(Contemporary issues related to topic)** Threats of Nanomaterials. **Silicon Chips:** Introduction. Physical, chemical, electrical & mechanical properties and applications. **Chemical sensors**: Types and application **(Contemporary issues related to topic)**	
Total Lecture	**39 Hours**

Textbooks:	
1.	S S. Dara , A Text book 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	B.Sivasankar ,Engineering Chemistry ,Tata McGraw-Hill.

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.	T.G. Miller, Environmental Science Wadsworth Publishing Co, 13th 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.	Silicon Chips: What is Computer Chips Made Of? https://www.intel.com/content/www/us/en/history/museum-making-silicon.html
2.	https://www.youtube.com/watch?v=XTt3gXB0a84
3.	https://www.youtube.com/watch?v=iihYXx79QiE
4.	https://www.youtube.com/watch?v=JfJ7MlP9Dco
5.	https://www.youtube.com/watch?v=L2VSOccUrSk

I SEMESTER

22ADS103: Lab.: Engineering Chemistry

Course Outcomes
Upon successful completion of the course the students will be able to
1. Illustrate different thermodynamic functions and chemical reaction rates. (L3)
2. Apply concepts of electrochemistry for energy storage devices. (L3)
3. Discuss drug molecules synthesis. (L2)
4. Establish insight into 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 polyaniline.
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.
9	Determination of conductivity of water sample by conductivity meter.
10.	To verify Beer-Lambert law for KMnO4 and determine the concentration of the given solution of KMnO4

	List of Demonstration Experiments
1	Determination of pH of water sample by pH meter
2	Synthesis of urea formaldehyde resin.
3	Determination of consistency of grease sample by using penetrometer
4	Determination of Drop Point of grease sample.

I SEMESTER

22ADS104: Technical Communications

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

Unit I: Basics of Communication	**(6Hrs.)**
Language as a tool of communication & characteristics of language Process of Communication, Levels of Communication, Flow of Communication, Networks of Communication, Classification of Barriers (Intrapersonal, Interpersonal, Organizational). **(Contemporary issues related to topic)**	
Unit II: English Phonetics	**(6 Hrs.)**
Speech Mechanism, Organs of speech, Consonant and Vowels sounds, Word stress rules. **(Contemporary issues related to topic)**	
Unit III: Interview Skills	**(5 Hrs.)**
Purpose , expectations of employer and preparation for Interview, Types, Types of Questions & Answering Techniques, Telephonic Interviews – preparation and guidelines, Reading Techniques (Exercise based on Complex Unseen passages **(Contemporary issues related to topic)**	
Unit IV: Oral Skills	**(6 Hrs.)**
Group Communication- (Purpose, Different types of Group Communication, Organizational GD, GD as a part of selection process), Meeting (purposes, preparation, procedure and minutes of meeting), Listening Skills - definition types and traits **(Contemporary issues related to topic)**	
Unit V: Presentation & Visual Communication	**(6 Hrs.)**
Presentation and audience analysis, Organizing content, Nuances of presentation, Visual Communication – Introduction & importance, Role & Psychology of color in visual communication. **(Contemporary issues related to topic)**	
Unit VI: Technical Written Communication	**(6 Hrs.)**
Memo, Email, Report -Types, Characteristics, prewriting aspects of report and preparing writing aspects of report), Types of paragraphs.. **(Contemporary issues related to topic)**	
Total Lecture	**35 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

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

Reference Books:	
1.	Public Speaking, Dale Carnegie, How to Develop Self – Confidence & Influence People.
2.	Asha Kaul, 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-superior-vocabulary-e157841139.html
3	https://www.pdfdrive.com/improve-your-communication-skills-present-with-confidence-write-with-style-learn-skills-of-persuasion-e156963640.html
4	https://www.pdfdrive.com/21-days-of-effective-communication-everyday-habits-and-exercises-to-improve-your-communication-skills-and-social-intelligence-e158273760.html

I SEMESTER

22ADS105: Lab.: Technical Communications

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.)**
Sess 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**

Textbooks:	
1.	Technical Communication, 3rd Edition, Raman & Sharma,Oxford University Press
2.	Textbook of English Phonetics for Indian Students,3rd 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'sGerson

MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/XoVLa6Dqd5I
2.	https://youtu.be/45uNWLmAZR8

I SEMESTER

22ADS106: 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**

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=wrIvuzi56oQ

I SEMESTER

22ADS107: 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

I SEMESTER

22ADS108: Computer Programing

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Write algorithms & design flowcharts for given problem. 2. Write program using loops and Arrays for fixed size data storage 3. Implement programs using functions and pointers 4. Implement program using Implement program using structures, strings and files 5. Implement sorting algorithms

Unit I:	**(6 Hrs.)**
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Algorithms & Conventions used in writing algorithms, Flowcharts. Overview of Programming Language, sample „C" code, compiler, operating system, running C" programs, Types of programming errors. **(Contemporary issues related to topic)**	

Unit II:	**(8 Hrs.)**
Character set, variables, identifiers & keywords, Data types, Operators, Types of operators and expressions, sizeof() operator, constants and its types, Symbolic constant, typedef statement, Introduction to library functions, basic input/output statements, precedence of operators, write straight line programs, Decision control statements: if, if - else and nested if-else statements, else-if ladder statement, switch-case control statement, Programming Examples. **(Contemporary issues related to topic)**	

Unit III:	**(7 Hrs.)**
Loop Structures: While, do while and for loops, break and continue statement, „goto" statement, C programs based on these loop structures. **(Contemporary issues related to topic)**	

Unit IV:	**(8 Hrs.)**
Concept of functions, Modular programming, user defined and library functions, function prototypes, formal parameters, actual parameters, return types, function call- call by value, C programs using functions, Recursive functions, comparing recursion against iteration, C programs using recursive functions, Concepts of pointer. **(Contemporary issues related to topic)**	

Unit V:	**(9 Hrs.)**
Concept of functions, Modular programming, user defined and library functions, function prototypes, formal parameters, actual parameters, return types, function call- call by value, C programs using functions, Recursive functions, comparing recursion against iteration, C programs using recursive functions, Concepts of pointer. **(Contemporary issues related to topic)**	

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Unit VI:	**(6 Hrs.)**
Introduction to strings, string handling functions. Introduction to structures and Union. Concepts of files, Types of files, file opening in various modes, file closing, reading and writing text files, concept of pre-processor directives and macros, Command line Argument. **(Contemporary issues related to topic)**	
Total Lecture	**44 Hours**

Textbooks:	
1.	"The C Programming Language",J.B.W.Kernighan & D.M.Ritchie, Prentice Hall.
2.	"Mastering C"K.R.Venugopal & S.R. Prasad,TMH,2007.
3.	"Programming in ANSI C",E. Balaguruswamy,Mc Graw Hill Education.

Reference Books:	
1.	"Problem Solving And Program Design In C", Jer,i. R. Hanly, Elliot B. Koffman,Pearson Education.
2.	"Programming with C", Byron Gottfried Schaum;s Outline Series.
3.	"How to solve it by computers ",R. G. Dromey ,Prentice Hall India.

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/104/106104128/
2.	https://www.youtube.com/watch?v=zOjov-2OZ0E

I SEMESTER

22ADS109: Lab.: Computer Programing

Course Outcomes
Upon successful completion of the course the students will be able to 1. To implement different types of basic linux commands to get familiar with Linux environment to run „C" programs. 2. To Understand & implement straight line program by using basic „C" programming language constructs. 3. To Design & implement programs using different loop control structures. 4. To Design & implement user defined functions, understand the concept of Pointers & Modular programming. 5. To Understand, analyze different dimensional Arrays as a data structure and designing & implementation of programs. 6. To Understand, analyze the basics of structures, data handling through files and designing & implementation of programs

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

<table>
<tr><th>Sr.</th><th>Problem Statements</th></tr>
<tr><td>1 A</td><td>Introduction to Linux Operating system & it's different commands.</td></tr>
<tr><td>1 B</td><td>Introduction to Vi editor, Compilation and Execution of a program in Linux</td></tr>
<tr><td>2 A</td><td>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.</td></tr>
<tr><td>2 B</td><td>1) Write program using conditional operators to evaluate the following function
and print the value of y. y = 2.4x + 3, for x <= 2
y = 3x –5, for x > 2</td></tr>
<tr><td>3</td><td>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><td>Age</td><td>Gender</td><td>City</td><td>Will Buy?</td></tr>
<tr><td>25-30</td><td>M</td><td>Chenaai</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>Chenaai</td><td>No</td></tr>
</table></td></tr>
</table>

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 2nd number to 1st number if two number is entered by the user. 4) Exit.
5	Write a program print weather entered number is Prime or not
6	Write a program to print the sum of exponential series $e(x) = 1 + x/1! + x^2/2! + x^3/3! + \ldots\ldots$
7	Write a program to print following pyramid **1** **1 2 3** **1 2 3 4 5** **1** 2 3 4 5 6 7
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. iii)
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. 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
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.

I SEMESTER

Audit Course

GE2131: Universal Human Value

Course Outcomes
Upon successful completion of the course the students will be able to 1.Experiential validation through the way to verify right or wrong. 2. Practice living in harmony with natural acceptance. 3. Realize the importance of relationships**.** 4. Recognize the importance of sustainable co-existence in existence.

Unit I: Course Introduction Need, Basic Guidelines, Content and Process for Value Education	**(4 Hrs.)**
Understanding the need, basic guidelines, content and process for Value Education Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations	
Unit II: Understanding Harmony in the Human Being - Harmony in Myself!	**(4 Hrs.)**
Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I'	
Unit III: Understanding Harmony in the Family	**(4 Hrs.)**
Understanding Harmony in the family – the basic unit of human interaction Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship Understanding the meaning of Vishwas; Difference between intention and competence Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship	
Unit IV: Understanding Harmony in the Society-	**(4 Hrs.)**
Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and ,differentiation; the other salient values in relationship ,Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sahasttva as comprehensive Human Goals,Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhauma Vyavastha)- from family to world family! ,Practice Exercises and Case Studies will be taken up in Practice Sessions	

Unit V: Understanding Harmony in the Nature -	**(4Hrs)**
Whole existence as Co-existence, Understanding the harmony in the Nature Interconnectedness and mut Practice Exercises and Case Studies will be taken up in the Practice Sessions.ual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Practice Exercises and Case Studies will be taken up in the Practice Sessions.	
Unit VI :Understanding Harmony in the Existence -	**(4Hrs)**
Understanding Existence as Coexistence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence ,Practice Exercises and Case Studies will be taken up in the Practice Sessions.	
Total Lecture	**24 Hours**

Textbooks:	
1.	**The primary resource material for teaching this course consists of text book** A foundation course in Human Values and professional Ethics, Excel books, 1st Edition 2011, R.R Gaur, R Sangal, G P Bagaria

Reference Books:	
1.	**The teacher's manual** A foundation course in Human Values and professional Ethics, Excel books,1st Edition 2011, R.R Gaur, R Sangal, G P Bagaria

I SEMESTER
Audit Course
MLC2121: YCAP1-Get Set Go

Objective	Outcomes
Get Set Go program is designed to introduce students to the real world. It gives them the skills they need to reach their goals and live up to their full potential at college, home and work. The program was developed with feedback from students; it consists of interactive sessions that include real-life scenarios and role-playing. It can help young adults become more confident and better able to cope with the pressure and stress they face.	The students gain more confidence and skills required to deal with the challenges they will face in college and at home. Their interpersonal and intrapersonal skills are enhanced pushing them to think towards their future and aim for their goals.

Syllabus Subject: Communication Skills – 1st Year, No. of hours - 18

Unit No.	Topic	Duration
1	Topic: Build a foundation for success - 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	2.5 Hours
2	Topic: 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	3.5 Hours
	Practice Conversations, Activity – Pause-Part-Punch, Group Activity	

Unit No.	Topic	Duration
3	Topic: Increase Self Confidence -• Use our experiences to communicate more confidently • Communicate with clarity and conciseness • Discover how past experiences influence behavior	2.5 Hours
4	Topic: 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	4 Hours
	Individual Activity – Sharing of defining moment, Skit to demonstrate Leadership Principles, Stranded on Island	

Unit No.	Topic	Duration
5	Topic: Fundamentals of Communication (Earn the right – Excite -Eagerness) ♣ Elevator Pitch ♣ Develop more Flexibility, ♣ Recap and Summarize	3.5 Hours
6	Activities - – Individual Presentation, Flexibility Drills, Individual Presentations – My Vision Assignment	2 Hours

Reference Books:

1. How to win friends & influence people – Dale Carnegie

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 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

2nd Semester

(Department of Computer Technology)

Artificial Intelligence and Data Science

28 June 2019

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

Artificial Intelligence and Data Science

SoE No. 22ADS-101

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															
1	1	BS	GE/MTH	22ADS101	Calculus, Sequances & Series	T	3	1	0	3	4	30	20	50	3 Hrs
2	1	BS	GE/CHE	22ADS102	Engineering Chemistry	T	3	0	0	3	3	30	20	50	3 Hrs
3	1	BS	GE/CHE	22ADS103	**Lab.:** Engineering Chemistry	P	0	0	2	2	1		60	40	
4	1	HS	GE/HUM	22ADS104	Technical Communications	T	3	0	0	3	3	30	20	50	3 Hrs
5	1	HS	GE/HUM	22ADS105	**Lab.:** Technical Communications	P	0	0	2	2	1		60	40	
6	1	PC	CT/CT	22ADS106	Foundations of Data Science	T	3	0	0	3	3	30	20	50	3 Hrs
7	1	PC	CT/CT	22ADS107	**Lab.:** Foundations of Data Science	P	0	0	2	2	1		60	40	
8	1	BES	CT/CT	22ADS108	Computer Programing	T	3	0	0	3	3	30	20	50	3 Hrs
9	1	BES	CT/CT	22ADS109	**Lab.:** Computer Programing	P	0	0	2	2	1		60	40	
					TOTAL FIRST SEM		**15**	**1**	**8**	**23**	**20**				
List of Mandetory Learning Course (MLC)															
1	1	HS	GE/HUM	GE2131	Universal Human Value	A	2	0	0	2	0				
2	1	HS	GE/T&P	MLC2121	YCAP1-Get Set Go	A	2	0	0	2	0				
SECOND SEMESTER															
1	2	BS	GE/MTH	22ADS201	Probability and Statistics	T	3	1	0	3	4	30	20	50	3 Hrs
2	2	BS	GE/PHY	22ADS202	Engineering Physics	T	3	0	0	3	3	30	20	50	3 Hrs
3	2	BS	GE/PHY	22ADS203	**Lab.:** Engineering Physics	P	0	0	2	2	1		60	40	
4	2	HS	GE/HUM	22ADS204	Social Science	T	3	0	0	3	3	30	20	50	3 Hrs
5	2	BES	CT/CT	22ADS205	Computer Architecture and Organization	T	3	0	0	3	3	30	20	50	3 Hrs
6	2	PC	CT/CT	22ADS206	Object Oriented Programming	T	3	0	0	3	3	30	20	50	3 Hrs
7	2	PC	CT/CT	22ADS207	**Lab.:** Object Oriented Programming	P	0	0	2	2	1		60	40	
8	2	PC	CT/CT	22ADS208	Data Structures	T	3	0	0	3	3	30	20	50	3 Hrs
9	2	PC	CT/CT	22ADS209	**Lab.:** Data Structures	P	0	0	2	2	1		60	40	
10	2	PC	CT/CT	22ADS210	Software Lab	P	0	0	2	2	1		60	40	
					TOTAL SECOND SEM		**18**	**1**	**8**	**26**	**23**				
List of Mandetory Learning Course (MLC)															
1	2	HS	GE/T&P	MLC2122	YCAP2 -Functional English	A	2	0	0	2	0				
2	2	BES	GE/CHE	GE2132	Environmental Science	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 activitied decided by course teacher, TA3 - 3 marks on class attendance

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

		June 2022	1.00
Chairperson	Dean (Acad. Matters)	Date of Release	Version

Applicable for AY 2022-23 Onwards

II SEMESTER

22ADS201: Probability and Statistics

Course Outcomes
Upon successful completion of the course the students will be able to 1. Identify an appropriate probability distribution for a given discrete or continuous random variable and compute probabilities. 2. Make use of probability distributions to solve real life problems. 3. Apply concepts of sampling theory to find probabilities and estimate parameters of various problems. 4. Inspect scientific data, use proper curve fitting and find correlation, regression of variables.

