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 2021

1st to 8th Semester

(Department of Information Technology)

Computer Science and Design

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

SoE No. CSD-203

B.TECH SCHEME OF EXAMINATION 2021-22

(Scheme of Examination w.e.f. 2021-22 onward)

(Department of Information Technology)

Computer Science and Design

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
First Semester															
1	1	BS	GE	CSD2101	Calculus, Sequences and Series	T	3	0	0	3	3	30	30	40	3
2	1	BS	GE	CSD2102	Applied Physics	T	3	0	0	3	3	30	30	40	3
3	1	BS	GE	CSD2103	Lab.: Applied Physics	P	0	0	2	2	1		60	40	
4	1	HS	GE	CSD2104	Constitution of India	T	3	0	0	3	3	30	30	40	3
5	1	BES	CV	CSD2105	Engineering Mechanics	T	3	0	0	3	3	30	30	40	3
6	1	BES	CV	CSD2106	Lab.:Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	IT	CSD2107	Introduction to Computer Programming	T	3	0	0	3	3	30	30	40	3
8	1	BES	IT	CSD2108	Lab.: Introduction to Computer Programming	P	0	0	2	2	1		60	40	
					TOTAL FIRST SEM		**15**	**0**	**6**	**21**	**18**				

List of Audit Course

1	1	HS	GE	GE2131	Universal Human Value	**T**	2	0	0	0	0				
2	1	HS	GE	GE2123	YCCE Communication & Aptitude Preparation (YCAP)	**A**	3	0	0	3	0				
3	2	HS	GE	GE2124	YCCE Communication & Aptitude Preparation (YCAP)	**A**	3	0	0	3	0				

Second Semester															
1	2	BS	GE	CSD2151	Probability & Statistics	T	3	0	0	3	3	30	30	40	3
2	2	BS	GE	CSD2152	Applied Chemsitry	T	3	0	0	3	3	30	30	40	3
3	2	BS	GE	CSD2153	Lab: Applied Chemsitry	p	0	0	2	2	1		60	40	
4	2	HS	GE	CSD2154	Technical Communication	T	3	0	0	3	3	30	30	40	3
5	2	HS	GE	CSD2155	Lab:Technical Communication	P	0	0	2	2	1		60	40	
6	2	BES	EE	CSD2156	Digital Circuit Design	T	3	0	0	3	3	30	30	40	3
7	2	BES	EE	CSD2157	Lab.:Digital Circuit Design	P	0	0	2	2	1		60	40	
8	2	BES	EL	CSD2158	Basic Electrical Machines	T	3	0	0	3	3	30	30	40	3
9	2	BES	EL	CSD2159	Lab:Basic Electrical Machines	P	0	0	2	2	1		60	40	
10	2	BES	ME	CSD2160	Lab.: Engineering Design	P	0	0	4	4	2		60	40	
					TOTAL SECOND SEM		**15**	**0**	**12**	**27**	**21**				

MSEs* = Two MSEs of 15 Marks each will be conducted and total marks of MSE 1 and MSE 2 MSEs will be considered for Continuous Assessment out of 30.

TA- for Theory : 30 marks on quizzes, activities, attendance etc as included in TA plan of course teacher. TA - for Practical: MSPA will be 15 marks each as included in TA plan of course teacher

TA – for Practical : MSPA will be 15 marks each

		June 2021	**1.00**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**

Applicable for AY 2021-22 Onwards

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Yeshwantrao Chavan College of Engineering

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B.TECH SCHEME OF EXAMINATION 2021-22

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

(Department of Information Technology)

Computer Science and Design

SoE No. CSD-203.1

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
Third Semester															
1	3	BS	GE	CSD2201	Linear Algebra	**T**	3	1	0	4	4	30	20	50	3 Hours
2	3	PC	IT	CSD2202	Microprocessors and Microcontrollers	**T**	3	0	0	3	3	30	20	50	3 Hours
3	3	PC	IT	CSD2203	Lab:Microprocessors and Microcontrollers	**P**	0	0	2	2	1		60	40	
4	3	PC	IT	CSD2204	Data Structures	**T**	4	0	0	4	4	30	20	50	3 Hours
5	3	PC	IT	CSD2205	Lab:Data Structures	**P**	0	0	2	2	1		60	40	
6	3	PC	IT	CSD2206	Computer System Organization	**T**	3	0	0	3	3	30	20	50	3 Hours
7	3	PC	IT	CSD2207	Theoretical Foundation of Computer Sciences	**T**	3	0	0	3	3	30	20	50	3 Hours
8	3	PC	IT	CSD2208	Software Lab-I	**P**	0	0	4	4	2		60	40	
					TOTAL THIRD SEM		**16**	**1**	**8**	**25**	**21**				
Fourth Semester															
1	4	BS	IT	CSD2251	Discrete Mathematics and Graph Theory	**T**	3	1	0	4	4	30	20	50	3 Hours
2	4	PC	IT	CSD2252	Operating Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
3	4	PC	IT	CSD2253	**Lab :** Operating Systems	**P**	0	0	2	2	1		60	40	
4	4	PC	IT	CSD2254	Computer Networks	**T**	3	0	0	3	3	30	20	50	3 Hours
5	4	PC	IT	CSD2255	Object Oriented Programming	**T**	3	0	0	3	3	30	20	50	3 Hours
6	4	PC	IT	CSD2256	**Lab:**Object Oriented Programming	**P**	0	0	2	2	1		60	40	
7	4	PC	IT	CSD2257	Design and Analysis of Algorithms	**T**	3	0	0	3	3	30	20	50	3 Hours
8	4	PC	IT	CSD2258	**Lab**.:Design and Analysis of Algorithms	**P**	0	0	2	2	1		60	40	
9	4	PC	IT	CSD2259	Software Lab-II	**P**	0	0	4	4	2		60	40	
					TOTAL FOURTH SEM		**15**	**1**	**10**	**26**	**21**				