Unit I:Random Variables & Probability Distributions	**(7 Hrs.)**
Conditional probability, Baye's theorem. Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions. Independent Random variables, Conditional Distribution. **(Contemporary issues related to topic)**	
Unit II: Mathematical Expectation	**(7 Hrs.)**
Mathematical Expectation, Variance & Standard Deviation, Moments, Moment generating function, Skewness and Kurtosis. **(Contemporary issues related to topic)**	
Unit III: Special Probability Distributions	**(6 Hrs.)**
Binomial, Geometric, Poisson, Exponential, Normal distributions, Central Limit theorem. **(Contemporary issues related to topic)**	
Unit IV: Sampling Theory	**(6 Hrs.)**
Population and sample. Statistical inference. Sampling with and without replacement. Population parameters, sample statistics. Sampling distribution of means. Sampling distribution of proportions. **(Contemporary issues related to topic)**	
Unit V: Estimation	**(7 Hrs.)**
Unbiased and efficient estimates. Point estimates and interval estimates. Confidence interval for means, Confidence interval for proportions, Confidence interval for differences and sums of mean and proportions. **(Contemporary issues related to topic)**	
Unit VI: Curve Fitting	**(6 Hrs.)**
Fitting of straight line, $y = a + bx$, a parabola $y = a + bx + cx^2$, exponential curves and power curves by method of least squares; Lines of regression and correlation; Rank correlation. **(Contemporary issues related to topic)**	
Total Lecture	**39 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
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Textbooks:	
1.	The theory and problems of probability and Statistics, 5rd edition, M. R. Spiegel, Schaum series,McGraw Hill
2.	Basic Statistics for Business and economics , 3rd edition,E. K.Bowen, M.K Star,McGraw Hill
3.	Engineering Mathematics, 43rd edition, Dr. B. S. Grewal, Khanna Publisher
4.	Probability and Statistics, 2nd edition, Michael J. Evans and Jeffrey S.

Reference Books:	
1.	A First course in probability,Sixth Edition, Sheldon Ross, Pearson Education
2.	Fundamentals of Mathematical statistics ,3rd Edition, S. C.Gupta and V.K.Kapoor,Sultan Chand and sons
3.	Probability and Statistics for Engineering, 6th edition, Miller Freund and Johnson, Richard A. Johnson

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/

MOOCs Links and additional reading, learning, video material	
1.	https://youtu.be/UftY0e2ilM4
2.	https://youtu.be/bwga7Pnv30c
3.	https://youtu.be/WUCMavXbJo4

II SEMESTER

22ADS202: Engineering Physics

Course Outcomes :
1. Co-relate fundamentals of quantum mechanics to solve problems dealing with quantum particle.
2. Assess the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
3. Illustrate working principle of lasers and optical fibres for their use in the field of industry.
4. Analyze the motion in electric and magnetic field and its applications to electron optic devices.
5. Develop ability to classify nanomaterials for their potential applications.

Unit:1 Quantum Physics	**(7 Hrs.)**
Wave-particle duality, Wave packet, Heisenberg uncertainty principle, Interpretation of wavefunction, Schrodinger Equations, Particle in infinite and finite potential well, quantum tunnelling, Introduction to Bits and Qubits. **(Contemporary issues related to topic)**	
Unit II: Band Theory of Solids	**(7 Hrs.)**
Formation of energy bands in solids, Classification and energy band diagrams, Structure of semiconductor with band diagram, Intrinsic and extrinsic semiconductors,Law of mass action, Carrier transport, conductivity, Hall Effect. **(Contemporary issues related to topic)**	
Unit III: Lasers	**(7 Hrs.)**
Interaction of radiation with matter, Population Inversion and Optical resonance cavity, Three and four level laser, Ruby laser, He-Ne laser, diode laser, Properties and engineering applications of laser. **(Contemporary issues related to topic)**	
Unit IV: Optical Fibres	**(6 Hrs.)**
Principle, structure and classification, Acceptance angle, Numerical aperture, Losses in optical fibres, Applications as sensor. **(Contemporary issues related to topic)**	
Unit V: Electron Ballistics and Optics	**(7 Hrs.)**
Motion of a charged particle in uniform electric and magnetic field, Cross field configuration;Electron refraction, Electron lens, CRO. **(Contemporary issues related to topic)**	
Unit VI: Physics of Nano Materials	**(6 Hrs.)**
Introduction to nanomaterials, classification of nanomaterials, synthesis methods, Low dimensional systems: Quantum well, dots and wires, CNT, Graphene. **(Contemporary issues related to topic)**	
Total Lecture	**40 Hours**

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Textbooks:	
1.	M. N. Avadhanulu, P. G. Kshirsagar, A Textbook of Engineering Physics, Revised 14th Edition, S. Chand & Company, 2014.
2.	John Allision, Electronic Engineering Materials and Devices, TMH edition, 10th reprint, Tata McGraw Hill.

Reference Books:	
1.	David Halliday, Robert Resnick and Jerle Walker, Fundamentals of Physics,10th edition, John-Wiley India, 2013.
2.	Subramanyam, Brijlal, M N Avadhanulu, Text Book of Optics, S. Chand & Company, 2006.
3.	M N Avadhanulu, An Introduction to Lasers: Theory & Applications, First Edition 2001, S. Chand & Company Pvt. Ltd, 2017.
4.	Arthur Beiser, Concept of Modern Physics, 6th edition, Tata McGraw - Hill Education, 2002.
5.	Thyagarajan K. and Ghatak A.K, LASERS: Theory and Applications, 2nd Edition, Macmillan Publication.
6.	S.O.Pillai, Solid State Physics, 9th Edition, New Edge International Publishers.
7.	Palanisamy, Solid State Physics, 8th Edition, New Edge International Publishers.
8.	C. Kittel, Solid State Physics, 8th Edition, Willey Publication.
9.	B. K. Pandey, S. Chaturvedi, Engineering Physics, 1st Edition, Cengage Learning.
10.	Hitendra K Malik , A K Singh , Engineering Physics, 2nd Edition, Tata McGraw Hill Education Private Limited, 2015.

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	chrome-http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/2016 Book_ThePhysicsOfSemiconductors.pdf
3	chrome-http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Physics/Dekker%20-%20Solid%20State%20Physics.pdf

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/122/107/122107035/
2.	https://nptel.ac.in/courses/122104016
3.	https://freevideolectures.com/course/3531/engineering-physics-i

II SEMESTER

22ADS203: Lab.: Engineering Physics

Course Outcomes
Upon successful completion of the course the students will be able to
1. Co-relate fundamentals of quantum mechanics to solve problems dealing with quantum particle. 2. Assess the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands. 3. Illustrate working principle of lasers and optical fibres for their use in the field of industry. 4. Analyze the motion in electric and magnetic field and its applications to electron optic devices. 5. Develop ability to classify nanomaterials for their potential applications.

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

SN	**Experiments based on**
1.	Determination of Hall coefficient and density of charge carriers using Hall effect.
2.	Dependence of Hall coefficient on temperature.
3.	The study of V-I characteristics of a semiconductor diode (germanium and silicon) in forward and reverse bias mode.
4.	Determination of Band gap in a semiconductor by four probe method.
5.	Determination of Band gap in a semiconductor using reverse biased p-n diode .
6.	Determination of wavelength of laser using diffraction grating.
7.	Determination of divergence of laser beam.
8.	Determination of Acceptance angle and numerical aperture of a given optical fiber
9.	Determination of attenuation of a given optical fibre.
10.	To measure the phase shift introduced by a phase shift network using Dual beam CRO.
11.	Determination of amplitude and frequency of sinusoidal signal using C.R.O.
12.	Determination of the velocity of Ultrasonic waves in a non –electrolytic liquid by ultrasonic interferometer.

II SEMESTER

22ADS204: Social Science

Course Outcomes
Upon successful completion of the course the students will be able to
1. Explain the basic concepts of social sciences.
2. Describe the development of various Civilizations and their culture.
3. Explain the basic idea of Constitution of India and aware about their rights & Duties.
4. Analyze the Impact of Industrialization on Society and discuss the Fundamental Concepts of Society.

Unit I: Social Sciences & Its Utility	**(6 Hrs.)**
Meaning & Scope of Social Science, General Utility of Social Sciences to Engineers, Applied Humanities, Social Engineering, Society its types & Characteristics. **(Contemporary issues related to topic)**	
Unit II: Human Civilization	**(7 Hrs.)**
Development of human civilization with specific reference to monumental studies of engineering skill, Ancient Indian Civilization:- a) Indus Valley Civilization b) Vedic Civilization, c) Indian Art & Architecture. **(Contemporary issues related to topic)**	
Unit III: Fundamental Concept in Social Science	**(7 Hrs.)**
Social Structure and Social System, Socialization, Social Control and Social Change, Culture: Characteristics and Features. **(Contemporary issues related to topic)**	
Unit IV: Introduction to Constitution of India	**(7 Hrs.)**
Significance of Preamble, Fundamental Rights and Duties, Directive principles of state policy. Federal System Concept of industrial Democracy. **(Contemporary issues related to topic)**	
Unit V: Industrial Organization & Society	**(6 Hrs.)**
Industrialization and its impact on society, Selection, Training & Motivation of workers, Industrial Psychology, Industrial sociology, Work Organization, Power, Authority and Status system. **(Contemporary issues related to topic)**	
Unit VI: Industrial Management	**(6 Hrs.)**
Labour Union Organization, Discipline in Industry, Labour Turnover, Industrial Fatigue of workers, Health and Safety of Workers. **(Contemporary issues related to topic)**	
Total Lecture	**39 Hours**

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Textbooks:	
1.	S. Shabbir & Sheikh, A New Look Into Social Sciences, S.Chand , New Delhi,1993.
2.	C N Shankar Rao, Sociology Principles of Sociology With An Introduction To Social Thought, S. Chand, New Delhi, 2010.
3.	O P Khanna, Industrial Engineering And Management, Dhanpat Rai Publication, New Delhi, 2010.
4.	Dr. G. N. Nimbarte, Social Science, Sankalp Publications, Nagpur.

Reference Books:	
1.	C. N. Shankar Rao, Sociology: Principal of Sociology with an introduction to social thought, Publication: S. Chand, New Delhi.
2.	O. P. Khanna, Industrial Engineering and Management, Dhanpat Rai Publication, New Delhi.
3.	Reader's Digest Vanished Civilizations, The Reader's Digest Association Limited, New York.
4.	Constitution of India: Dr B. R. Ambedkar: Government of India, Government of India.
5.	B. L. Kayastha, Recent trends in Humanities and Social Sciences, 1st Ed., Akinik Publications, New Delhi.

MOOCs Links and additional reading, learning, video material	
1.	https://mobidrive.com/sharelink/r/4I2bDsxN9YrVI03vMZaInJ5VBpojBmR9EqKv7nin9pkN
2.	https://mobidrive.com/sharelink/r/4I2bDsxN9YrVI03vMZaInJ2sUn37wK4V3CpGhemYRKnz

II SEMESTER

22ADS205: Computer Architecture and Organization

Course Outcomes :
Upon successful completion of the course, the student 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.)**
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 **(Contemporary issues related to topic)**	
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 **(Contemporary issues related to topic)**	
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, Micro programmed Control: Microinstructions, Grouping of control signals, Micro program sequencing, Micro Instructions with next Address field, perfecting microinstruction. **(Contemporary issues related to topic)**	
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 **(Contemporary issues related to topic)**	
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. **(Contemporary issues related to topic)**	
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. **(Contemporary issues related to topic)**	
Total Lecture	**42 Hours**

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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, Willaiam Staliing , 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://www.digimat.in/nptel/courses/video/106105163/L01.html
2.	https://www.youtube.com/watch?v=q6oiRtKTpX4&list=PLfzBO7vcQZ1ILg0snGisdbzp4SZ2-W8ah&index=3

II SEMESTER
22ADS206: Object Oriented Programming

Course Outcomes :
1. Understand the concept of object-oriented programming and modeling
2. Apply the knowledge of object-oriented programming to solve the given problem
3. Apply the knowledge of advanced concepts of object-oriented programming like I/O stream, generic components and multithreading
4. Formulate the standardized event driven solution for the real life scenarios using object oriented concepts

Unit I:	**(7 Hrs.)**
Introduction to object oriented programming paradigm, procedure oriented programming vs OOP, features of OOP, benefits of OOP, defining class, instantiating a class. UML diagrams to represent class, objects and various relationships **(Contemporary issues related to topic)**	
Unit II:	**(7 Hrs.)**
Functions in OOP, function overloading, Passing & returning Objects, pointers to members, constructors and its types, Access specifiers and packages. Inheritance, types of inheritance, run time polymorphism, abstract classes, Interface, collection interface **(Contemporary issues related to topic)**	
Unit III:	**(7 Hrs.)**
Exceptions – exception hierarchy – throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files **(Contemporary issues related to topic)**	
Unit IV:	**(7 Hrs.)**
Multithreading, Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations **(Contemporary issues related to topic)**	
Unit V:	**(7 Hrs.)**
MVC architecture, Java web components and its architecture Graphics programming – Frame – Components – working with 2D shapes – Using color, fonts, and images **(Contemporary issues related to topic)**	
Unit VI:	**(7 Hrs.)**
Basics of event handling – event handlers – adapter classes – actions – mouse events – AWT event hierarchy – Introduction to Swing – layout management – Swing Components – Text Fields, Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes **(Contemporary issues related to topic)**	
Total Lecture	**42 Hours**

Textbooks:	
1.	Java Complete Reference 7th, Herbert Schildt , McGraw-Hill
2.	Object Oriented Programming with C++

Reference Books:	
1.	Thinking in Java 4th , Bruce Eckel , Prentice Hall
2.	Mastering C++ 4th ,Ravishankar, Venugopal, TMH

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/105/106105191/

II SEMESTER

22ADS207: Lab.: Object Oriented Programming

Course Outcomes
1. Understand the concept of object-oriented programming and modeling
2. Apply the knowledge of object-oriented programming to solve the given problem
3. Apply the knowledge of advanced concepts of object-oriented programming like I/O stream, generic components and multithreading
4. Formulate the standardized event driven solution for the real life scenarios using object oriented concepts

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

SN	**Experiments based on**
1	Implement the concept of Class and its data members and member functions in Java
2	Implement the concept of class constructor and its type in Java.
3	Implement the concept of function overloading in Java
4	Implement the concept of run time polymorphism in Java.
5	Implement the concept of Abstraction in Java.
6	Implement the concept of all types of inheritance in Java.
7	Implement he collection listener to solve the problem in Java
8	Implement the concept of exception in Java.
9	Implement the concept of thread in Java
10	Implement the concept of Files in Java.
11	Implement the concept of generic functions and generic class in Java
12.	Implement the concept of applet to prepare a web application in Java
13.	Implement the event driven approach to prepare the web application in Java

II SEMESTER

22ADS208: Data Structures

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Implement applications of stacks and queues. 2. Implement applications using linked list. 3. Demonstrate various operations of tree data structure. 4. Use the knowledge of graph data structure for solving real life problems

Unit I:	**(7 Hrs.)**
Introduction to Data structures, classification, dynamic memory allocation, array-based implementation of stacks, queues, applications of stacks: expression conversion, applications of queue, implementation stack using queue and queue using stack, Hashing **(Contemporary issues related to topic)**	
Unit II:	**(7 Hrs.)**
Linked list, self-referential data structure, types: singly, doubly, circular, application for polynomial evaluation, implementation of stacks and queue using linked list **(Contemporary issues related to topic)**	
Unit III:	**(7 Hrs.)**
Binary trees, binary search trees, terminologies, AVL, Red-Black **(Contemporary issues related to topic)**	
Unit IV:	**(7 Hrs.)**
Splay trees, B and B+ trees, Multidimensional trees, Tries **(Contemporary issues related to topic)**	
Unit V:	**(6 Hrs.)**
Directed and Undirected Graphs, Terminologies, Graph traversals, connected and bi-connected components, Topological sort, Applications of BFS and DFS **(Contemporary issues related to topic)**	
Unit VI:	**(6 Hrs.)**
Minimum Spanning Trees, Shortest Path Algorithms and Applications, All pair shortest paths, Introduction to Network flow Problems **(Contemporary issues related to topic)**	
Total Lecture	**40 Hours**

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Textbooks:	
1.	Data Structures using C ,Latest , Reema Thareja ,Oxford publications.
2.	Data Structures, Algorithms and Applications in C++, 2nd, S. Sahani, University Press Orient Longman (India) Pvt. Ltd.
3.	Data Structures and Algorithms in C++ ,Student, Michael T. Goodrich, R. Tamassiaand, Mount Willy, JonhWilly and sons.

Reference Books:	
1.	Data Structures a Pseudocode approach with C ,Latest , Richard Gilberg, B. Forouzan ,Thompsons Course Technology
2.	Data Structures and Program Design in C, Latest ,Tondo Kruse, Leung and Tondo, Pearson Publications

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/106102064
2.	https://www.youtube.com/watch?v=I_314LpT6X8
3.	https://nptel.ac.in/courses/106106133

II SEMESTER

22ADS209: Lab.: Data Structures

Course Outcomes
Upon successful completion of the course the students will be able to 5. Implement applications of stacks and queues. 6. Develop applications using linked list. 7. Demonstrate various operations of tree data structure. 8. Apply the knowledge of graph data structure for solving real life problems

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

SN	**Program based on**
1	Program based on Stacks and its application
2	Program based on Queue and its application
3	Implementation of one data structures using another
4	Program based on linked list
5	Program on Skip list
6	Program based on Binary tree
7	Program based on Binary Search tree
8	Program based on application of Graph in networking
9	Program based on finding shortest path using Graph
10	Mini project covering all data structures

II SEMESTER

22ADS209: Software Lab

Course Outcomes
1. Select any framework for python programming as per their understanding
2. Write any python program using various data structures and control statements
3. Write program where file handling and concepts of classes and objects are needed
4. Develop advanced applications using functionalities provided under various packages of python

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

SN	**Experiments based on**
1	Introduction to Python language and Installation of Python write a Python program to implement arithmetic, logical operators
2	Write a program using control structures: Loops, if-else, if-else etc.
3	Write a program using functions and recursion :list, strings
4	Write a program using dictionary, tuples, sets
5	Write program using array
6	Program using Numpy
7	File handling
8	Study of Pandas dataframes and implement dataframes related operations
9	Program using Matplotlib
10	Project work :Data Extraction to Visualization

II SEMESTER

Audit Course

MLC2122: YCAP2 -Functional English

MLC2122 YCAP-II	**No of Evaluations**	**Result of successful completion of YCAP II shall be calculated based on the basis of evaluations.** **To pass the exam a students must score 50% marks**
Evaluation Scheme	EVAL-I	
	100 marks	

Objective	**Objective**
The aim of this course is to get the students to a common level in spoken English. The majority of the target group is expected to know English as a foreign/official language. Thus the objective of the course is to make the students comfortable in using it as a spoken language when the situation demands	Students will heighten their awareness of correct usage of English grammar in writing and speaking.

Syllabus Subject: Functional English – 2nd Sem , No. of hours - 20

Unit No.	**Topic**	**Duration**
1	Introduction to Functional English - 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	2 hours
2	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	2 hours
	Practice exercises, Practice Conversations, Script Activity	1.5 Hours
	Quiz on the above Topics, Exercises for Evaluation	0.5 Hours

Unit No.	Topic	Duration
3	Topic: Internet & Social Media Communication Introduction & Basics to Social Networking, Texting & Instant messaging, Blogs & Discussion Board- discussion with examples, Ethics of Social media & communication	3 Hours
	Topic: Introduction to Creative Ads Why Ads, Whats in it for me?, Characteristics of ads, Assignment	
4	Topic: Tenses -1 Introduction & Basics, Simple Tense (Past, Present, Future), Continuous Tense (Past, Present, Future) – discussion with examples	4 Hours
	Assignment Presentation on Mad Ads, Quiz on Tenses and Social Media-Internet Communication	

Unit No.	Topic	Duration
5	Topic: Tenses -2 Introduction & Basics, Perfect Tense (Past, Present, Future), Perfect Continuous Tense (Past, Present, Future) – discussion with examples	3.5 Hours
	Topic: Introduction to Movie Magic Learn English with films, Film Vocabulary, Describing a film, Types of Films,	
6	Topic: Written Communciation 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	3.5 Hours
	Assessment – Letter and Email Writing, Tenses - Quiz	

Reference Books:	
1.	Soft Skills and Professional Communication, Francis Peters SJ, Mcgraw Hill Education
2.	Bringing out the best in People, Aubrey Daniels, Mcgraw Hill

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/channel/UCLsI5-B3rIr27hmKqE8hi4w
2.	https://www.youtube.com/channel/UC1Y1I4shF84scQ4HBThahcg

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

II SEMESTER

Audit Course

GE2132 : Environmental Science

Course Outcome :
Upon successful completion of the course the students will be able 1. To understand the basic concepts and problems and follow sustainable development practices 2. To enhance knowledge skills and attitude towards environment 3. To understand natural environment and its relationship with human activities. 4. To evaluate local, regional and global environmental topics related to resource use and management.

Unit I: : Introduction	**(2Hrs.)**
Definition, scope and importance; Need for public awareness – institutions in environment, people in environment.	

Unit II: : Natural Resources	**(2 Hrs.)**
Renewable and non-renewable and associated problems; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.	

Unit III: Ecosystems	**(4 Hrs.)**
Concept of an ecosystem – understanding ecosystems, ecosystem degradation, resource utilization. Structure and functions of an ecosystem – producers, consumers and decomposers. Energy flow in the ecosystem – water, carbon, oxygen, nitrogen and energy cycles, integration of cycles in nature. Ecological succession; Food chains, food webs and ecological pyramids; Ecosystem types – characteristic features, structure and functions of forest, grassland, desert and aquatic ecosystems.	

Unit IV: Bio-diversity	**(4 Hrs.)**
Introduction – biodiversity at genetic, species and ecosystem levels Bio-geographic classification of India. Value of biodiversity – Consumptive use value, productive use value, social, ethical, moral, aesthetic and optional vlue of biodiversity. India as a mega-diversity nation; hotspots of biodiversity.Threats to bio-diversity – habitat loss, poaching of wildlife, man-wild life conflicts. Common endangered and endemic plant and animal species of India. Insitu and Exsitu conservation of biodiversity. Role of individual and institutions in prevention of pollution.Disaster management – Floods, earthquake, cyclone, landslides.	

Unit V: Pollution	**(4 Hrs.)**
Definition; Causes, effects and control measures of air, water, soil, marine, noise and thermal pollutions and nuclear hazards. Solid waste management – Causes, effects and control measures of urban and industrial waste.	

Unit VI: Social Issues and the Environment	**(4 Hrs.)**
Unsustainable to sustainable development; Urban problems related to energy; Water conservation, rainwater harvesting, watershed management; Problems and concerns of resettlement and rehabilitation of affected people. Environmental ethics – issues and possible solutions – Resource consumption patterns and need for equitable utilization; Equity disparity in Western and Eastern countries; Urban and rural equity issues; need for gender equity. Preserving resources for future generations. Te rights of animals; Ethical basis of environment education and awareness; Conservation ethics and traditional value systems of India. Climate change, global warming, acid rain, Ozone layer depletion, nuclear accidents and holocasts. Wasteland Reclamation; Consumerism and Waste products. Environment legislations – The Environment (Protection) Act; The water (Prevention and Control of Pollution) Act; The Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislations – environment impact assessment (EIA), Citizens actions and action groups. Public awareness – Using an environmental calendar of activities, self-initiation.	
Unit VII : Human Population and the Environment	**(4Hrs.)**
Global population growth, variation among nations. Population explosion; Family Welfare Programmes – methods of sterilization; Urbanization. Environment and human health – Climate and health, infectious diseases, water-related diseases, risk due to chemicals in food, Cancer and environment. Human rights – equity, Nutrition and health rights, Intellectual property rights (IPRS), Community Biodiverstity registers (CBRs). Value education – environmental values, valuing nature, valuing cultures, social justice, human heritage, equitable use of resources, common property resources, ecological degradation. HIV / AIDS; Women and Child Welfare; Information technology in environment and human health.	
Total Lecture	**24 Hours**

Textbooks:	
1.	Perspectives in environmental studies by A. Kaushik and C. P. Kaushik.
2.	Textbook for Environmental studies by Erach Bharucha for UGC
3.	Textbook of Environmental studies by Shanta Satyanarayan, Dr. Suresh Zade, Dr. Shashikant Sitre & Dr. Pravin Meshram.
4.	Fundamental concepts in Environmental studies by Dr. D.D. Mishra. S. Chand publications

Reference Books:	
1.	Essentials of Ecology and Environmental Science by Dr. S .V .S. Rana,PHI Learning Pvt. Ltd, Delhi
2.	Environmental Chemistry by Anil Kumar De, Wiley Eastern Limited
3.	Environmental Science by T.G. Miller, Wadsworth Publishing Co, 13th edition.
4.	Ecology and Environment by P. D. Sharma, Rastogi publications

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

Bachelor of Technology

SoE & Syllabus 2022

3rd Semester

(Department of Computer Technology)

Artificial Intelligence and Data Science

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

Artificial Intelligence and Data Science

SoE No. 22ADS-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Third Semester															
1	3	BS	GE	22ADS301	Discrete Mathematics & Graph Theory	**T**	3	0	0	3	3	30	20	50	3 Hours
2	3	PC	CT	22ADS302	Statistics for Data Science	**T**	3	0	0	3	3	30	20	50	3 Hours
3	3	PC	CT	22ADS303	**Lab** :Statistics for Data Science	P	0	0	2	2	1		60	40	
4	3	PC	CT	22ADS304	Computer Network	**T**	3	0	0	3	3	30	20	50	3 Hours
5	3	PC	CT	22ADS305	**Lab.:** Computer Network	P	0	0	2	2	1		60	40	
6	3	PC	CT	22ADS306	Software Engineering	**T**	3	0	0	3	3	30	20	50	3 Hours
7	3	PC	CT	22ADS307	**Lab.:** Software Engineering	P	0	0	2	2	1		60	40	
8	3	PC	CT	22ADS308	Operating Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
9	3	PC	CT	22ADS309	**Lab.** Web Technology	P	0	0	4	4	2		60	40	
					TOTAL THIRD SEM		**15**	**0**	**10**	**25**	**20**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0				
2	3	BES	CT/AIDS	MLC121	Document Presentation and Computation	**A**	2	0	0	2	0				

Fourth Semester															
1	4	PC	GE	22ADS401	Linear Algebra	**T**	3	0	0	3	3	30	20	50	3 Hours
2	4	PC	CT	22ADS402	Theoretical foundation of Computer Science	**T**	3	0	0	3	3	30	20	50	3 Hours
3	4	PC	CT	22ADS403	Design & Analysis of Algorithms	**T**	3	0	0	3	3	30	20	50	3 Hours
4	4	PC	CT	22ADS404	**Lab:** Design & Analysis of Algorithms	**P**	0	0	2	2	1		60	40	
5	4	PC	CT	22ADS405	Database Management Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
6	4	PC	CT	22ADS406	**Lab:** Database Management Systems	**P**	0	0	2	2	1		60	40	
7	4	PC	CT	22ADS407	Bayesian Data Analysis	**T**	3	0	0	3	3	30	20	50	3 Hours
8	4	PC	CT	22ADS408	**Lab:** Advanced Python	**P**	0	0	2	2	1		60	40	
					TOTAL FOURTH SEM		**15**	**0**	**6**	**21**	**18**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC124	YCCE Communication Aptitude Preparation (YCAP4)	**A**	3	0	0	3	0				
2	4	BES	CT/AIDS	MLC122	Data Visualization	**A**	2	0	0	2	0				

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

TA ** = for Theory : 12 marks on lecture quizzes, 12 marks on two TA2 activitied decided by course teacher, 2 marks on class attendance and 4 marks on TA4 activities

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

		June 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

III SEMESTER

22ADS301: Discrete Mathematics & Graph Theory

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Identify the importance of statements in deriving valid inferences.
2.Use relations and ordering methods to identify the relationship among the inferences.
3.Select suitable algebraic systems to find solution for real time problems.
4.Find the suitable computing methods and applying graph theory concepts to solve complex problems.

Unit:1	**Mathematical Logic and Set Theory**	**6 Hours**
Statement and Notation: Negation, Conjunction, Disjunction, Tautologies, Truth Tables, Basic Concepts of Set Theory, Inclusion & equality of set, Power Set, Ordered Pairs and n-tuples, Operations on Sets, mathematical induction. Propositions, Predicate logic. **Contemporary Issues related to Topic**		

Unit:2	**Relations and Functions**	**6 Hours**
Relations and Ordering, Relation Matrix and Graphs, Partition and Covering of a set, Equivalence relation, Partial order relation, Partially Ordered sets, Functions, Composition of functions, Inverse Functions, Characteristics function of a set. **Contemporary Issues related to Topic**		

Unit:3	**Group Theory**	**7 Hours**
Groups, Subgroups and Homomorphism, Cosets and Lagrange's theorem, Normal subgroups. Semi groups and Monoids Homomorphism of semigroups and monoids, Sub semi groups and monoids. **Contemporary Issues related to Topic**		

Unit:4	**Rings**	**6 Hours**
Definitions and Examples, sub ring, Integral domain, ring homomorphism, ideal of ring polynomial. **Contemporary Issues related to Topic**		

Unit:5	**Field and Lattices**	**7 Hours**
Definitions and Examples, Finite Field, Ordered sets, Hasse Diagrams of partially Ordered sets. Lattices, Bounded Latices, Complements Latices, Definitions and Examples of Finite Field, Ordered sets, Hasse Diagrams of partially Ordered sets. Lattices, Bounded Latices, Complements Latices. **Contemporary Issues related to Topic**		

Unit :6	Graph Theory	7 Hours
Basic concepts of graph theory, Basic definitions, Paths and circuits, Reach ability and connectedness, Matrix Representation of graphs, Tree and their representation and operations, Rooted trees, Path lengths in rooted trees, Multi graphs and weighted graphs, and graph isomorphism, shortest paths in weighted graphs, Hypergraphs, transitive closure, Spanning trees, Kruskal's algorithm, Prim's algorithm. **Contemporary Issues related to Topic**		
	Total Lecture Hours	**39 Hours**

Text books	
1	J. P. Tremblay & R. Manohar, Discrete Mathematics Structure with application to Computer Science, 23rd re-print,2005,Tata McGraw-Hills Publication Company Limited, New Delhi.
2	Lipschutz Schaums's , Outline series ,Discrete Mathematics, 2nd edition, Tata McGraw-Hills Publication Company Limited, New Delhi.

Reference Books	
1	Bernard Kolman ,Robert C.Busby, Sharon Ross, Discrete Mathematical structures, 3rd edition, 2001 Prentice Hall of India, New Delhi.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/

MOOCs Links and additional reading, learning, video material	
1	https://onlinecourses.nptel.ac.in/noc22_ma10/preview
2	https://onlinecourses.nptel.ac.in/noc20_cs82/preview
3	https://nptel.ac.in/courses/111106102

III SEMESTER

22ADS302: Statistics for Data Science

Course Outcomes :
1. Apply different visualization and summarizing technique to given data for its interpretation. 2. Solve given problem using the probability theory and linear algebra 3. Perform sampling distribution to estimate the given data and predict the solution using regression 4. Analyse the data using hypotheses and other testing methods 5. Implement various statistics methods on a given dataset using modern tool and write a report

Unit I:	**(6 Hrs.)**
Probability and Probability distribution: Basic terminology in probability and rules, Probabilities under conditions of statistical independence and dependence, Bayes Theorem. Random variables, expected values, variance, probability distributions, model given data.	
Unit II:	**6 Hrs.)**
Sampling and Sampling Distributions and: Sampling Distributions: Introduction to sampling, random sampling, non-random sampling, Introduction to sampling distributions, design of experiments	
Unit III:	**(7 Hrs.)**
Estimation and Testing Hypotheses: Introduction, point estimates, interval estimates and confidence interval, determining the sample size in estimations Introduction, Basic to the Hypotheses-testing Procedure, Testing Hypotheses, One sample test: Hypotheses Testing of Means when the population standard deviation is Known, Hypotheses Testing of Means when the population standard deviation is not known, Hypotheses Testing of proportions, Limitations of the tests of hypotheses	
Unit IV:	**7 Hrs.)**
Testing Hypothesis II, Quality and quality control: Testing Hypotheses, Two sample test, Statistical process control, Control charts for process mean, Process variability, Charts for attribute, Total quality management.	
Unit V:	**(6 Hrs.)**
Simple Regression and Correlation: Introduction, Estimation Using the Regression Line, Correlation Analysis Making Inferences about Population Parameters Using Regression and Correlation Analyses.	
Unit VI:	**(7 Hrs.)**
Parametric and Non-Parametric Testing: Introduction to parametric and non-parametric tests, ANNOVA, Chi-square test, sign test, rank sum test. Circuits, Applications of Hamilton Circuits; Planar Graphs: Euler's Formula, Kuratowski's Theorem; Graph Coloring: Introduction, Applications of Graph Colorings.	
Total Lecture	**39 Hours**

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Textbooks:				
1.	Statistics for Management	Richard I. Levin & David S. Rubin	7 th Edition	Pearson Education
2.	Introduction to Linear Algebra	Gilbert Strang	5 th Edition	Wellesley - Cambridge Press
3.	Introduction to probability and statistics for engineers and scientist, Sheldon M. Ross, 3 rd Edi Elsevier			

Reference Books:		
1.	Practical Statistics for Data Scientists 50 Essential Concepts	Peter Bruce & Andrew Bruce
2.	An Introduction to Statistical Learning with Applications in R	Gareth James, Daniela Witten, Trevor Hastie & Robert Tibshirani
3.	Mathematical foundations for data analysis	Jeff m. Phillips

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Computer%20Technology/

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=V5fqShLVpoI

III SEMESTER

22ADS303 : Lab. Statistics for Data Science

Course Outcomes
Upon successful completion of the course the students will be able to
1. Able to analyze and find the hidden meaning from the given data and visualize the results
2. Able to solve the real-life problem using the probability theory and use it for decision making
3. Able to analyze the samples from the population and solve the problem to get predictive solution using the estimation theory
4. Able to analyze the sample data and use it to test the assumptions made for the population parameter

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

SN	**Program based on**
1	Implement basic functionality of R
2	Implement data import and export functionality in R
3	Implement R functions to calculate basic statistics of data source
4	Apply the basic visualization techniques in R to understand data
5	Apply some advanced visualization techniques in R to analyze the data
6	Solve the problems using probability distributions in R
7	Using a case study compare various probability distributions
8	Analyze the data using sampling technique
9	Analyze the data to find out estimated value

III SEMESTER
22ADS304 : Computer Network

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To understand design issues of layers and network reference model 2. To Solve the given problems related to networking domain. 3. To analyze different networking protocol at various layers. 4. To evaluate the performance of network using different tools.