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

TA ** = for Theory : 5 marks on lecture quizzes, 11 marks on TA2+TA4 activitied decided by course teacher, 4 marks on class attendance

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

List of Audit Course

1	3	HS		GE2121	Environmental studies	**T**	2	0	0	2	0	
2	3	HS		AU2123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0	
3	4	HS		AU2124	YCCE Communication Aptitude Preparation (YCAP4.1) for CV,ME,CT,IT,CSE, IIoT, AIML, CSD, AIDS	**A**	3	0	0	3	0	

		June 2022	**1.01**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**

Applicable for AY 2022-23 Onwards

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Yeshwantrao Chavan College of Engineering

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B.TECH SCHEME OF EXAMINATION 2021-22

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

(Department of Information Technology)

Computer Science and Design

SoE No. CSD-203.1

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
Fifth Semester															
1	5	HS	IT	CSD2301	Cyber Laws & Professional Ethics	**T**	3	0	0	3	3	30	20	50	3 Hours
2	5	PC	IT	CSD2302	Database Management Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
3	5	PC	IT	CSD2303	**Lab:** Database Management Systems	**P**	0	0	2	2	1		60	40	
4	5	PC	IT	CSD2304	Principles of Compiler Design	**T**	3	0	0	3	3	30	20	50	3 Hours
5	5	PC	IT	CSD2305	**Lab.:**Principles of Compiler Design	**P**	0	0	2	2	1		60	40	
6	5	PE	IT		**Professional Elective-1**	**T**	3	0	0	3	3	30	20	50	3 Hours
7	5	PE	IT		**Lab : Professional Elective-1**	**P**	0	0	2	2	1		60	40	
8	5	OE	IT		**Open Elective - 1**	**T**	3	0	0	3	3	30	20	50	3 Hours
9	5	OE	IT		**Open Elective - 2**	**T**	3	0	0	3	3	30	20	50	3 Hours
10	5	STR	IT	CSD2306	Seminar	**P**	0	0	2	2	1		100		
					TOTAL FIFTH SEM		**18**	**0**	**8**	**26**	**22**				
Professional Elective 1															
1	5	**PE1**	IT	CSD2310	Digital Image Processing										
	5	**PE1**	IT	CSD2311	**Lab:** Digital Image Processing										
2	5	**PE1**	IT	CSD2312	Machine Learning										
	5	**PE1**	IT	CSD2313	**Lab:** Machine Learning										
3	5	**PE1**	IT	CSD2314	Data Visualization										
	5	**PE1**	IT	CSD2315	**Lab:** Data Visualization										
4	5	**PE1**	IT	CSD2316	Computer Graphics										
	5	**PE1**	IT	CSD2317	**Lab:** Computer Graphics										
5	5	**PE1**	IT	CSD2318	Internet of Things										
	5	**PE1**	IT	CSD2319	**Lab**: Internet of Things										
Open Elective 1 & 2															
1	5	**OE1**	IT	CSD2331	Computer Graphics										
2	5	**OE1**	IT	CSD2332	Multimedia Design										
3	5	**OE2**	IT	CSD2341	Advanced Web Designing										
4	5	**OE2**	IT	CSD2342	Virtual Reality										

Audit Courses															
1	5	HS		AU2126	YCCE Communication Aptitude Preparation (YCAP5.1) for CV,ME,CT,IT,CSE, IIoT, AIDS, CSD, AIML	**A**	3	0	0	3	0				

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

		June 2022	**1.01**	**Applicable for AY 2022-23 Onwards**
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(Department of Information Technology)