Unit I:	**(7 Hrs.)**
Introduction: The uses of computer networks, LAN's, MAN's, WAN's., protocol hierarchies, design issues for layers, interfaces and services, connection oriented and connectionless services, service primitives relationship of services to protocols. The OSI reference model. TCP/IP reference model, Comparison of OSI & TCP/IP reference models, Critique of OSI model & protocols, critique of TCP/IP reference mode **Contemporary Issues related to Topic**	

Unit II:	**(7 Hrs.)**
Transmission Impairments, Transmission Media: Guided, unguided, Architecture of the Internet, , The Public Switched Telephone Network Switching: circuit, packet and message switching, Modems **Contemporary Issues related to Topic**	

Unit III:	**(7 Hrs.)**
The Data Link Layer: Data link layer design issues- Framing, Error Control, Flow Control, Link Management, Error detection and Correction-Error-Correcting Codes, error-detecting codes, Elementary data link protocols-An Unrestricted simplex Protocol, A simplex stop and wait protocol, A simplex protocol for a noisy channel, Sliding window protocols- A one bit sliding window protocol, Go Back N protocol, Selective Repeat Protocol. **Contemporary Issues related to Topic**	

Unit IV:	**(7 Hrs.)**
The Medium Access Sublayer: Static and Dynamic Channel allocation in LAN's and MAN's, Access Protocols-ALOHA, Persistent and Non Persistent CSMA, CSMA/CD, Collision free protocols, Binary countdown, Limited-connection protocol: The adaptive tree walk protocol. **Contemporary Issues related to Topic**	

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Unit V:	**(6 Hrs.)**
The Network Layer: Network Layer design issues-services provided to the transport layer, Logical Addressing: Classbase and classless, Subnetting and Supernetting, Routing and Routing Algorithm, Distance Vector, Link State, Hierarchical. Congestion Control algorithms- Preallocation of buffers, Packet discarding, Choke packets, Load shedding, Jitter control. Leaky bucket algorithm, token bucket algorithm, IP header format (IPv4, IPv6) **Contemporary Issues related to Topic**	
Unit VI:	**(6 Hrs.)**
The Transport Layer: Transport layer design issues-services provided to the session layer, Quality of service, transport service primitives, Elements of transport protocols-Addressing, Establishing and Releasing a connection, Flow control and Buffering, Multiplexing, Crash Recovery. Transmission Control Protocol (TCP). The Application Layer: HTTP DNS, SMTP, FTP, TFTP. **Contemporary Issues related to Topic**	
Total Lecture	**40 Hours**

Textbooks:	
1.	Computer Networks, A.S. Tanenbaum , Pearson Publication
2.	Computer Networking , Behrouz A. Forouzan , McGraw-Hill Publication.

Reference Books:	
1.	Data Communications and Networking, Behrouz A. Forouzan , McGraw-Hill Publication.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/E%20-%20books-Wiley-Blackwell-/New%20Microsoft%20Office%20Word%20Document%20(2).htm

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/105/106105081/
2.	https://www.digimat.in/nptel/courses/video/106105183/L01.html

III SEMESTER

22ADS305 : Lab. Computer Network

Course Outcomes
Upon successful completion of the course the students will be able to
1. To understand design issues of layers and network reference model
2. To Solve the given problems related to networking domain.
3. To analyze different networking protocol at various layers.
4. To evaluate the performance of network using different tools.

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

SN	Program based on
1	How to bring two computers in the network. Configure TCP/IP to configure Internet on your computer.
2	Use Network Utility Command like ping, ipconfig, netstat, tracert to observe the network details.
3	To implement Hamming Code using C and C++.
4	To implement Dijkstra's Routing algorithm using backtracking approach.
5	Use traffic monitoring tool Wireshark to observe network traffic with packet details.
6	Configure router. Configure network using Cisco Packet Tracer software and show packet transmission from source to destination.
7	Configure network using Distance vector routing protocol in Cisco Packet Tracer
8	Use Openssl command to perform Asymmetric key encryption (RSA) and also implement RSA algorithm.
9	Client server communication using socket programming
10	Advanced Practical: Study of NSG tool

III SEMESTER

22ADS306 : Software Engineering

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Choose appropriate software engineering process model, requirement engineering principles and software designing fundamentals for a given project. 2. Select appropriate testing strategy and apply testing principles for testing a given application. 3. Apply basics of software configuration management, version control and change control in software development. 4. Evaluate cost estimation, effort and severity of software risk for given application. 5. Perform basic operations on Sub-version for software version control.

Unit I:	**(6 Hrs.)**
Introduction to Software Engineering, A Generic View of process, Process models: Water fall Model, RAD Model, Prototyping Model, Component Development Model, Agile Model, Requirement Engineering: Requirement Engineering Task Initialization Eliciting Requirement, Developing Use Case, Analysis Model, Negotiation, Validation **Contemporary Issues related to Topic**	

Unit II:	**(7 Hrs.)**
Building the Analysis mode: Requirement Analysis, Analysis Modeling Approaches, Data Modeling Concept, Object Oriented Analysis, Types of Modeling, Design Engineering: Design Concept, Design Model. **Contemporary Issues related to Topic**	

Unit III:	**(7 Hrs.)**
Testing Strategies: Strategic Approach, Strategic issues, Strategies for conventional Software, Strategies for Object Oriented Software, Validation Testing, Testing Tactics: White-Box Testing, Basis Path testing: Flow Graph Notation, Independent Pr **Contemporary Issues related to Topic**	

Unit IV:	**(5 Hrs.)**
Configuration Management: Base lines, Software Configuration items, The SCM Process, Identification of Objects in the Software Configuration, Version Control, Change Control, Configuration Audit, Status Reporting, SCM Standards **Contemporary Issues related to Topic**	

Unit V:	**(7 Hrs.)**
Project Management, Metrics for Process and Projects, Project Estimation, Risk Management: Reactive vs. Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection.rithms- Preallocation of buffers, Packet discarding, Choke packets, Load shedding, Jitter control. Leaky bucket algorithm, token bucket algorithm, IP header format (IPv4, IPv6) **Contemporary Issues related to Topic**	
Unit VI:	**(5 Hrs.)**
Advanced Topics in Software Engineering: Re engineering Computer aided software engineering, Open source SE tools introduction, Example-Subversion: Overview, Typical subversion usage and work flow. **Contemporary Issues related to Topic**	
Total Lecture	**37 Hours**

Textbooks:	
1.	Software Engineering–A Practitioner's Approach (Sixth Edition) by Roger S. Pressman– McGraw Hill.
2.	Object Oriented Software Engineering by Leth Bridge, Pearson Edu.

Reference Books :	
1.	Software Engineering, 9th Edition, Ian Sommerville, University of St Andrews, Scotland, ©2011 , Pearson

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/E%20-%20books-Wiley-Blackwell-/New%20Microsoft%20Office%20Word%20Document%20(2).htm

MOOCs Links and additional reading, learning, video material	
1.	http://103.152.199.179/YCCE/E%20-%20books-Wiley-Blackwell-/New%20Microsoft%20Office%20Word%20Document%20(2).htm
2.	https://www.digimat.in/nptel/courses/video/106105182/L01.html

III SEMESTER

22ADS307 : Lab. Software Engineering

Course Outcomes
Upon successful completion of the course the students will be able to
1. Choose appropriate software engineering process model, requirement engineering principles and software designing fundamentals for a given project.
2. Select appropriate testing strategy and apply testing principles for testing a given application.
3. Apply basics of software configuration management, version control and change control in software development.
4. Evaluate cost estimation, effort and severity of software risk for given application.
5. Perform basic operations on Sub-version for software version control.

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

SN	**Program based on**
1	Introduction to Software Engineering fundamentals, UML and RATIONAL ROSE Interface.
2	To study and create Software Requirement Specification document for given case study
3	To study and draw UML Use Case diagram for the given case study.
4	To study and draw UML Class diagram for given Case Study.
5	To study and draw UML Activity diagram for given Case Study
6	To study and draw UML Sequence Diagram for given Case Study
7	To study and draw State Diagram for given Case Study
8	Write a Program to find out the Estimation (cost and effort) by using COCOMO model.
9	To Perform Manual and Automated testing using CASE tool for given Case Study
10	To Study and execute Version Control using Subversion

III SEMESTER
22ADS308: Operating Systems

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Describe the different services provided by Operating System at different level.
2. Apply knowledge of different operating system algorithms to solve a given problem.
3. Analyze various approaches used to improve system performance.
4. Differentiate various disk scheduling algorithms based on their performances

Unit I:	**7 Hrs.)**
Introduction, services provided by OS, functions of OS, system calls. Process management-introduction, process control block, process states, process context switch, threads: user level and kernel level. **Contemporary Issues related to Topic**	
Unit II:	**(8 Hrs.)**
CPU scheduling, goals of scheduling, CPU scheduling algorithms: FCFS, SJF, SRTF, RR, Priority based.Inter-process communication: process cooperation and synchronization, race condition, critical section, mutual exclusion and implementation, semaphores, classical inter-process communication problems. **Contemporary Issues related to Topic**	
Unit III:	(7 Hrs.)
Deadlocks: System Model, deadlock characterization-necessary conditions, resource allocation graph (RAG), methods for handling deadlock-deadlock avoidance, deadlock detection, deadlock prevention recovery from deadlock. **Contemporary Issues related to Topic**	
Unit IV:	6 Hrs.)
Memory management techniques-contiguous and non-contiguous, paging and segmentation, translation look aside buffer (TLB) and overheads. **Contemporary Issues related to Topic**	
Unit V:	6 Hrs.)
Virtual memory and demand paging, page faults, page replacement algorithms, thrashing and working set model. **Contemporary Issues related to Topic**	

Unit VI:	6 Hrs.)
File systems-introduction, disk space management and space allocation strategies, directory structures, disk caching, disk arm scheduling strategies: FCFS, SSTF, SCAN, CSACN, LOOK, CLOOK, File Organization: Sequential, Index, Index Sequential **Contemporary Issues related to Topic**	
Total Lecture	**40 Hours**

Textbooks:	
1	Operating system concepts,5th Edition, A. Silberchatz and P.Galvin, Addison Wesley Longman Inc.
2.	Operating system concepts,7th Edition, A. Silberchatz and P.Galvin, Addison Wesley Longman Inc.

Reference Books :	
1	Modern operating systems,2ndedition, A.S. Tanenbaum, Prentice Hall of India publication.
2	Operating System, 5th Edition, William Stalling, Pearson Education publication.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/E%20-%20books-Wiley-Blackwell-/New%20Microsoft%20Office%20Word%20Document%20(2).htm

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/102/106102132/
2.	https://www.youtube.com/watch?v=783KAB-tuE4

III SEMESTER

22ADS309: Lab. Web Technology

Web Technologies Lab (AIDS-2208)

Session 2022-23(ODD) 3rd Semester

Course Outcomes: -

On completion of this course, the student will be able to

CO1: Acquire the basic concept of the internet, web applications, HTML structure, and basic tags
CO2: Create and design web pages using HTML
CO3: Design animated and responsive web pages using CSS and Bootstrap.
CO4: Create interactive web pages with logical functionality using JS.
CO5: Gain insight into React JS and develop web pages using components

Sr. No.	List of Experiments	CO
1	Study of the internet (internet overview, email, www, broadband, FTP, URL) Study Web Pages and implement basic HTML Tags (table tag) Give a task to make Chess-board and Ludo-board	CO1
2	Create a web form and web page structure by using form and div tags Give a task to make Student Information Form and web page layout	CO2
3	Implement the usage of CSS (Inline, Internal, and External)	CO3
4	Demonstrate and Implement the usage of Bootstrap	CO3
5	Create an Animated and Responsive web page using HTML, CSS, Bootstrap	CO2,CO3
6	Demonstrate and Implement basics of JavaScript (variables, operators, Loops, Conditional statements)	CO4
7	Program using: JavaScript (Functions, Events)	CO4
8	Demonstrate and Implement the basics of React JS (introduction, folder structure, JSX, React DOM, React Fragments)	CO5
9	Demonstrate and Implement React JS concepts (CSS in React, Bootstrap in React, React Components, Modules importing, Rendering)	CO5
10	**Project:** Submission of an **interlinked, interactive, responsive, and functional website** with a report.	CO1,CO2 CO3,CO4,CO5

Textbooks:	
1	Operating system concepts,5th Edition, A. Silberchatz and P.Galvin, Addison Wesley Longman Inc.
2.	Operating system concepts,7th Edition, A. Silberchatz and P.Galvin, Addison Wesley Longman Inc.

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/106/102/106102132/
2.	https://www.youtube.com/watch?v=783KAB-tuE4

III Semester

Audit Course

MLC2123 - YCCE Communication Aptitude Preparation (YCAP3)

III SEMESTER

DEPARTMENT SPECIFIC AUDIT COURSE

MLC121 : DOCUMENT PRESENTATION AND COMPUTATION

(SAME AUDIT COURSE IN CT)

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To do Professional & Advanced Document Formatting & Layout in Microsoft Word 2. To create sheets and manage data using Microsoft Excel 3. To Create a Eye Catchy Presentation using Microsoft PowerPoint

Unit I: Editing with Microsoft Word: Introduction to Microsoft Word Interface. Font and Paragraph formatting, Insert Table, Picture, Shapes, Icons & 3d Models, SmartArt, Charts, Hyperlink	**(4 Hrs.)**
Unit II: Page Setup in Microsoft Word: Page Setup Options, Header, Footer & Page Number Options, Water Mark, Page Color & Page Border Options in Microsoft Word, View Tab Options in Microsoft Word	**(4 Hrs.)**
Unit III: Calculations with Microsoft Excel: Introduction to Microsoft Excel Interface, Basic Math Functions, AutoSum Functions, Sum IF & Sum IFs, Count IF & Count IFs Functions, Absolute & Relative References, Copy, Paste & Paste Special Options	**(4 Hrs.)**
Unit IV: Advance Excel: Conditional Formatting, Sort & Filter, Logical Function (IF, Nested IF, OR), VLOOKUP Function, Pivot Table & Chart, Text Functions, Text to Columns Tool	**(4 Hrs.)**
Unit V: Designing with Microsoft PowerPoint: Introduction to Microsoft PowerPoint Interface, Font & Slide Options, Drawing Tools, Inserting Tables, Pictures, Videos, WordArt	**(4 Hrs.)**
Unit VI: Presentation in PowerPoint: Transitions, Animations, Slide Show, Built-in Presentation Templates, Printing Slides	**(4 Hrs.)**
Total Lecture	**24 Hours**

MOOCs Links and additional reading, learning, video material	
1.	https://www.youtube.com/watch?v=h_UBLvhszko
2.	https://www.tutorialspoint.com/advanced_excel/index.htm
3	https://www.geeksforgeeks.org/how-to-add-different-slide-designs-in-ms-powerpoint/

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

Bachelor of Technology

SoE & Syllabus 2022

4th Semester

(Department of Computer Technology)

Artificial Intelligence and Data Science

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

Artificial Intelligence and Data Science

SoE No. 22ADS-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Third Semester															
1	3	BS	GE	22ADS301	Discrete Mathematics & Graph Theory	**T**	3	0	0	3	3	30	20	50	3 Hours
2	3	PC	CT	22ADS302	Statistics for Data Science	**T**	3	0	0	3	3	30	20	50	3 Hours
3	3	PC	CT	22ADS303	**Lab** :Statistics for Data Science	P	0	0	2	2	1		60	40	
4	3	PC	CT	22ADS304	Computer Network	**T**	3	0	0	3	3	30	20	50	3 Hours
5	3	PC	CT	22ADS305	**Lab.:** Computer Network	P	0	0	2	2	1		60	40	
6	3	PC	CT	22ADS306	Software Engineering	**T**	3	0	0	3	3	30	20	50	3 Hours
7	3	PC	CT	22ADS307	**Lab.:** Software Engineering	P	0	0	2	2	1		60	40	
8	3	PC	CT	22ADS308	Operating Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
9	3	PC	CT	22ADS309	**Lab.** Web Technology	P	0	0	4	4	2		60	40	
10	3	PC	CV/CT	22ADS310	Environmental Sustainability, Pollution and Management	**T**	3	0	0	3	3	30	20	50	3 Hrs
					TOTAL THIRD SEM		**15**	**0**	**10**	**25**	**23**				
List of Mandatory Learning Course (MLC)															
1	3	HS	T&P	MLC2123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0				
2	3	BES	CT/AIDS	MLC121	Document Presentation and Computation	**A**	2	0	0	2	0				
Fourth Semester															
1	4	PC	GE	22ADS401	Linear Algebra	**T**	3	0	0	3	3	30	20	50	3 Hours
2	4	PC	CT	22ADS402	Theoretical foundation of Computer Science	**T**	3	0	0	3	3	30	20	50	3 Hours
3	4	PC	CT	22ADS403	Design & Analysis of Algorithms	**T**	3	0	0	3	3	30	20	50	3 Hours
4	4	PC	CT	22ADS404	**Lab:** Design & Analysis of Algorithms	**P**	0	0	2	2	1		60	40	
5	4	PC	CT	22ADS405	Database Management Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
6	4	PC	CT	22ADS406	**Lab:** Database Management Systems	**P**	0	0	2	2	1		60	40	
7	4	PC	CT	22ADS407	Bayesian Data Analysis	**T**	3	0	0	3	3	30	20	50	3 Hours
8	4	PC	CT	22ADS408	**Lab:** Advanced Python	**P**	0	0	2	2	1		60	40	
					TOTAL FOURTH SEM		**15**	**0**	**6**	**21**	**18**				
List of Mandatory Learning Course (MLC)															
1	4	HS	T&P	MLC2124	YCCE Communication Aptitude Preparation (YCAP4)	**A**	3	0	0	3	0				
2	4	BES	CT/AIDS	MLC122	Data Visualization	**A**	2	0	0	2	0				

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

TA ** = for Theory : 12 marks on lecture quizzes, 12 marks on two TA2 activitied decided by course teacher, 2 marks on class attendance and 4 marks on TA4 activities

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

		June 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

IV SEMESTER

22ADS401: Linear Algebra

Course Outcomes:
Upon successful completion of the course the students will be able to
1. Solve systems of linear equations using rank of matrix.
2. Determine eigen values and eigen vectors and solve eigen value problems.
3. Explain the concepts of vector space and subspace, span and basis.
4. Apply principles of matrix algebra to linear transformations and inner product.