Computer Science and Design

SoE No. CSD-203.1

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
Six Semester															
1	6	HS	IT	CSD2351	Management Studies	**T**	3	0	0	3	3	30	20	50	3 Hours
2	6	PC	IT	CSD2352	Software Architecture & Design	**T**	3	0	0	3	3	30	20	50	3 Hours
4	6	PC	IT	CSD2353	Computer Game Design and Programming	**T**	3	0	0	3	3	30	20	50	3 Hours
5	6	PC	IT	CSD2354	Lab: Computer Game Design and Programming	**P**	0	0	2	2	1		60	40	
6	6	PE2	IT		**Professional Elective-II**	**T**	3	0	0	3	3	30	20	50	3 Hours
7	6	PE2	IT		**Professional Elective-II Lab**	**P**	0	0	2	2	1		60	40	
8	6	STR	IT	CSD2355	Design Workshop	**P**	0	0	4	4	2		60	40	
9	6	OE3	IT		**Open Elective-III**	**T**	3	0	0	3	3	30	20	50	3 Hours
10	6	OE4	IT		**Open Elective-IV**	**T**	3	0	0	3	3	30	20	50	3 Hours
					TOTAL SIX SEM		**18**	**0**	**8**	**26**	**22**				

Professional Elective 2					
1	6	**PE2**	IT	CSD2361	Multimedia Design & Processing
	6	**PE2**	IT	CSD2362	**Lab:** Multimedia Design & Processing
2	6	**PE2**	IT	CSD2363	Advanced Web Designing
	6	**PE2**	IT	CSD2364	**Lab**: Advanced Web Designing
3	6	**PE2**	IT	CSD2365	Design Manufacturing and Assembly
	6	**PE2**	IT	CSD2366	**Lab.:** Design Manufacturing and Assembly
4	6	**PE2**	IT	CSD2367	UX &UI Design
	6	**PE2**	IT	CSD2368	**Lab.** UX &UI Design
5	6	**PE2**	IT	CSD2369	Introduction to Deep Learning
	6	**PE2**	IT	CSD2370	**Lab.:** Introduction to Deep Learning
Open Elective -III					
1	6	**OE3**	IT	CSD2381	Computer Graphics
2	6	**OE3**	IT	CSD2382	Multimedia Design
Open Elective- IV					
3	6	**OE4**	IT	CSD2391	Advanced Web Designing
4	6	**OE4**	IT	CSD2392	Virtual Reality

Audit Courses												
1	6	HS		AU2130	YCCE Communication Aptitude Preparation (YCAP6.3) for CT, IT, CSE, IIoT, AIDS, CSD, AIML	**A**	3	0	0	3	0	

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TA ** = for Theory : 5 marks on lecture quizzes, 11 marks on TA2+TA4 activitied decided by course teacher, 4 marks on class attendance

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

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B.TECH SCHEME OF EXAMINATION 2021-22

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

(Department of Information Technology)

Computer Science and Design

SoE No. CSD-203.1

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
Seventh Semester															
1	7	PC	IT	CSD2401	Virtual and Augmented Reality	**T**	3	0	0	3	3	30	20	50	3 Hours
2	7	PC	IT	CSD2402	Lab: Virtual & Augmented Reality	**P**	0	0	2	2	1		60	40	
3	7	PC	IT	CSD2403	Computer Aided Design	**T**	3	0	0	3	3	30	20	50	3 Hours
4	7	PC	IT	CSD2404	Lab: Computer Aided Design	**P**	0	0	2	2	1		60	40	
5	7	PE	IT		Professional Elective 3	**T**	3	0	0	3	3	30	20	50	3 Hours
6	7	PE	IT		Professional Elective 3 Lab	**P**	0	0	2	2	1		60	40	
7	7	PE	IT		Professional Elective 4	**T**	3	0	0	3	3	30	20	50	3 Hours
8	7	PE	IT		Professional Elective 5	**T**	3	0	0	3	3	30	20	50	3 Hours
9	7	STR	IT	CSD2405	Mini Project	**P**	0	0	4	4	2		100		
10	7	STR	IT	CSD2406	CRT	**P**	0	0	0	0	2		100		
					TOTAL SEVENTH SEM		**15**	**0**	**10**	**25**	**22**				

Professional Elective 3					
1	7	**PE3**	IT	CSD2411	PE III : GPU Computing
	7	**PE3**	IT	CSD2412	PE III : Lab: GPU Computing
2	7	**PE3**	IT	CSD2413	PE III : Digital Audio Design and Synthesis
	7	**PE3**	IT	CSD2414	PE III : Lab: Digital Audio Design and Synthesis
3	7	**PE3**	IT	CSD2415	PE III : Special Effects Techniques
	7	**PE3**	IT	CSD2416	PE III : Lab. Special Effects Techniques
4	7	**PE3**	IT	CSD2417	PE III : Animation Principles & Design
	7	**PE3**	IT	CSD2418	PE III : Lab: Animation Principles & Design
5	7	**PE3**	IT	CSD2419	PE III : Product Design and Development
	7	**PE3**	IT	CSD2420	PE III : Lab:Product Design and Development