Unit:1	**Elementary matrix operations**	**6 Hours**
Introduction to Matrices and Determinants, Solution of Linear Equations, Cramer's rule, Inverse of a Matrix. **Contemporary Issues related to Topic**		

Unit:2	**Matrix Algebra**	**6 Hours**
Rank of a matrix, Gaussian elimination, LU Decomposition (Crout's method), Solving Systems of Linear Equations using the tools of Matrices. **Contemporary Issues related to Topic**		

Unit:3	**Diagonalization of matrix**	**7 Hours**
Eigen Values and Eigen vectors, Linear dependence and independence of Eigen Vectors, Orthogonal Eigen vector, Diagonalization of matrix, Cayley-Hamilton Theorem and Sylvester's Theorem. **Contemporary Issues related to Topic**		

Unit:4	**Vector Space**	**7 Hours**
Vector Space, Subspace, Sum of Sub space, linear combination, Linear dependence and independence, Span and basis, Spanning sets, Generators. **Contemporary Issues related to Topic**		

Unit:5	**Linear Transformation**	**7 Hours**
Linear transformation, Ranges and Kernel (null space) of linear transformation, Inverse of linear transformation, Algebra of linear transformation, Singular and non-singular linear transformation. . **Contemporary Issues related to Topic**		

Unit :6	Inner product Spaces	6 Hours
Inner product space and Norms, orthogonal vector, the Gram Schamidt orthogonalization Process , orthogonal compliment, Adjoint of Linear operator, Normal and self adjoint operator, Unitary and orthogonal operator, Bilinear and Quadratic form . **Contemporary Issues related to Topic**		
	Total Lecture Hours	**39 Hours**

Text books	
1	Erwin Kreyzig, Advance Engineering Mathematics, 9th Edition, John Wiley and Sons, INC.
2	Dr. B. S. Grewal, Higher Engineering Mathematics, 40th edition, Khanna Publisher.
3	H.K. Dass, Advanced Engineering Mathematics, 8th revised edition, S. Chand, Delhi.
4	Hoffman and Kunze, Linear Algebra, prentice Hall of India, New Delhi
5	Glbert Strang, Linear Algebra and its Applications, Nelson Engineering (2007)
6	Swapan Kumar Sarkar, A Textbook of Discrete Mathematics, S.Chand Company Limited, Delhi.
7	Seymour Lipschutz, Linear Algebra, Schaum's Solved Problem Series, McGraw-Hill Book Company.
8	Vijay M. Soni, Mathematics, B.Sc. Semester VI, Himalaya Publishing House.

Reference Books	
1	Chandrika Prasad, Mathematics for Engineers (19th edition), , John Wiley & Sons.
2	L.A. Pipes and Harville, Applied Mathematics for Engineers (3rd edition), McGraw Hill.
3	K.B.Datta, Matrix and Linear Algebra, , Prentice Hall of India.
4	N.P. Bali & Manish Goyal, A textbook of Engineering Mathematics (Reprint 2008), Laxmi Prakashan.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/Suported%20file/Supprted%20file/e-copies%20of%20books/Applied%20Sciences%20&%20Humanities/Mathematics%20and%20Humanities/

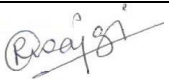
MOOCs Links and additional reading, learning, video material	
1	https://nptel.ac.in/courses/111106051
2	https://archive.nptel.ac.in/courses/111/104/111104137/
3	https://archive.nptel.ac.in/courses/111/106/111106135/

IV SEMESTER

22ADS402: Theoretical foundation of Computer Science

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Apply basic properties of formal languages and to design finite automata for regular expression and Regular Grammar. 2. Construct context free grammar for various languages. 3. Solve various problems of push down automata for context free language 4. Design Turing Machines for given any computational problem.

Unit I:	**8 Hrs.)**
Alphabet, Symbols, Sets, Strings, Language, Operations, Relations, Design of Finite State Machines, Acceptance of strings and languages, Non Deterministic Finite Automation, Deterministic Finite Automation, Equivalence between NFA and DFA, NFA with ε-transition, Minimization of FA. **Contemporary Issues related to Topic**	
Unit II:	**(7 Hrs.)**
Regular Regular sets, Regular expressions, Manipulation of regular expressions, Equivalence between RE and FA. Pumping Lemma, closure properties of regular sets (Proofs not required), Regular grammars, Right linear and left linear regular grammars, inter-conversion between LLG & RLG, Equivalence between regular grammar and F.A., Inter-conversion between RE and RG. **Contemporary Issues related to Topic**	
Unit III:	**(7 Hrs.)**
Context free grammar, Derivation trees (Syntax tree and Parse tree), Ambiguous Grammar, Context Free Language (CFL), Normal Form of grammar: Chomsky Normal form, Greibach normal form. **Contemporary Issues related to Topic**	
Unit IV:	**(6 Hrs.)**
Push down automata, definition, and model, acceptance of CFL by empty Stack and by final state, equivalence CFL and PDA, Inter-conversion, Closure of properties of CFL, DPDA & NDPDA. **Contemporary Issues related to Topic**	
Unit V:	**6 Hrs.)**
Turing machine, Definition, Model of TM, Design of Turing Machine, Computable functions, Recursive enumerable language, Recursive Language, Properties of Recursive enumerable language, Church‟s hypothesis, Chomsky hierarchy of language, Linear bounded automata and context sensitive language, Universal Turing Machin **Contemporary Issues related to Topic**	

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Unit VI:	**(6 Hrs.)**
Un-decidability Problems related to Recursive enumerable language and Turing Machine, post correspondence problem. Recursive function Theory –Basis functions and operations on them. Bounded minimization preemptive μ recursive function unbounded minimization and recursive function **Contemporary Issues related to Topic**	
Total Lecture	**40 Hours**

Textbooks:	
1.	Introduction to Automata Theory, Languages, and computation 3rd Edition Hopcroft J.E., Rajeev Motwani, Jeffrey D. Ullman Pearson Education
2.	Introduction to languages and the Theory of Computation 3rd Edition John C.Martin Mc Graw Hill

Reference Books:	
1.	Introduction to the Theory of Computation 2nd Edition Michael Sipser GALE CENGAGE Learning
2.	Theory of Computation1st Edition Dr. O. G. Kakde Laxmi Publication

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/E%20-%20books-Wiley-Blackwell-/New%20Microsoft%20Office%20Word%20Document%20(2).htm

MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/108/106108052/
2	https://www.digimat.in/nptel/courses/video/106104148/L01.html

IV SEMESTER

22ADS403 : Design & Analysis of Algorithms

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Students should be able to design some algorithms 2. Analyze their performance with respect to selected evaluation parameters

Unit I:	**(7 Hrs.)**
Mathematical foundations, summation of arithmetic and geometric series, □n, □n2, bound summations using integration, Analysis of algorithms, analyzing control structures, worst case and average case analysis, Asymptotic notations, Analysis of sorting algorithms such as selection sort, insertion sort, bubble sort, heap sort, external Sorting, lower bound proof. **Contemporary Issues related to Topic**	
Unit II:	**(7 Hrs.)**
Recursive functions and recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions, elementary and advanced data structures with operations on them and their time complexity, Amortized analysis **Contemporary Issues related to Topic**	
Unit III:	**(7 Hrs.)**
Divide and conquer basic strategy, binary search, quick sort, merge sort, Fast Fourier Transform etc. Greedy method –basic strategy, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path etc. **Contemporary Issues related to Topic**	
Unit IV:	**(6 Hrs.)**
Dynamic Programming basic strategy, multistage graphs, all pair shortest path, single source shortest paths, optimal binary search trees, traveling salesman problem. **Contemporary Issues related to Topic**	
Unit V:	**(6 Hrs.)**
Basic Traversal and Search Techniques, breadth first search, connected components, Backtracking basic strategy, 8 – Queen‟s problem, graph colouring, Hamiltonian cycles etc. **Contemporary Issues related to Topic**	
Unit VI:	**(6 Hrs.)**
NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook‟s Theorem, decision and optimization problems, polynomial reduction. **Contemporary Issues related to Topic**	
Total Lecture	**39 Hours**

			July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Dean OBE	Date of Release	Version	

Textbooks:			
1.	Computer Algorithms Third	Horowitz, Sahani, Rajsekharan	Galgotia Publications Pvt. Ltd.
2.	Introduction to Algorithms Third	Thomas H. Cormen	Prentice Hall of India.

Reference Books:			
1.	Fundamentals of Algorithms Second	Brassard and Bratley	Prentice Hall

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/E%20-%20books-Wiley-Blackwell-/New%20Microsoft%20Office%20Word%20Document%20(2).htm

MOOCs Links and additional reading, learning, video material	
1	https://archive.nptel.ac.in/courses/106/101/106101060/
2	https://www.digimat.in/nptel/courses/video/106101060/L27.html

IV SEMESTER

22ADS404 : Lab. Design & Analysis of Algorithms

Course Outcomes
Upon successful completion of the course the students will be able to 1. Students should be able to design some algorithms 2. Analyze their performance with respect to selected evaluation parameters

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

SN	**Program based on**
1	Write a program for insertion sort and display its time complexity for different number of inputs.
2	Write a program for heap sort and compare its time complexity with insertion sort for different number of inputs.
3	Write a program for merge sort and display its time complexity for different number of inputs.
4	Write a program for quick sort and compare its time complexity with merge sort for different number of inputs.
5	Write a program for fractional knapsack problem using greedy strategy and analyse its time complexity for different number of inputs.
6	Write a program for job sequencing with deadline problem using greedy strategyand analyse its time complexity for different number of inputs.
7	Write a program for travelling salesman problem using dynamic programmingand analyse its time complexity for different number of inputs.
8	Write a program for all pair shortest path using dynamic programming and analyse its time complexity for different number of inputs.
9	Write a program for 8 queen's problem using backtracking
10	Write a program for graph coloring problem using backtracking

IV SEMESTER

22ADS405 : Database Management Systems

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand database management system, through modeling and designing concepts. 2. Apply the knowledge of query language to perform the operations on database. 3. Apply the knowledge of database concepts to perform the transaction and concurrency control 4. Design database using the entity relation diagrams and relational database aspects.

Unit I:	**7 Hrs.)**
Introduction to Database Management System: Database system Concepts and Architecture, Data Models, Schemas and Instances, Abstraction & Different Levels of Data Abstraction, Data Independence: Logical & Physical Independence. **Entity-Relationship Model**: Entities and Entity Sets, Relationships and Relationship Sets, Attributes, Mapping Constraints, Keys, Entity Relationship Diagram, Generalization, Aggregation, Reducing E-R Diagrams to Tables **Contemporary Issues related to Topic**	
Unit II:	**(5 Hrs.)**
Relational Data Model: Structure of Relational Databases **Relational Algebra:** Structure of relational databases, Fundamental Relational-Algebra Operations, Additional relational algebra operations, extended relational algebra operations, modification of the databases **Contemporary Issues related to Topic**	
Unit III:	**(6 Hrs.)**
SQL: Data definition language (DDL), Data Manipulation Language (DML), Basic structure of SQL Queries, Set operations, Null Values, Nested sub-queries, views, modification of database, transaction, Joins. **PLSQL Constructs:** SQL data types & schemas, Integrity Constraints, Domain Constraints, Assertions, triggers, Stored Procedures **Contemporary Issues related to Topic**	
Unit IV:	**(7 Hrs.)**
Relational Database Design AND Normalization: Pitfalls in Relational Database Design, Functional Dependencies, Inference Rules, Minimal Cover, Properties of Relational Decomposition, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form. **Contemporary Issues related to Topic**	

Unit V:	**(8 Hrs.)**
Transaction Management: ACID Properties, Implementation of ACID Properties, Database processes to support ACID Properties, Schedules, and Testing of Serializability. **Contemporary Issues related to Topic**	
Unit VI:	**(6 Hrs.)**
Concurrency Control: Lock-based Protocols, Timestamp Based Protocols, Validation Techniques. **Crash Recovery**: Failure Classification, Log Based Recovery, Buffer Management, Checkpoints. **Contemporary Issues related to Topic**	
Total Lecture	**39 Hours**

Textbooks:	
1.	Database System Concepts, Korth, Silberschatz McGraw-Hill publication.
2.	Fundamentals of Database Systems , Elmasri, Navathe & Gupta, Pearson Education.

Reference Books:	
1.	Database System Concepts, Henry Korth and Others, McGraw Hill
2.	Database Systems, Connolly, Pearson Publications
3	Database Systems, S. K. Singh, Pearson Education
4	Principles of Database Systems, Ullman Golgotia Publications 1998

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/E%20-%20books-Wiley-Blackwell-/New%20Microsoft%20Office%20Word%20Document%20(2).htm

MOOCs Links and additional reading, learning, video material	
1	https://www.digimat.in/nptel/courses/video/106105175/L01.html
2	https://www.youtube.com/watch?v=OWX4RvijwLw

IV SEMESTER

22ADS406 : Lab. Database Management Systems

Course Outcomes
Upon successful completion of the course the students will be able to 1. Implement applications of stacks and queues. 2. Develop applications using linked list. 3. Demonstrate various operations of tree data structure. 4. Apply the knowledge of graph data structure for solving real life problems

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

SN	**Program based on**
1	Study of File System (Excel)
2	Draw the ER diagram
3	Implementation of DDL and DML queries
4	Perform select queries using predicates
5	To Perform various data manipulation queries, aggregate functions, sorting concept, single row functions
6	Displaying data from Multiple Tables (join)
7	To apply the concept of Aggregating Data using Group functions.
8	To solve queries using the concept of sub query
9	To apply the concept of Cursor
10	To apply the concept of procedure and function

IV SEMESTER

22ADS407 : Bayesian Data Analysis

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Demonstrate the fundamental theories of Bayesian statistics 2. Construct a probability model for computing the posterior distribution 3. Examine the model using model checking techniques 4. Estimate the predictive model accuracy and expand in the direction of improvement

Unit I:	**6 Hrs.)**
Fundamentals of Bayesian Inference : The three steps of Bayesian data analysis, General notation for statistical inference , Bayesian inference, probability as a measure of uncertainty **Contemporary Issues related to Topic**	
Unit II:	**(7 Hrs.)**
Single Parameter Models : Estimating a probability from binomial data, Posterior as compromise between data and prior information, Summarizing posterior inference, Informative prior distributions, Normal distribution with known variance, Other standard single-parameter models, informative prior distribution, Noninformative prior distributions. **Contemporary Issues related to Topic**	
Unit III:	**(7 Hrs.)**
Multiparameter model : Averaging over 'nuisance parameters', Normal data with a noninformative prior distribution, Normal data with a conjugate prior distribution, Multinomial model for categorical data, Multivariate normal model with known variance, Multivariate normal with unknown mean and variance **Contemporary Issues related to Topic**	
Unit IV:	**(7 Hrs.)**
Hierarchical models : Constructing a parameterized prior distribution, Exchangeability and hierarchical models, Bayesian analysis of conjugate hierarchical models, Normal model with exchangeable parameters, Hierarchical modeling applied to a meta-analysis **Contemporary Issues related to Topic**	
Unit V:	**7 Hrs.)**
Model checking : The place of model checking in applied Bayesian statistics, Posterior predictive checking , Graphical posterior predictive checks, Model checking for the educational testing example **Contemporary Issues related to Topic**	

Unit VI:	**(7 Hrs.)**
Evaluating, comparing, and expanding models : Measures of predictive accuracy, Information criteria and cross-validation, Model comparison based on predictive performance, Model comparison using Bayes factors, Continuous model expansion. Application domains **Contemporary Issues related to Topic**	
Total Lecture	**41 Hours**

Textbooks:	
1.	Gelman, A., Carlin, J. B., Stern, H. S., Rubin, D. B. (2013) Bayesian Data Analysis, Third Edition, Chapman & Hall/CRC.