Professional Elective 4

1	**7**	PE4	IT	CSD2431	PE IV : Mobile Computing
2	7	PE4	IT	CSD2432	PE IV : Information Retrival
3	7	PE4	IT	CSD2433	PE IV : Image & Video Processing
4	7	PE4	IT	CSD2434	PE IV : Computer Vision
5	7	PE4	IT	CSD2435	PE IV : Sensors & Actuators

Professional Elective 5

1	7	**PE5**	IT	CSD2441	PE V : Spatial Computing
2	7	**PE5**	IT	CSD2442	PE V : Artificial Intelligence
3	7	**PE5**	IT	CSD2443	PE V : Cloud Computing
4	7	**PE5**	IT	CSD2444	PE V : Industry 4.o
5	7	**PE5**	IT	CSD2445	PE V : Additive Manufacturing

Eighth Semester															
1	8	STR		CSD2451	Major Project/Internship	**P**	0	0	12	12	9		60	40	
2	8	STR		CSD2452	Extra curricular Activity Evaluation	**P**	0	0	0	0	1		100		
					TOTAL EIGHTH SEM		**0**	**0**	**12**	**12**	**10**				

GRAND TOTAL	**112**	**2**	**74**	**188**	**157**	

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

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

Chairperson	**Dean (Acad. Matters)**	**June 2022**	**1.01**
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Hingna Road, Wanadongri, Nagpur - 441 110

Bachelor of Technology

SoE & Syllabus 2021

1st Semester

(Department of Information Technology)

Computer Science and Design

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 2021-22

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

(Department of Information Technology)

Computer Science and Design

SoE No. CSD-203.1

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
First Semester															
1	1	BS	GE	CSD2101	Calculus, Sequences and Series	T	3	0	0	3	3	30	20	50	3 Hours
2	1	BS	GE	CSD2102	Applied Physics	T	3	0	0	3	3	30	20	50	3 Hours
3	1	BS	GE	CSD2103	Lab.: Applied Physics	P	0	0	2	2	1		60	40	
4	1	HS	GE	CSD2104	Constitution of India	T	3	0	0	3	3	30	20	50	3 Hours
5	1	BES	CV	CSD2105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hours
6	1	BES	CV	CSD2106	Lab.:Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	IT	CSD2107	Introduction to Computer Programming	T	3	0	0	3	3	30	20	50	3 Hours
8	1	BES	IT	CSD2108	Lab.: Introduction to Computer Programming	P	0	0	2	2	1		60	40	
					TOTAL FIRST SEM		**15**	**0**	**6**	**21**	**18**				
List of Audit Course															
1	1	HS	GE	GE2131	Universal Human Value	**T**	2	0	0	0	0				
2	1	HS	GE	AU2121	YCCE Communication Aptitude Preparation (YCAP1)	**A**	3	0	0	3	0				
3	2	HS	GE	AU2122	YCCE Communication Aptitude Preparation (YCAP2)	**A**	3	0	0	3	0				
Second Semester															
1	2	BS	GE	CSD2151	Probability & Statistics	T	3	0	0	3	3	30	20	50	3 Hours
2	2	BS	GE	CSD2152	Applied Chemistry	T	3	0	0	3	3	30	20	50	3 Hours
3	2	BS	GE	CSD2153	Lab: Applied Chemistry	p	0	0	2	2	1		60	40	
4	2	HS	GE	CSD2154	Technical Communication	T	3	0	0	3	3	30	20	50	3 Hours
5	2	HS	GE	CSD2155	Lab:Technical Communication	P	0	0	2	2	1		60	40	
6	2	BES	EE	CSD2156	Digital Circuit Design	T	3	0	0	3	3	30	20	50	3 Hours
7	2	BES	EE	CSD2157	Lab.:Digital Circuit Design	P	0	0	2	2	1		60	40	
8	2	BES	EL	CSD2158	Basic Electrical Machines	T	3	0	0	3	3	30	20	50	3 Hours
9	2	BES	EL	CSD2159	Lab:Basic Electrical Machines	P	0	0	2	2	1		60	40	
10	2	BES	ME	CSD2160	Lab.: Engineering Design	P	0	0	4	4	2		60	40	
					TOTAL SECOND SEM		**15**	**0**	**12**	**27**	**21**				

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

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

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Applicable for AY 2022-23 Onwards

I Semester
CSD2101: Calculus, Sequences and Series

Objective	Course Outcome
1. To give basic knowledge of sequence and Series. 2. To explain the differential calculus and its applications. 3. To extend the concept of integration to double and triple integrals. 4. To teach various methods for solving higher order differential equations and its applications.	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 No.	Contents	Max. Hrs.
1	**Sequence and Series** 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.	6
2	**Ordinary Differentiation** Successive differentiation; Leibnitz theorem, Taylor"s and Maclaurin"s series for functions of single variable and its applications.	7
3	**Partial Differentiation** 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.	7
4	**Curve Tracing and Improper Integrals** Tracing of curves, Beta, Gamma functions and its applications.	6
5	**Multiple integrals** 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.	7
6	**Differential Equations** Higher order differential equations with constant coefficients. Cauchy"s and Legendre"s homogeneous differential equations, Applications of differential equations	6

Text Books

1. Advance Engineering Mathematics by Erwin Kreyzig,John Wiley and Sons,INC.
2. Engineering Mathematics - by H.K. Dass, 11th revised edition, 2003, S.Chand, Delhi.
3. Advanced Engineering Mathematics - by H.K. Dass, 8th Ed, 2007, S.Chand, Delhi.
4. Engineering Mathematics by Dr. B.S. Grewal
5. Applied Mathematics by P.N.Wartikar and J.N.Wartikar,,Pune Vidyarthi Griha Prakashan, Pune

I Semester
CSD2101: Calculus, Sequences and Series

Reference Books

1. G B Thomas and R L Finney: Calculus and Analytical Geometry, 9th ed, Addison-Wesley, 1999.
2. Calculus-by Michael Spivak and Tom Apostol (Vols I and II)
3. N.P. Bali and Manish Goyal, A text book ofEngineering Mathematics, LaxmiPrakashan, Reprint 2008.

I Semester

CSD2102: Applied Physics

Course Objective :

1.	Enable the students to comprehend the basics of the latest advancements in Physics viz., Quantum Physics, Crystal structure, semiconductor, lasers, optical fibres and electronic display.
2.	To provide problem solving experience in theory and laboratory in Quantum Physics, Crystal structure, semiconductor, lasers, optical fibre and electronic display.

Course Outcome: After completion of the course, student will demonstrate the ability to

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

CO – PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	2												
CO 2	2	2												
CO 3	2	2												
CO 4	3	3												
CO 5	3	3												

Unit No.	Contents	Max. Hrs.
1	**QUANTUM PHYSICS** Wave-particle duality, Wave packet, Heisenberg uncertainty principle, Interpretation of wave function, Schrodinger Equations, Particle in infinite and finite potential well, quantum tunneling, Introduction to Bits and Qubits.	7
2	**CRYSTALLOGRAPHY** Introduction, Unit cell characteristics: SC, BCC and FCC unit cells, Crystal planes andMiller indices, Bragg's law, Voids: Tetrahedral and octahedral.	6
3	**BAND THEORY OF SOLIDS** Formation of energy bands in solids, Classification and energy band diagrams,	7

	Structure of semiconductor with band diagram, Intrinsic and extrinsic semiconductors,Law of mass action, Carrier transport, conductivity, Hall Effect.	
4	**LASERS** 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	7
5	**FUNDAMENTALS OF FIBRE OPTICS** Principle, structure and classification, Acceptance angle, Numerical aperture, Lossesin optical fibres, Applications as sensor.	6
6	**ELECTRON BALLISTICS AND OPTICS** Motion of a charged particle in uniform electric and magnetic field, Cross field configuration; Electron refraction, Electron lens, CRO.	7

Text Books:

SN	Title	Edition	Authors	Publisher
1	A Textbook of Engg. Physics	Revised	M.N.Avadhanulu , P.G.Kshirsagar	S.Chand and Company
2	Electronic Engineering Materials and Devices	TMH edition, 10th reprint	John Allision	Tata McGraw Hill

Reference Books:

SN	Title	Edition	Authors	Publisher
1	Fundamentals of Physics	10^{th}	David Halliday, Robert Resnick and Jerle Walker,John-Wiley India	**John Wiley & Sons Inc**
2	Text Book of Optics	Revised	Brijlal and Subramanyam	S. Chand and Company
3	Laser	2^{nd}	M. N. Avadhanulu	S. Chand and Company
4	Concept of Modern Physics	6^{th}	A.Beiser	Tata McGraw-Hill
5	LASERS: Theory and Applications.	2^{nd}	Thyagarajan K and GhatakA.K	Macmillan Publication
6	Solid state Physics	9^{th}	S.O.Pillai	New Edge International Publishers
7	Solid State Physics	8^{th}	Palanisamy	SciTech Publishers
8	Solid State Physics	8^{th}	C. Kittel	Willey Publication
9	Engineering Physics	1^{st}	B.K.Pandey,S.Chaturvedi	Cengage Learning
10	Engineering Physics	2^{nd}	H. K. Malik, A. K. Singh	Tata McGraw-Hill

I Semester
CSD2103 : Lab. Applied Physics

Expt.No.	Course Outcomes	Statement of Course outcomes Students are able to
5	CO 2	Analyze crystal structures in terms of lattice parameters with identification of crystal planes.
1,3,4,8,11	CO 3	Assess the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
7,9,10,12	CO 4	Illustrate working principle of lasers and optical fibres for their use in the field of industry.
2,6	CO 5	Analyze the motion in electric field and magnetic field and its applications to electron optic devices.