Reference Books:	
1.	R. Christensen, W. Johnson, A. Branscum, T. E. Hanson (2010) Bayesian Ideas and Data Analysis: An Introduction for Scientists and Statisticians, CRC Press.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]	
1	http://103.152.199.179/YCCE/E%20-%20books-Wiley-Blackwell-/New%20Microsoft%20Office%20Word%20Document%20(2).htm

MOOCs Links and additional reading, learning, video material	
1	https://www.youtube.com/watch?v=GqxOwxwH1C8
2	https://nptel.ac.in/courses/106105215

IV SEMESTER
22ADS408 : Lab: Advanced Python

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Write a python program to apply various data structures concept 2. Apply the concept of file handling and object-oriented programming in python 3. Select the required framework and appropriate libraries to write a program in python 4. Develop web-based application using functionalities provided under various packages

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

SN	Program based on
1.	Revision to Python language: Lists, Dictionary, Sets, Tuples, Numpy. write a Python program using: Lists comprehension, Dictionary comprehension
2.	Write a program using: File handling
3.	Write a program using: Exception Handling
4.	Write a program using: Enumeration, Lambda Function
5.	Write program using: Decorators
6.	Write a program using object-oriented concept
7.	Module reference: statistics, Random, Math
8.	Study of Pandas data frames and implement data frames related operations
9.	Program using: Matplotlib
10.	Project work: GUI creation in Python (Flask framework)

IV Semester

Audit Course

MLC2124 - YCCE Communication Aptitude Preparation (YCAP4)

IV Semester
Department Specific Audit Course
MLC122 : Data Visualization

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

1. *Understand the fundamental concepts of Data Visualization*
2. *Apply the various operations on data from the visualization tool*
3. *Connect to different data sources using the data visualization tool*

Unit I: Basics of Design	**(4 Hrs.)**
Key components of a visualization, represent data using channels like color, size, and position, and some ground rules for honest and effective visualization	
Unit II: User Needs	**(4 Hrs.)**
how to choose the right visualization for a given scenario, align your design with that task, basics of task analysis, methods for task elicitation, and foundational knowledge of visual perception for design	
Unit III: Evaluation	**(4 Hrs.)**
assess the effectiveness of your visualization, qualitative and quantitative approaches for evaluating visualizations, basics of insight-based evaluation, interview studies, and experimental design and analysis	
Unit IV: Getting to Know Tableau for Data Visualization	**(4 Hrs.)**
welcome screen, worksheet screen, and dashboard screen, preliminary analysis of the data set, three different charts: a line chart, a tree map, and a bar chart,	
Unit V: Dashboard creation	**(4 Hrs.)**
Create a dashboard with those charts, and be able to add some simple dashboard interactions	
Unit VI: Project based on the case study	**(4 Hrs.)**
Study the data for specific case study. Prepare the dashboard for the same data set.	
Total Lecture	**24 Hours**

MOOCs Links and additional reading, learning, video material	
1.	https://in.coursera.org/learn/fundamentals-of-data-visualization#syllabus
2.	https://in.coursera.org/learn/data-visualization-tableau?specialization=data-visualization#syllabus

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 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

5th Semester

(Department of Computer Technology)

Artificial Intelligence and Data Science

V SEMESTER

22ADS501 : Artificial Intelligence

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To understand basic concepts in Artificial Intelligence, intelligent agents and to define the problem as a state space search 2. To understand the blind search and heuristic search techniques and apply them in problem solving 3. To understand the knowledge representation and its issues and inference methods for intelligent decision making 4. To understand the knowledge representation and reasoning under uncertainty 5. To understand basics of learning and development of expert systems

Unit I:	**(7 Hrs.)**
Introduction to AI: Definition of AI, early work in AI, the importance of AI,AI and related fields, distributed AI, task domains of AI, Introduction to intelligent agents, agents and environments, rationality, the nature of environments, the structure of agents. Problems, problem spaces and searches, defining the problem as a state space search,	
Unit II:	**(7 Hrs.)**
Production systems and control strategies: depth first and breadth first search, back tracking, problem characteristics, issues in the design of search programs. Heuristic search techniques: generate and t e s t , hill climbing, best first search, A* search, problem reduction, constraint satisfaction problems	
Unit III:	(7 Hrs.)
Knowledge representation: issues, representation and mapping approaches, procedural Vs declarative k n o w l e d g e, introduction to propositional logic, knowledge representation using predicate logic, unification and resolution algorithms. Introduction to Prolog language: Representation of Predicates, rules, and facts in prolog.	
Unit IV:	(7 Hrs.)
Representation of knowledge using rules, logic programming, forward and backward reasoning, matching, control knowledge. Knowledge representation using semantics nets and frames, scripts	
Unit V:	(6 Hrs.)
Introduction to non-monotonic reasoning, logics for non-montonic reasoning, Statistical reasoning: probability and Bay‟s theorem, certainty factors and rule based system.	
Unit VI:	(6 Hrs.)
Learning: general learning model, overview of different forms of learning, Expert Systems: Design & Development of Expert System, knowledge based Systems, Rule Based Expert System, Expert System Shell, Application Areas of Expert System	
Total Lecture	**40 Hours**

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Textbooks:				
1.	Artificial Intelligence A Modern Approach	Third	Stuart Russell,Peter Norvig	Pearson
2.	Artificial Intelligence	Third	by E. Richand K. Knight and S. Nair.	McGraw Hill

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Introduction to Artificial Intelligence and Expert System		D. W. Patterson	PHI

V SEMESTER

22ADS502 : Lab. Artificial Intelligence

Course Outcomes
Upon successful completion of the course the students will be able to 1. To understand basic concepts in Artificial Intelligence, intelligent agents and to define the problem as a state space search 2. To understand the blind search and heuristic search techniques and apply them in problem solving 3. To understand the knowledge representation and its issues and inference methods for intelligent decision making 4. To understand the knowledge representation and reasoning under uncertainty 5. To understand basics of learning and development of expert systems

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

SN	**Program based on**
1	Implementing Breadth First Search
2	Implementing Depth First Search
3	Implementing Heuristic search Algorithm
4	Implementing A* Algorithm
5	Solving a Constraint Satisfaction Problem
6	Developing a small Expert System Using Prolog
7	Solving Classification Problem using Bayes Theorem
8	Implementing Breadth First Search

V SEMESTER

22ADS503 : Data Mining

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the concepts related to data preparation, data modeling, and knowledge extraction 2. Apply the techniques for data pre-processing and modeling for knowledge extraction 3. Apply the supervised and unsupervised data mining techniques for knowledge extraction 4. Analyze the data to apply appropriate data modeling and mining technique

Unit I:	**(7 Hrs.)**
Introduction to data mining (DM) and Data Pre-processing: Introduction to data mining, KDD process. Data pre-processing, Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies	
Unit II:	**(7 Hrs.)**
Data Modelling to perform Data Mining: Data warehouse concepts, Data warehouse modelling, Data warehouse implementation, Data generalization by Attribute – Oriented Induction.	
Unit III:	(7 Hrs.)
Data mining using pattern mining algorithms: Association rules Motivation and terminology, Example, Basic idea: item sets, generating item sets and rules efficiently, Advanced Association Rule Techniques, Measuring the Quality of rules, Correlation analysis.	
Unit IV:	(7 Hrs.)
Data mining using Prediction methods: Linear and nonlinear regression, Multiple regression, Logistic Regression	
Unit V:	(6 Hrs.)
Data mining using Clustering Algorithm: Fundamentals of Clustering, Partitioning Clustering -K-Means Algorithm, K-Means Additional issues, Evaluation of Clustering Algorithms	
Unit VI:	(6 Hrs.)
Outlier Detection Techniques: Outliers and outlier analysis, Outlier detection methods, Statistical approaches, Proximity based approaches, Clustering based approaches, classification based approaches	
Total Lecture	**40 Hours**

Textbooks:			
1.	Data Mining: Concepts and Techniques 3rd Edition, 2012	J. Han, M. Kamber	Morgan Kaufman
2.			

Reference Books	
Data Mining Techniques	Arun Pujari

V SEMESTER
22ADS504 : Lab. Data Mining

Course Outcomes
Upon successful completion of the course the students will be able to 1. Understand the concepts related to data preparation, data modeling, and knowledge extraction 2. Apply the techniques for data pre-processing and modeling for knowledge extraction 3. Apply the supervised and unsupervised data mining techniques for knowledge extraction 4. Analyze the data to apply appropriate data modeling and mining technique

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

SN	Program based on
1	Collect and understand the standard dataset
2	Perform Pre-processing on standard datasets provided in the tool
3	Perform Pre-processing on standard datasets
4	Develop a program to pre-process the data using any one technique using Java
5	Perform Association Rule Mining with WEKA
6	Prediction model building in WEKA
7	Develop a program to build the regression model
8	Perform k-Means clustering in WEKA
9.	Develop a program to perform the k-means clustering algorithm

V SEMESTER

22ADS505 : Cyber Laws and Ethics in IT

Course Outcomes :
Upon successful completion of the course the students will be able to 1. The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. 2. The students will learn the rights and responsibilities as an employee, team member and a global citizen 3. To understand offences and penalties for cybercrimes under IT Act. 4. Interpret Cyber Ethics.

Unit I:	**(7 Hrs.)**
Introduction to Cyber Law: Evolution of computer technology, emergence of cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.	
Unit II:	**(7 Hrs.)**
Information Technology Act: Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.	
Unit III:	(7 Hrs.)
Cyber Law and Related Legislation: Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, Alternative Dispute Resolution , Online Dispute Resolution (ODR).	
Unit IV:	(7 Hrs.)
Privacy and Security: Basic Principal of Data Protection Act, Health Insurance Portability Accountability Act, concepts of ISO 27001 security Audit, Payment Card Industry Data Security Standard (PCI DSS), Computer crime investigation process and evidence collection, Incident Response Procedures, Net Neutrality	
Unit V:	(6 Hrs.)
Electronic Business and Legal Issues: Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C, E security. Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends.	

Unit VI:	(6 Hrs.)
Cyber Ethics: The Importance of Cyber Law, Significance of cyber Ethics, Need for Cyber regulations and Ethics. Ethics in Information society, Introduction to Artificial Intelligence Ethics: Ethical Issues in AI and core Principles, Introduction to Block chain Ethics. Application Area : Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends	
Total Lecture	**40 Hours**

Textbooks:	
1.	
2.	

Reference Books	
1.	Cyber Laws: Intellectual property & E Commerce, Security. -- Kumar K Dominant Publisher
2.	Cyber Ethics 4.0 -- Christoph Stuckelberger, Pavan Duggal Globethic
3.	Cryptography and E-Commerce 2001 Hon C Graff A Wiley Tech Brief, Wiley Computer Publisher
4.	The Information Technology Act, 2005: A Handbook 2011 OUP Sudhir Naib New York
5.	Cyber law: the Law of the Internet 1997 Jonathan Rosenoer Springer-verlag

V SEMESTER

22ADS506 : Lab : Open Source Tools

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Connect to and visualize data in Power BI 2. Build data model and get the insights from data. 3. Design compelling Power BI reports.

Lab Experiment List:

Expt. No	Name of Experiment
1	Introduction to Power BI and the different Power BI elements
2	Importing data into the Power BI from local data files and cloud servers
3	Clean, transform, and load data in Power BI
4	Create simple pre-defined models for visualization
5	Combine different visualization modes
6	Slice the dataset in Power BI
7	Matrices and tables in Power BI
8	Extract data relations and trends
9	Publish Power BI reports
10	Customizing the data analytics with Power BI and Power Automate

V SEMESTER

22ADS511 : PE I: Digital Image Processing

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Describe and understand Basic relationships between pixels. 2. Compare and Implement various image enhancement techniques in spatial domain and frequency domain. 3. Compare and illustrate different image compression techniques to understand the advantage of image compression 4. Identify and demonstrate the applications of similarity based and dissimilarity-based approaches for image segmentation. 5. Interpret and illustrate various representation techniques.

Unit I:	**(7 Hrs.)**
Introduction: Fundamental Steps in Image Processing, Elements of DIP systems, A Simple Image Model, Sampling and Quantization, Some Basic Relationships between Pixels.	
Unit II:	**(7 Hrs.)**
Image Enhancement in the Spatial Domain: Introduction to Spatial domain, Basic Gray Level Transformations, Histogram Processing, Histogram Equalization, Spatial Domain Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters	
Unit III:	(7 Hrs.)
Transforms: Introduction to the Fourier Transform, Discrete Fourier Transformation, Fourier Properties, 2DFT, inverse Fourier transforms, Typical Applications. Filtering in the Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency-Domain Filters.	
Unit IV:	(7 Hrs.)
Image Compression: Fundamentals of Image compression, coding redundancy, spatial and temporal redundancy, Irrelevant Information, Measuring Image Information, Image compression models, Various compression methods.	
Unit V:	(6 Hrs.)
Image Segmentation: Point Detection, Line Detection, Edge Detection, Gradient Operator, Edge Linking and Boundary Detection, Thresholding, Region-oriented Segmentation.	

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Unit VI:	(6 Hrs.)
Image Representation: Chain Codes, Polygonal Approximations, Signatures, Skeleton of a Region. Description: Boundary Descriptors, Shape Numbers, Regional Descriptors, Simple Descriptors, Topological Descriptors. Introduction to various color image processing models.	
Total Lecture	**40 Hours**

Textbooks:				
1.	Digital Image Processing Hall	3rd edition	Rafael C. Gonzalez and Richard, E. Woods	Prentice
2.	Digital Image Processing McGrawHill.	3rd edition	Jayaraman, S. Esakkirajan, T. Veerakumar	Tata

Reference Books				
1.	Fundamentals of Digital Image Processing	2nd Edition	A.K.Jain	Prentice Hall.
2.	Image Processing Principles & Applications Inter-Science.	2nd Edition	Tinku Acharya & Ajoy K. Ray	Willey

V SEMESTER

22ADS512 : PE I: Lab. Digital Image Processing

SN	**Program based on**
1	Write a program in MATLAB for following Point processing techniques in spatial domain a. Negation of an image b. Thresholding of an image c. Contrast Stretching of an image
2	Write a Program in MATLAB to Create a Histogram of a given Image.
3	Write a program in MATLAB to perform following smoothing operations on an image a. Average filter b. Ordered Statistics filter
4	Write a program to sharp an image using Laplacian mask.
5	Write a program to compress an image using Huffman Coding
6	Write a program to segment an image using multilevel thresholding.
7	Write a program to apply split and merge algorithm on a given image.
8	Write a program to find the code chain of a given image.
9	Write a program to find the shape number of a given image.
10	Write a program to find Euler number of image a given image.

V SEMESTER

22ADS513 : PE I: Internet of Things

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Design and evaluate various IOT environments. 2. Describe IOT architecture and its enabling technologies. 3. Analyze IOT environments using various communication technologies 4. Apply various IOT enabling technologies for creation of IOT environments

Unit I:	**(7 Hrs.)**
Introduction: Concepts behind the Internet of Things, Characteristics of IoT, IoT enabling technologies, IoT Communication Model, IoT architecture, Applications of IoT, Transducers, Sensors, Sensor classes, Sensor types, Actuators and its types	
Unit II:	**(7 Hrs.)**
IOT Protocols: Application layer: MQTT, COAP, XMPP, AMQP, Network Layer: IPv4, IPv6, 6LoWPAN, IoT Communication protocols: IEEE802.15.4, ZigBee, Wireless HART, Zwave, Bluetooth, NFC, RFID .	
Unit III:	**(7 Hrs.)**
Wireless Sensor networks: Components of sensor nodes, Node Behavior in WSNs, Applications, WSN Coverage, OGDC algorithm, Stationary and Mobile Wireless Sensor Networks.	
Unit IV:	**(7 Hrs.)**
Cloud Computing: Recent Trends in Computing, Characteristics, Components of Cloud Computing, Service Models, Deployment Models, Service Management, Cloud Security, IoT Data analytics, Case studies, Middleware for IoT.	
Unit V:	**(6 Hrs.)**
Machine to Machine Communication: Node types, IP and Non-IP based M2M network Interoperability in Internet of Things: Current Challenges in IoT, Interoperability, Types of Interoperability	
Unit VI:	**(6 Hrs.)**
Software-Defined Networking: Current Network to SDN, SDN Architecture, Challenges, OpenFlow Protocol, APIs in SDN, Controller Placement, Recent Advances of SDN in IoT, Industrial internet of things, Case studies.	
Total Lecture	**40 Hours**

Textbooks:	
1.	Internet of Things A hands on approach First Edition Arshdeep Bahga and Vijay K. Madisetti Orient Blackswan Private Limited - New DelhiHall
2.	

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V SEMESTER

22ADS514 : PE I: Lab. Internet of Things

SN	**Program based on**
1	To study IoT Kit
2	Design a sketch for running of LED's
3	Design a sketch to monitor state of switch by establishing serial communication between Arduino and computer.
4	Design a sketch to read analog value of potentiometer by establishing serial communication between arduino and computer.
5	Design a sketch for blinking LED's without using delay
6	Design a sketch to develop switch based binary LED counter. Also observe output on serial monitor.
7	Design a sketch to create a simple digital clock using LCD display.
8	Design a sketch to make use of EEPROM to control devices(LED)
9	To log data of temperature sensor over internet and monitor it from anywhere in the world.
10	Use of ESP-32

V SEMESTER

22ADS515 : PE I : Numerical Methods

Course Outcomes :
Upon successful completion of the course the students will be able to
1. Apply appropriate formula to find different types of error in numerical computation and mitigate it. 2. Choose and apply appropriate numerical techniques for problem solving interpret the results and assess accuracy. 3. Apply appropriate techniques for numerical integration 4. Demonstrate basics of conditioning of problems and stability of numerical algorithms

Unit I:	**(7 Hrs.)**
Introduction to numerical computing: Characteristics of Numerical computing, Approximations and errors in numerical computations, types of errors, analysis, error estimation, numerical instabilities in computation, convergence (convergence of iterative method)	
Unit II:	**(7 Hrs.)**
Roots of Non-linear equations: Methods of solutions, Iterative methods, Horner‟s rule, Bisection method, Regula Falsi method, Iteration method, Newton Raphson method, Secant method	
Unit III:	**(7 Hrs.)**
Solutions to System of Linear Algebraic Equations: Existence of Solution, Solution By Elimination, Cramers rule, Basic Gauss Elimination Method, Gauss Elimination With Pivoting, Gauss – Jordan Method, Tringularization Methods, Choleskey‟s Method, Gauss Siedel method of iteration. Round Off Errors And Refinement, Ill – Conditioned System, Matrix Inversion Method.	
Unit IV:	**(7 Hrs.)**
Interpolation and Approximation: Linear interpolation and high order interpolation using Lagrange and Newton Interpolation methods, finite difference operators and interpolation polynomials using finite differences.	
Unit V:	**(6 Hrs.)**
Numerical Differentiation and Integration: Numerical differentiation and errors in numerical differentiation, NewtonCotes formulae, trapezoidal rule, Simpson‟s rule, Double integrals by Trapezoidal and Simpson rule, Romberg Integration.	
Unit VI:	**(6 Hrs.)**
Numerical Solution of Ordinary Differential Equation: Solution By Taylor‟s Series, Picard‟s Method Of Successive Approximation, Euler‟s Method, Error Estimates For The Euler Method, Runge-Kutta Method for 2nd and 4th order, Predictor-Corrector Methods	
Total Lecture	**40 Hours**

Textbooks:	
1.	Introductory Methods of Numerical Analysis Fifth Eidtion S.S.Sastry Prentice- Hall of India, New Delhi
2.	