Lab Experiment List:

Expt. No	Name of Experiment	CO	PO
1	Determination of Hall coefficient and density of charge carriers using Hall effect.	CO3	PO1,PO2
2	Determination of amplitude and frequency of sinusoidal signal using C.R.O.	CO 5	PO1,PO2
3	The study of V-I characteristics of a semiconductor diode (germanium and silicon) in forward and reverse bias mode.	CO 3	PO1,PO2
4	Determination of Band gap in a semiconductor by four probe method.	CO 3	PO1,PO2
5	A study of cubic space lattices and atomic packing in solids.	CO 2	PO1,PO2
6	To measure the phase shift introduced by a phase shift network using Dual beam CRO.	CO 5	PO1,PO2
7	Determination of wavelength of laser using diffraction grating.	CO 4	PO1,PO2
8	Determination of Band gap in a semiconductor using reverse biased p-n diode .	CO 3	PO1,PO2
9	Determination of divergence of laser beam.	CO 4	PO1,PO2
10	Determination of Acceptance angle and numerical aperture of a given optical fiber	CO 4	PO1,PO2
11	Dependence of Hall coefficient on temperature.	CO 3	PO1,PO2
12	Determination of attenuation of a given optical fibre.	CO 4	PO1,PO2
Demonstration Experiment			
13	Determination of the velocity of Ultrasonic waves in a non –electrolytic liquid by ultrasonic interferometer		

I Semester
CSD2104 – Constitution of India

Objective	Course Outcome
1. To enable the student understand the importance of constitution 2. To understand the structure of executive, legislature and judiciary 3. To analyze federalism in the Indian context 4. To understand philosophy of fundamental rights and duties 5. To understand and evaluate the Indian Political scenario of the emerging challenges.	1. Explain the basic concepts of Constitution of India. 2. Describe the various Fundamental rights 3. Analyze the Impact of federalism on the State 4. Explain Industrial Law and Judiciary.

Unit	Contents	Hrs
1	**Origin and Meaning** Origin of history of Constitution, Meaning of the constitution law and constitutionalism, Kingship and Republic States in Ancient India	6
2	**Concept of the Constitution of India** Preamble, The union and its territory, Citizenship	6
3	**Federalism** Salient features of Federalism, Structures and features of Indian Federalism, Panchayat Raj System	6
4	**Fundamental Rights** Scheme of the Fundamental rights, duties, Scheme of the Fundamental Right to Equality, The scheme of the Fundamental Duties and its legal status	7
5	**Legislative Power** Federal structure and distribution of legislative, Financial power between the Union and the States, Parliamentary Form of Government in India – The constitution power and status of the President of India	7
6	**Challenges to Indian Political Systems** The Executive, Directive principles of State Policy, The Union Judiciary	7

Text Books :

1. Dr G.N. Nimbarte, (2018) "Social Science" Sankalp Publication, Vidhya Nagar, Nagpur

Reference Books :

1. G. Austin (2004) Working of a Democratic Constitution of India, New Delhi: Oxford University Press.

2. A.S. Altekar, (2016) State and Government in Ancient India, Motilal Banarsidass Publishing House, New Delhi.

3. Basu, D.D (2005), An Introduction to the Constitution of India, New Delhi, Prentice Hall.

4. A. Vanaik and R. Bharghava (eds) (2010) Understanding Contemporary India: Critical Perspectives, New Delhi: Orient Blackswan.

5. A.G. Noorani (2000): Constitution questions in India: The President, Parliament and the Status, New Delhi: Oxford University Press.

6. Singh, M.P & Saxena, R (2008) Indian Politics: Contemporary Issues and Concerns. New Delhi: PHI Learning.

7. Constitution of India: Dr. B. R. Ambedkar: Government of India.

I Semester
CSD2105: Engineering Mechanics

Course Objective	Course Outcomes
1. To make student aware about fundamental concept of static and dynamics 2. To introduce the basic concepts of planar force system 3. To understand the properties of surface, moment of inertia and mass moment of inertia 4. To learn the dynamics variables applied to kinetics of particles.	1 **Describe** the fundamental concepts of statics and dynamics. 2 **Apply** the basic concepts of applied mechanics for solution of problems on planar force system with and without friction. 3 **Determine** the properties of surface like centroid, moment of inertia, etc. for planar surfaces and mass moment of inertia for rigid body. 4 **Analyze** the dynamic variables of kinetics of particles and simple lifting machine.
Mapped POs :- 1,2,12	

Unit I: Resultant of Plane Force System
Resultant: Fundamental concepts, system of forces, laws of mechanics, principle of transmissibility of forces, Resolution and Resultant of a 2-Dimensional force system, Moment of force, Principle of moment, Couple, Equivalent force couple system.