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Numerical Methods	Standard Edition	E. Balagurusamy	Tata McGraw hill.
2	Schaum's Outlines: Numerical Analysis -	Second Edition	Francis Scheid	Tata McGraw Hill Publishing Co. Limited.
3.	Numerical Computational Methods	illustrated, revised	P.B. Patil, U.P. Verma	Alpha Science International Limited, 2009

V SEMESTER

22ADS516 : PE I : Lab. Numerical Methods

SN	**Program based on**
1	To find the absolute, relative percentage error in given function when: i. Three terms ii. ii. Five terms are considered. The given function is: y = ex
2	To find solution for Algebraic and Transcendental equation using Bisection Method.
3	To find solution for Algebraic and Transcendental equation using Regula Falsi Method.
4	To find solution for Algebraic and Transcendental equation using Newton Raphson Method
5	To find solution of Linear System of equations using Gauss Elimination Method.
6	To find solution of Linear System of equations using Gauss - Siedal Method of Iteration.
7	To Implement Lagrangian method of interpolation.
8	To calculate numerical Differentiation using Newton's Forward Interpolation formula
9	To calculate Integration using Simpson's rule/Trapezoidal Rule

V SEMESTER

22ADS531 : OE I: Introduction to 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	
Unit II:	**(7 Hrs.)**
Understanding different data sets Introduction to Data analysis, Types of Data analysis, Applications. Technologies involved in the data analysis	
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	
Unit IV:	**(7 Hrs.)**
Probability theory: basic concepts, applications, types. Bayes theorem	
Unit V:	**(6 Hrs.)**
Probability distribution, Binomial distribution, Poisson distribution, Normal distribution. random variable.	
Unit VI:	**(6 Hrs.)**
Application domains of data analysis. Case studies in various application domains.	
Total Lecture	**40 Hours**

	Textbooks:
1.	Statistics for Management", Richard I. Levin & David S. Rubin, 7th Edition, Pearson Education.
2.	

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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=wrIvuzi56oQ

V SEMESTER

22ADS532 : OE I: Foundations of AI

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Understand the fundaments of artificial intelligence and identify performance measure for given intelligent agent 2. Apply searching techniques for problem solving 3. Apply the concept of knowledge representation and transform real life information in different representations 4. Solve AI problems using the techniques of uncertainty

Unit I:	**(7 Hrs.)**
Introduction: Intelligent Agents,Agents and Environments, Rationality, Nature of Environments, Structure of Agents, Problem solving agents, Problem Formulation	
Unit II:	**(7 Hrs.)**
Uninformed search strategies : Depth, Breadth, Uniform Cost, Depth Limited, Iterative deepening DFS, Bidirectional Search	
Unit III:	**(7 Hrs.)**
Informed search strategies : Heuristic Search and Exploration, Greedy best first search, A* search, Memory bounded heuristic search, Heuristic functions, inventing admissible Heuristic functions, Local Search algorithms, Hill-climbing, Simulated Annealing	
Unit IV:	**(7 Hrs.)**
Constraint Satisfaction Problems, Backtracking Search, variable and value ordering, constraint propagation, intelligent backtracking, local search for CSPs, Adversarial Search, Games, The minimax algorithm, Alpha-Beta pruning, Imperfect Real-Time Decisions	
Unit V:	**(6 Hrs.)**
Knowledge Based Agents, Logic, Propositional Logic: Inference, Equivalence, Validity and Satisfiability, Resolution, Forward and Backward Chaining, First Order Logic: Models for first order logic, Symbols and Interpretations, Atomic sentences, complex sentences, Quantifiers, Inference in FOL, Unification, Forward Chaining, Backward Chaining, Resolution	
Unit VI:	**(6 Hrs.)**
Uncertainty, Handing uncertain knowledge, rational decisions, basics of probability, axioms of probability, inference using full joint distributions, independence, Baye's Rule and conditional independence, Bayesian networks, Semantics of Bayesian networks, Exact inference in Bayesian Networks	
Total Lecture	**40 Hours**

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Textbooks:				
1.	Artificial Intelligence A Modern Approach	Third	s. Russell and P. Norvig	Pearson Education.

Reference Books:				
1.	Artificial Intelligence	Second	E. Rich and K. Knight and Shivashankar B. Nair	McGraw Hill
2.	Introduction to Artificial Intelligence and Expert System	Third	D. W. Patterson	PHI

V SEMESTER

22ADS551 : OE II: Introduction to DBMS

Course Outcomes :
Upon successful completion of the course the students will be able to 1. Students should be able to design database forgiven situation, write appropriate queries for accessing database.

Unit I:	**(7 Hrs.)**
An Overview of the Database Management System: What is database? Why database?, database system, database management system (DBMS), advantages of DBMS	
Unit II:	**(7 Hrs.)**
An Architecture of the Database system: Three levels of architecture, mappings, role of database administrator (DBA), E-R model, three approaches of DBMS relational, hierarchical and network.	
Unit III:	**(7 Hrs.)**
Relational Database Management System (RDBMS): Introduction, RDBMS terminology, relational model, base tables, key	
Unit IV:	**(7 Hrs.)**
The SQL Language: Introduction, Characteristics of SQL, data definition command	
Unit V:	**(6 Hrs.)**
Data manipulation commands	
Unit VI:	**(6 Hrs.)**
Introduction to XML	
Total Lecture	**40 Hours**

Textbooks:	
1.	Silberschatz A, Korth H.F and Sudarshan S, "Data base System Concepts", Fifth Edition, Tata McGraw-Hill.
2.	R. Elmasri, S. B Navathe, "Fundamentals of Database System", Pearson Education.

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Reference Books:	
1.	Leon A and Leon M, "Fundamentals of DBMS", Vijay Nicole & Tata McGraw-Hill.
2.	Gill P.S, "DBMS", I.K. International.
3	Singh S.K, "Database Systems: Concepts, Design & Applications", Pearson Education.
4	Leon A and Leon M, "Database Management Systems", Vikas Publishing House

V SEMESTER

22ADS552 : OE II: Current Trends and Technologies

Course Outcomes :
Upon successful completion of the course the students will be able to 1. To understand multimedia basics - hardware and software. 2. To develop skills in design, illustration, image manipulation, graphic designing, video editing, visual effects and game designing. 3. To develop the skills in animation software

Unit I:	**(7 Hrs.)**
Fundamentals of Communications: Types of communication-Wired, wireless, mobile, Modes of transmission: Simplex, Half Duplex, Full Duplex, Multiplexing techniques, History and evolution of wireless and mobile systems, Transition and characteristics of 1G, 2G, 3G, 4G, Spectrum, regulations, and frequency allocation	
Unit II:	**(6 Hrs.)**
Fundamental of INTERNET: History, Internet working, Connections, Internet services, The World Wide Web, Tools for the WWW, Web servers, Web browsers, Web page makers and editors, Plug-ins and delivery vehicles.	
Unit III:	**(7 Hrs.)**
e-Technologies: Electronic Commerce: Framework, Media Convergence of Applications, Consumer, Applications, Organization Applications, Electronic Payment Systems: Digital Token, Smart Cards, Credit Cards, Risks in Electronic, Payment System, Designing Electronic Payment Systems, Electronic Data Interchange (EDI): Concepts, Applications, (Legal, Security and Privacy) issues, EDI and Electronic Commerce, Standardization and EDI, EDI Software, Implementation, EDI Envelope for Message Transport, Internet-Based EDI.	
Unit IV:	**(6 Hrs.)**
e-Learning: Definition, Introduction, Types of e-Learning: Learner-led e-Learning, Facilitated eLearning, Instructor-led e-Learning, Embedded e-Learning, Telemonitoring And e-Coaching ELearning Models: WBT, CBT, LMS, LCMS, Virtual School Systems, E-Learning Tools And Technologies: e-mail, Online Discussion, Chat and Instant Messaging, Voting, Whiteboard, Application Sharing, Conferencing, Online Meeting Tools, Case study.	

Unit V:	**(6 Hrs.)**
Green Computing: Introduction, Why....Green Computing? Approaches to Green ComputingVirtualization, Power Management, Power supply, Storage, Video Card, Display, IT Equipment, Recycling, Remote Conferencing & Telecommuting Strategies, Product longevity, Resource allocation, Terminal servers, Operating system support, How to Implement? Industrial implementations of Green Computing- Blackle, Fit-PC, Zonbu computer, Sunray thin client.	
Unit VI:	**(7 Hrs.)**
Social Networking: Definition, Overview of Social Networking Sites, Types of Social Networking Sites: General purpose, Niche. Advantages of Social Networking Sites, Drawbacks of Social Networking Sites, Features and Need of Social Networking, Security Issues with Social Networking Sites, Case Studies	
Total Lecture	**39 Hours**

Textbooks:	
1.	. Impact of E-Business Technologies on Public and Private Organizations by OzlemBak, Nola Stair.
2.	Mobile Computing by Tomasz Imielinski , Henry F. Korth .
3.	Broadband telecommunications technology by Byeong Gi Lee, Minho Kang, Jonghee Lee.

Reference Books:	
1.	Introduction to broadband communication systems by Cajetan M. Akujuobi, Matthew, N. O. Sadiku.
2.	E-Learning Tools and Technologies William Hortan, Katherine Hortan,Wiley Pub
3.	Internet (Use of Search Engines Google & Yahoo etc).

V SEMESTER

22ADS507 : Industrial training, Seminar & Report

V SEMESTER

Audit Course

MLC2125 : YCAP5

V SEMESTER

Audit Course

MLC125 : Design thinking

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 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2022

6th Semester

(Department of Computer Technology)

Artificial Intelligence and Data Science

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B.TECH SCHEME OF EXAMINATION 2022

(Scheme of Examination w.e.f. 2022-23 onward)

(Department of Computer Technology)

Artificial Intelligence and Data Science

SoE No. 22ADS-101

SN	Sem	Type	BoS/ Deptt	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	T	P	Hrs		MSEs*	TA**	ESE	
Sixth Semester															
1	6	GE	GE/HUM	22ADS601	Management Studies	**T**	3	0	0	3	3	30	20	50	3 Hours
2	6	PC	CT	22ADS602	Business Analytics	**T**	3	0	0	3	3	30	20	50	3 Hours
3	6	PC	CT	22ADS603	**Lab:** Business Analytics	P	0	0	2	2	1		60	40	
4	6	PC	CT	22ADS604	Machine Learning	**T**	3	0	0	3	3	30	20	50	3 Hours
5	6	PC	CT	22ADS605	**Lab:** Machine Learning	P	0	0	2	2	1		60	40	
6	6	PC	CT	22ADS606	**Lab :** Advanced Web Technolgy	P	0	0	2	2	1		60	40	
7	6	PE	CT		**Professional Elective-II**	**T**	3	0	0	3	3	30	20	50	3 Hours
8	6	PE	CT		**Open Elective III**	**T**	3	0	0	3	3	30	20	50	3 Hours
9	6	PR	CT		**Open Elective IV**	**T**	3	0	0	3	3	30	20	50	3 Hours
10	6	OE	CT	22ADS607	Project Phase I	P	0	0	4	4	2		60	40	
					TOTAL SIXTH SEM		**18**	**0**	**10**	**28**	**23**				

List of Professional Electives- II

Professional Electives-II

1	6	PE-II	CT	22ADS611	PE-II : Computer Vision
2	6	PE-II	CT	22ADS612	PE-II : Natural Language Processing
3	6	PE-II	CT	22ADS613	PE-II : Robotics
4	6	PE-II	CT	22ADS614	PE-II : Data Analytics for Industry 4.0
5	6	PE-II	CT	22ADS615	PE-II : Social Media Analytics
6	6	PE-II	CT	22ADS616	PE-II : Optimization Techniques

Open Elective-III

1	6	OE-III	CT	22ADS631	OE III: Introduction to Data Science
2	6	OE-III	CT	22ADS632	OE III: Foundations of AI

Open Elective-IV

1	6	OE-IV	CT	22ADS651	OE IV: Introduction to DBMS
2	6	OE-IV	CT	22ADS652	OE IV: Current Trends and Technologies

List of Mandatory Learning Course (MLC)

1	6	HS		MLC2126	**YCAP6:**	**A**	3	0	0	3	0

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

TA* = for Theory : 12 marks on lecture quizzes, 12 marks on two TA2 activities decided by course teacher, 2 marks on class attendance and 4 marks on TA4 activities

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

		June 2022	**1.00**	**Applicable for AY 2022-23 Onwards**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**	

VI SEMESTER

22ADS601 : Fundamentals of Management and Economics

Course Outcomes:

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

1. Explain the Functions of Management and identify tools and techniques of Marketing of goods and services
2. Analyze the role of Financial Accountancy and Management in the Organization
3. Develop perspective about economy based on logical reasoning and estimate the economic outcomes.
4. Interprets comparative advantage of resources.

Unit:1	**Principles of Management**	**7 Hours**

Evolution of Management Thought: Scientific and Administrative Theory of Management, Definition and Concept of Management, Functions of Management: Planning, Organizing, Directing, Coordinating and Controlling, Motivational Theories, Concept of Leadership.

Unit:2	**Marketing Management**	**7 Hours**

Marketing Management - Definition & scope, Selling & Modern Concepts of Marketing, Market Research, Customer Behaviors, Product Launching, Sales Promotion, Pricing, Channels of Distribution, Advertising, Market Segmentation, Marketing Mix, Positioning, Targeting.

Unit:3	**Financial Accountancy and Management**	**7 Hours**

Definition & Functions of Finance department, Sources of finance, Types of capital, Types of Taxes, Introduction of Accountancy and its rules, Preparation of Books of Account- Jounal, Posting of transaction into ledger and preparation of trial balance, Introduction of trading account, profit and loss account and balance sheet

Unit:4	**Introduction to Economics and engineering Economy:**	**6 Hours**

Economics and engineering economy, Utility analysis- Cardinal, ordinal, Law of diminishing marginal utility, Laws of demand and supply, elasticity of demand, its measurement and application.

Unit:5	**Engineering Production and Costs**	**7 Hours**

Factors of Production: Land, Labour, Capital, Enterprise and their peculiarities, Concepts and types of costs, Law of Variable proportions (Law of diminishing marginal returns) and Return to Scale (Increasing, constant and decreasing), Economies and diseconomies of scale. Inflation: Meaning, types, causes and consequences, measures to control inflation, Concepts of deflation and Stagflation.

Unit :6	Market structures - equilibrium output and price	7 Hours
Forms of market structures: Perfect competition, monopolistic competition, oligopoly, duopoly and monopoly, Demand and revenue curves for firm and industry in various forms of market structure, Total, average and marginal revenue curves, equilibrium of firms and industries under various forms of market structures, Price discrimination.		
Total Lecture Hours		**39 Hours**

Textbooks	
1.	Principle of Management, 9th edition , Harold Koontz Ramchandra, Tata McGrow hills
2.	Marketing Management: Planning, Implementation and Control, 3rd Edition, Ramaswamy V.S. and Namakumari S, Macmillian
3.	Financial Services, 19th Edition, Khan M Y, Tata McGraw Hill, 19
4.	Modern Economics, 13th Edition, H. L. Ahuja, S. Chand Publisher, 2009
5.	Modern Economic Theory, 3rd edition, K. K. Devett, S. Chand Publisher,2007
6.	Principle of Economics, 7th edition, Mankiw N. Gregory, Thomson, 2013
Reference Books	
1.	Foundations of Financial Markets and Institutions, 3rd Edition, Fabozzi, Pretice Hall
2.	Fundamentals of Financial Instruments , 2nd Edition, Parameshwaran, Wiley India
3.	Marketing Management , 3rd Edition , RajanSaxena, Tata McGraw Hill
4.	Advance Economic Theory, 17th Edition, H. L. Ahuja, S. Chand Publisher, 2009
5.	International Trade, 12th edition, M. L. Zingan, Vindra Publication, 2007
6.	Macro Economics, 11th edition, M. L. Zingan, Vindra Publication, 2007
7.	Monitory Economics:, 1st Edition, M. L. Sheth, Himayalaya Publisher, 1995
8.	Economics of Development and Planning, 12th edition, S. K. Misra and V. K. Puri, Himalaya Publishing House, 2006.
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_mg104/preview
2	https://nptel.ac.in/
3	https://onlinecourses.nptel.ac.in/noc20_mg31/preview
4	https://onlinecourses.nptel.ac.in/noc21_hs52/preview
5	https://onlinecourses.nptel.ac.in/noc22_hs67/preview

VI SEMESTER

22ADS602 : Business Analytics

Course Outcome
1. Apply the knowledge of basic concepts of Business Intelligence and multidimensional modelling and able to compare digital data types.
2. Build and operate the multidimensional data model for the specific scenario to extract the information.
3. Analyze the business information to construct the reports from it.
4. Decide the mode / channel to implement the business intelligence solution for the specific problem.