Unit II: Equilibrium of Plane Force System and Friction

Equilibrium: Free body diagrams, Conditions of equilibrium, types of supports, types of beams, types of loads, Application to 2D force system.
Friction: Plane friction, belt friction

Unit III: Resultant of special Force System

Resultant: Resultant of a 3-Dimensional force system, Moment of force, Principle of moment, Wrench.
Equilibrium: Conditions of equilibrium, Application of equilibrium to 3D force system.

Unit IV: Properties of Surfaces
Centroid: Introduction, First Moment of Area, Problem on Centroid of composite sections.
Area Moment of Inertia: Introduction, Second Moment of Area, Radius of Gyration, Transfer Theorem, Product of Inertia, Moment of Inertia and Product of Inertia with respect to inclined axes, Principal Moments of Inertia.

Unit V: Virtual Work Method and Kinetics of Particle
Virtual Work Method: Introduction, Principle of virtual work, Application to beam and frame.
Kinetics of Particle: D‟ Alembert‟s principle, Translation of bodies and interconnected particles.

Unit VI: Work Energy and Impulse Momentum Method
Work Energy Method: Introduction, Conservation of energy and problems on connected bodies.
Impulse Momentum Method: Definitions, Principle of conservation of momentum, elastic impact of two bodies, coefficient of restitution, application of impulse momentum method.

I Semester
CSD2105: Engineering Mechanics

Textbooks:

1. Beer F.P. and Johnston E.R; Vector Mechanics for Engineers, 9th edition Tata McGraw Hill Publication, New Delhi. 2007
2. Nelson A., Engineering Mechanics (Statics and Dynamics), ed 2009, Tata Mc-Grew Hill Education Pvt. Ltd., New Delhi, 2009
3. Dubey N.H., Engineering Mechanics (Statics and Dynamics) first edition 2013, Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2013

Reference Books:

1. Timoshenko S, Young D.H and Rao J.V, Engineering Mechanics, McGraw Hill Publication, New Delhi, 2007
2. Bhattacharyya B., Engineering Mechanics, Oxford University Press, New Delhi, 2008
3. Hibbeler R.C, Engineering Mechanics (Statics and Dynamics), Pearson Publication, Singapore, 2000
4. Shames I.H. and Rao J.V., Engineering Mechanics (Statics and Dynamics), First Edition, Pearson Publication, New Delhi, 2003
5. Singer F.L, Engineering Mechanics (Statics and Dynamics), Harper and Rowe publication, New Delhi, 1994.
6. http://nptel.ac.in/courses

I Semester
CSD2106: LAB.: Engineering Mechanics

SN	Minimum Ten Practical's to be performed from the list as below
1	To determine support reactions of a Simply Supported Beam experimentally and analytically.
2	To determine the forces in the members of a Jib Crane Apparatus experimentally and graphically.
3	To determine the coefficient of friction between two surfaces of different material on Plane Friction Apparatus.
4	To determine the coefficient of friction of Coil Friction Apparatus.
5	To determine the forces in members of a Shear Leg Apparatus experimentally and manually.
6	To determine the mass moment of inertia of a fly wheel using Fly Wheel Apparatus
7	To determine efficiency and law of machine of Differential Axel & Wheel machine.
8	To determine efficiency and Law of machine of Single Purchase Crab machine.
9	To determine efficiency and Law of machine of Double Purchase Crab machine.
10	To find support reactions of a simply supported beam using graphical method and hand calculation.
11	To find the forces in the member of truss using graphical method and hand calculation.
12.	To find for a composite figure by using Mohr"s circle and hand calculation, (1) Principle moment of inertia (2) Moment of inertia and product of inertia about any inclined axis.

Reference Books:-

1) Nelson A., Engineering Mechanics (Statics and Dynamics), ed 2009, Tata Mc-Graw Hill Education Pvt Ltd, New Delhi, 2009
2) Dubey N.H., Engineering Mechanics (Statics and Dynamics) first edition 2013, Tata Mc-Graw Hill Education Pvt Ltd, New Delhi, 2013
3) Beer F.P. and Johnston E.R; Vector Mechanics for Engineers, 9th edition Tata Mc-Graw Hill Publication, New Delhi. 2007

I Semester
CSD2107 : Introduction to Computer Programming

Course Objective	Course Outcomes
• To impart fundamental knowledge of computer • To provide problem solving experience through C Programming.	• Understand computer system, basics of algorithm & flowchart, and demonstrate straight line program using basic „C" programming language constructs. • Implement basic Linux commands and simple programs using different constructs in C. • Design & Develop programs using different loop control structures, user defined functions, and Pointers. • Analyze and apply concepts of different dimensional Arrays as a data structure & development of programs using the same. • Design and develop programs using basics of Strings, Structures, union and Files in 'C' language.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3	2	2										
CO4		1	2									
CO5	2	2	2									
Average:	**2.5**	**1.67**	**2**									