Unit No.	Contents	Max. Hrs.
1	Introduction to Business Intelligence: Introduction to digital data and its types –structured, semi-structured and unstructured, BI Definitions & Concepts, BI Framework, BI Infrastructure Components –BI Process, BI Technology, BI Roles & Responsibilities, Business Applications of BI, BI best practices	8
2	Principles of Dimensional Modelling: Foundation for Fact based decision making, The STAR and SNOWFLAKE schema, Pros & Cons of the STAR/SNOWFLAKE Schema Dimensional Model, Slowly Changing Dimension tables, Fact-less Fact Tables, Aggregation Strategy, Time Dimension	7
3	Basics of Data Integration (Extraction Transformation Loading): Concepts of data integration, needs and advantages of using data integration, introduction to common data integration approaches, Meta data –types and sources, Introduction to data quality, data profiling concepts and applications, introduction to ETL using Pentaho data Integration (formerly Kettle).	7
4	Introduction to business metrics and KPIs, creating cubes using Microsoft Excel,Basics of Enterprise Reporting: A typical enterprise, Malcolm Baldrige -quality performance framework, balanced scorecard, enterprise dashboard, balanced scorecard vs. enterprise dashboard, enterprise reporting using MS Access / MS Excel, best practices in the design of enterprise dashboards.	6
5	Identifying Dimension tables and fact table, designing of dimension and fact tables" schema, design of snowflake schema, query redirection. Aggregations: Why aggregate? , designing Summary tables, which summaries to create.	6
6	Case study: Overview and use of products from Pentaho and other open software. BI road Ahead: BI and mobility, BI and cloud computing, BI for ERP systems, Social CRM and BI	6

1

	Total Credits	**40**

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Fundamentals of Business Analytics		R. N. Prasad, Seema Acharya	Wiley India
2	Data Warehousing in the real world A practical guide for building Decision Support System		Sam Anahory, Dennis Murray	PEARSON

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1				
2				

VI SEMESTER

22ADS603 : Lab. Business Analytics

Sr. No.	Name of Practical
1	Design a conceptual multidimensional model for the given data.
2	Create a table for Time dimension using existing data source. Extract the data from various sources and move it to backup area.
3	Load the data from backup area to staging area and then Load data in data warehouse from staging area.
4	Create a chart report, by considering module names on the X-axis, Percentage Scored in the Various Modules on Y-axis.
5	Create a table report to display Year, Quarter, Month, Module name of the assessment conducted in the current month, Assessment type of the module conducted in the current month. Enable drill down for "Year," "Quarter, and "Month."
6	Graph the percentage sales over time to see the trends using given dataset. Also Pivot the data to see total sales by quarter and category and analyze the data
7	Report the sales by category and the corresponding freight charges. Filtering should be enabled in the Year and Quarter columns, and the selected Year and Quarter need to be visible. Also Sort the Sales data in terms of Year, Quarter and Month.
8	Extract the data from various sources using PENTAHO and apply the transformation on the data.
9	Describe the characteristics of data imported in R by using R functions.
10	Consider a data set and visualize it using appropriate visualization technique in 'R'
11	Apply data transformation and represent the data model in Orange tool
12	Perform data visualization using Tableau

VI SEMESTER
22ADS604 : Machine Learning

Course Outcome
Upon successful completion of the course students will be able to: 1. Interpret machine learning techniques suitable for a given problem 2. Apply machine learning techniques to solve the problems 3. Compare machine learning techniques 4. Evaluate different machine learning techniques

Unit No.	Contents	Max. Hrs.
1	Introduction, machine learning classes (i.e., supervised, unsupervised and reinforced), well posed and ill posed learning problems, designing a learning system, perspective and issues in machine learning, applications	7
2	Learning a class from Bayesian learning, learning theory (bias/variance tradeoffs; VC theory; large margins), Generative/discriminative learning, parametric/non-parametric learning linear and logistic regression, svm	7
3	Introduction, Density Estimation, Clustering Dimensionality reduction, PCA, kernel methods	7
4	Introduction, decision tree representation, appropriate problems for Decision Tree learning, the basics decision tree learning algorithm, hypothesis space search, inductive bias in decision tree learning, issues in decision tree learning.	7
5	Introduction, Factors, Response, and Strategy of Experimentation, Guidelines for Machine Learning Experiments, Cross-Validation and Resampling Method, Measuring Classifier Performance, Interval Estimation, Hypothesis Testing, Assessing a Classification Algorithm‟ Performance, Comparing Two Classification Algorithms, Comparing Multiple Algorithms: Analysis of Variance, Comparison over Multiple Datasets	7
6	Ensemble methods, Introduce the concepts behind deep learning and benefits of deep over shallow networks, introduce the concepts of reinforcement learning	7
	Total Credits	**42**

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	"Introduction to Machine Learning",	second edition	Ethem Alpaydin,	The MIT Press
2	"Machine Learning",		Tom Mitchell,	McGraw-Hill Science/Engineerin, 1997

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Pattern Recognition and Machine Learning		Christopher M. Bishop,	
2	An Introduction to Reinforcement Learning		R. Sutton and A. Barto,	
3	Reinforcement Learning		C. Szepesvari, Algorithms	
4	Deep Learning		Ian Goodfellow, Yoshua Bengio, and Aaron Courville,	

VI SEMESTER

22ADS605 : Lab. Machine Learning

Sr. No.	Name of Practical
01	Overview of Machine Learning Python Libraries, Datasets, Environments, Keras, and Tensorflow.
02	Implementation of Supervised Learning Algorithms from Scratch.
03	Implementation of Unsupervised Learning Algorithms from Scratch.
04	Introduction to Tensors, TensorFlow Basic Syntax, TensorFlow Graphs, Variables and Placeholders
05	Tensor flow implementation of regression , *k*-nn for structured data using csv file
06	Tensor flow implementation of *k* means for structured data using csv file
07	Implement Neural Network for MLP Digit-Classifier using TensorFlow
08	Save and Restore Models

VI SEMESTER

22ADS606 : Lab. Advanced Web Technology

S.N	List of Practical
1.	Write a JavaScript function that creates a table, accept row, column numbers from the user, and input row-column number as content (e.g. Row-0 Column-0) of a cell.
2.	Create employee registration webpage using HTML5 form objects
3.	Implement CSS3 for Online shopping system
4.	Create a dynamic web page which displays arithmetic operations [addition, subtraction, division, multiplication and modulus] using HTML Forms
5.	Write a suitable scripts which show methods of Server object [HTML Encode, URL Encode, Map path, Execute and Transfer]
6.	Write a script which creates and retrieves Cookies information
7.	Create a dynamic web page which displays capabilities of a web browser using Browser Capabilities Component using JavaScript
8.	Create a simple XML Http Request and retrieve data from a TXT file.
9.	Create a simple script to download Images Using AJAX,
10.	Create a simple script to Auto-Populate Select Boxes using AJAX

VI SEMESTER

22ADS611 : PE-II : Computer Vision

Course Outcome
1. The study of computer vision provides our students with the knowledge to correctly apply the laws of nature to the creative formulation and solution o engineering problems through the use of analytical, computational and experimental techniques.
2. The underlying principles such as geometric image formation models provide a solid background on the pertinent computer science, mathematical, and electrical engineering concepts that make up the foundations of the discipline of electrical engineering and computer science engineering, as well as their closely associated fields.
3. Two-dimensional filtering theory will help provide mastery of a broad and working knowledge of the principles of electrical engineering and computer science
4. Computer vision topics such as image formation, segmentation, and object detection will provide students with the ability to apply knowledge of computing, mathematics, science and engineering to solve problems in multidisciplinary research.

Unit No.	Contents	Max. Hrs.
1	Image formation, Image Transformations,. Homogenous coordinates, Projective geometry, Camera geometry, camera calibration, vanishing points	4
2	Image Filters, Edge Detection. Corner Detection. Fitting, Feature Detection and Matching. Homographies. Image Stitching/Mosaicing	10
3	Epipolar Geometry. Stereo Vision, Segmentation, Recognition and Classification	8
4	Optical flow 3D reconstruction Object detection, Object recognition Object tracking	8
5	Computational tools for creating Image Panoramas: homographies, RANSAC for point-matching, SIFT (scale invariant feature transform) for detection of salient feature points, Algorithms for - shape from shading, depth from needle map; optical flow, Kanade-Lucas-Tomasi algorithm, applications of optical flow in underwater imagery; shape from stereo, epipolar geometry; structure from motion;	5
6	Photometric stereo - deriving shape from multiple images of an object taken under different lighting conditions; applications to illumination invariant face recognition, face relighting , Machine Learning in computer vision: Face detection using Adaboost, Object detection using parts,Classifiers. SVMs, Neural Nets, Deep Learning	5
	Total Credits	**40**

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Computer Vision: A Modern Approach	4th edition	Forsyth and PonceH	Pearson Education.
2	Introductory Techniques for 3D Computer Vision",		Emanuele Trucco and Alessandro Verri	Prentice Hall
3	Computer Vision Algorithms and Applications		Richard Szeliski	

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Robot Vision		B. K. P. Horn	MIT Press (Cambridge).
2	Trucco and Verri, Introductory Techniques for 3D Computer Vision, 1998			

VI SEMESTER

22ADS612 : PE-II : Natural Language Processing

OUTCOMES
Upon successful completion of the course, the student will be able to: 1. Model linguistic phenomena with formal grammars. 2. Design, implement and test algorithms for NLP problems 3. Apply NLP techniques to design real world NLP applications

Unit No.	Contents	Max. Hrs.
1	**Introduction**: History of NLP, Generic NLP system, levels of NLP , Knowledge in language processing , Ambiguity in Natural language, stages in NLP, challenges of NLP, Applications of NLP	5
2	**Morphology fundamentals**: Morphological Diversity of Indian Languages, Morphology Paradigms, Shallow Parsing, Named Entities, Maximum Entropy Models, Random Fields. Word Level Analysis, Morphology analysis –survey of English and Indian language Morphology, Inflectional morphology & Derivational morphology, Lemmatization, Regular expression, finite automata, finite state transducers (FST) ,Morphological parsing with FST , Lexicon free FST Porter stemmer. N –Grams- N-gram language model, N-gram for spelling correction.	8
3	**Structures** : Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Text as in Web documents, Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.	7
4	**Meaning** : Lexical Knowledge Networks, Wordnet Theory, Indian Language Wordnets and Multilingual Dictionaries, Semantic Roles, Word Sense Disambiguation, WSD and Multilinguality Semantic Analysis: Lexical Semantics, Attachment for fragment of English- sentences, noun phrases, Verb phrases, prepositional phrases, Relations among lexemes & their senses – Homonymy, Polysemy, Synonymy, Hyponymy, Robust Word Sense Disambiguation (WSD), Dictionary based approach	8
5	**Pragmatics Discourse** : Coreferences, reference resolution, reference phenomenon , syntactic & semantic constraints on co reference	7
6	**Natural language Processing applications** (preferably for Indian regional languages) : Sentiment Analysis,Text Entailment, Robust and Scalable Machine Translation, Question Answering in Multilingual Setting, Cross Lingual Information Retrieval (CLIR)	7
	Total Credits	**40**

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Speech and Language Processing:An Introduction to Natural Language Processing, Speech Recognition, and Computational Linguistics		Jurafsky, Daniel, and James H. Martin,	PrenticeHall, 2000
2	Foundations of Statistical Natural Language Processing	1999	Christopher D. Manning and Hinrich Schütze,	Cambridge, MIT Press,.

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Natural Language Understanding	2nd, 1995.	James Allen	Benjamin/Cummings
2	Statistical Language Learning	1996	Eugene Charniak	MIT Press
3	Harald Clahsen, Andrew Redford, Linguistics	1999	Martin Atkinson, David Britain,	Cambridge University Press

VI SEMESTER

22ADS613 : PE-II : Robotics

VI SEMESTER

22ADS614 : PE-II : Data Analytics for Industry 4.0

VI SEMESTER

22ADS615 : PE-II : Social Media Analytics

OUTCOMES
1. Familiarize the learners with the concept of social media analytics and understand its significance. 2. Familiarize the learners with the tools of social media analytics. 3. Enable the learners to develop skills required for analyzing the effectiveness of social media for business purposes

Unit No.	Contents	Max. Hrs.
1.	**Introduction to Social Media Analytics (SMA)**: Social media landscape, Need for SMA; SMA in Small organizations; SMA in large organizations; Application of SMA in different areas	6
2.	**Network fundamentals and models:** The social networks perspective - nodes, ties and influencers, Social network and web data and methods.Graphs and Matrices- Basic measures for individuals and networks. Information visualization	6
3.	**Making connections:** Link analysis. Random graphs and network evolution. Socialcontexts: Affiliation and identity.	6
4.	**Web analytics tools:** Clickstream analysis, A/B testing, online surveys, Web crawling and Indexing. Natural Language ProcessingTechniques for Micro-text Analysis	6
5.	**Facebook Analytics:** Introduction, parameters, demographics. Analyzing page audience. Reach and Engagement analysis.Post- performance on FB. Social campaigns. Measuring andAnalyzing social campaigns, defining goals and evaluating outcomes, Network Analysis. (LinkedIn, Instagram, YouTube Twitter etc. Google analytics. Introduction. (Websites)6	6
6.	Processing and Visualizing Data, Influence Maximization,Link Prediction, Collective Classification, Applications in Advertising and Game Analytics Introduction to Python Programming, Collecting andanalyzing social media data; visualization and exploration	6

Reference Books:

Sr. No.	Author	Name of the Book	Publisher	Year of Publication
1	Matthew Ganis, Avinash Kohirkar	Social Media Analytics: Techniquesand Insights for Extracting Business Value Out of Social Media	Pearson	2016
2	Jim Sterne	Social Media Metrics:How to Measure and Optimize Your Marketing Investment	Wiley	Latest edition
3	Oliver Blanchard	Social Media ROI:Managing and Measuring Social	Que Publishing	Latest edition

VI SEMESTER
22ADS616 : PE-II : Optimization Techniques

OUTCOMES
1. Students will be able to understand basic theoretical principles for formulation of optimization models and its solution. 2. Students will be able to learn the unified and exact mathematical basis as well as the general principles of various soft computing techniques. 3. Students should be able to apply detailed theoretical and practical aspects of intelligent modeling, optimization and control of linear and non-linear Systems.

Unit No.	Contents	Max. Hrs.
1	Unconstrained Optimization: Optimizing Single-Variable Functions, conditions for Local Minimum and Maximum, Optimizing Multi-Variable Functions.	
2	Constrained Optimization: Optimizing Multivariable Functions with Equality Constraint: Direct Search Method, Lagrange Multipliers Method, Constrained Multivariable Optimization with inequality constrained: KuhnTucker Necessary conditions, Kuhn –Tucker Sufficient Conditions.	
3	Optimization: Quasi-Newton Methods and line search, least squares optimization, Gauss-Newton, Levenberg- Marquartd, Extensions of LP to Mixed Integer Linear Programming (MILP),	
4	Non-Liner Programming, The Newton Algorithm, Non-Linear Least Squares, Sequential Quadratics Programming (SQP), Constrained Optimization, SQP Implementation, Multi-Objective Optimization, Branch and Bound Approaches, Genetic Algorithms and Genetic Programming,	
5	Optimization in Operation Research: Dynamic Programming, Transportation – Linear Optimization Simplex and Hitchcock Algorithms, Algorithms, Minimax and Maximum Algorithm, Discrete Simulation	
6	Integer Programming – Cutting Plane Methods, Separable Programming, Stochastic Programming, Goal Programming, Integer Linear Programming, Pure and Mixed Strategy in theory of Games, Transshipment Problems, Heuristic Methods	

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Operations Research: Applications and Algorithms	**Latest**	Winston W L	Cengage Learning
2	Optimization: Theory and Applications	**Latest**	L. Cesari	**Springer**
	Model Building in Mathematics Programming	**March 2013**	**H. Paul Williams**	**Wiley**

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Integer and Combinatorial Optimization	Latest	G.L. Nemhauser and L.A. Wolsey.	Wiley
2	Discrete Optimization	Latest	R.G. Parker and R.L. Rardin.	

VI SEMESTER

22ADS631 : OE III: Introduction to Data Science

VI SEMESTER

22ADS632 : OE III: Foundations of AI

VI SEMESTER

22ADS651 : OE IV: Introduction to DBMS

VI SEMESTER

22ADS652 : OE IV: Current Trends and Technologies

VI SEMESTER

22ADS607 : Project Phase I

VI SEMESTER

Audit Course

MLC2126 : YCAP6