Unit No.	Contents	Max. Hrs.
1	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.	06
2	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.	08

I Semester
CSD2107 : Introduction to Computer Programming

Unit No.	Contents	Max. Hrs.
3	Loop Structures: While, do while and for loops, break and continue statement, ‚goto" statement, C programs based on these loop structures.	07
4	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.	08
5	Introduction to Arrays, One dimensional array, array manipulation, insertion, deletion of an element, searching techniques- Linear and binary search, sorting techniques - Bubble, insertion and selection sort.Two dimensional array: programs for basic matrix operations-addition, multiplication and transpose, converting a matrix in upper or lower triangular matrix, Array as function arguments.	09
6	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.	06

Textbooks:

T1: The C Programming Language.	J.B.W.Kernighan & D.M.Ritchie	Prentice Hall
T2: Mastering C	K.R.Venugopal & S.R. Prasad	TMH,2007.

Reference Book

R1:Problem Solving And Program Design In C	Jeri. R. Hanly, Elliot B. Koffman	Pearson Education
R2: Programming with C	Byron Gottfried	Schaum;s Outline Series
R3: How to solve it by computers	R. G. Dromey	Prentice Hall India

I Semester
CSD2108 : Lab - Introduction to Computer Programming

Course Objective	Course Outcomes
• To impart fundamental knowledge of computer • To provide problem solving experience through C Programming.	• Understand computer system, basics of algorithm & flowchart, and demonstrate straight line program using basic „C" programming language constructs. • Implement basic Linux commands and simple programs using different constructs in C. • Design & Develop programs using different loop control structures, user defined functions, and Pointers. • Analyze and apply concepts of different dimensional Arrays as a data structure & development of programs using the same. • Design and develop programs using basics of Strings, Structures, union and Files in 'C' language.

CO - PO Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3	2	2										
CO4		1	2									
CO5	2	2	2									
Average:	**2.5**	**1.67**	**2**									

List of Practical

SN	Unit	Name Of The Practical	Remark	CO'S Mapped	PO'S Mapped
1(A)		Introduction to Linux Operating system & it"s different commands.	**Manual**	**CO 1**	**PO 1**
1(B)		Introduction to Vi editor, Compilation and Execution of a program in Linux.	**Manual**	**CO 1**	**PO 1**
1(C)		Introduction to Turbo C, Compilation and Execution of a program on Turbo C.	**Manual**	**CO 1**	**PO 1**
2	**II**	A) Write a program in c accept radius us input from keyboard and display the area and circumference of circle	**Arithmetic Operators**	**CO 2**	**PO 1, PO 2**
	II	B) Write C program using conditional operators to display maximum number if any three number are inputted	**Conditional Operator**		

I Semester
CSD2108 : Lab Introduction to Computer Programming

SN	Unit	Name Of The Practical	Remark	CO'S Mapped	PO'S Mapped
3	II	A) Write a program which accept any character as input and check whether entered character is vowel or not.	**Simple if**	**CO 2**	**PO 1, PO 2**
	II	B) Write a program which accepts any year as input and check whether entered year is leap year or not and display the appropriate message.	**Nested if**		
	II	c) Write a C program to input electricity unit charge and calculate the total electricity bill according to the given condition: For first 50 units Rs. 3.50/unit For next 100 units Rs. 4.00/unit For next 100 units Rs. 5.20/unit For unit above 250 Rs. 6.50/unit An additional surcharge of 20% is added to the bill.	**Ladder if**		
4	II	Write a Menu Driven C program using Switch Case to perform the following operations on a four digit positive integer number entered by the user. 1. To display the number in reverse order. 2. To display sum of the digits of the number. 3. To display a number by adding one in each digit. 4. Exit.	**Switch Case**	**CO 2**	**PO 1, PO 2**
5	III	Write a C program to input any number and find the how many digits and also find the factorial of highest digit.	**For / While Loop**	**CO 3**	**PO 2, PO 3**
6	III	Write a C program to display sum of the following series. Sum $=1+\frac{x^1}{1!}+\frac{x^2}{2!}+\frac{x^3}{3!}+\ldots\ldots\ldots+\frac{x^n}{n!}$	**Do While Loop**	**CO 3**	**PO 2, PO 3**
7	III	Write a C program to print following pyramid. * * * * * * * * * *	**Nested For Loop**	**CO 3**	**PO 2, PO 3**
8	IV	A) Write a function which accepts a number a Check Whether a Number is Prime or not, your function returns 1 if a number is a prime number, otherwise 0.	**Functions**	**CO 4**	**PO 1, PO 2, PO 3**
	IV	B) C Program to Find Factorial of a Number Using Recursion.	**Recursion**	**CO 4**	**PO 1, PO 2, PO 3**
9	V	Write a C program to sort an array of integers using Bubble Sort.	**1D Array**	**CO 5**	**PO 1, PO 2, PO 3**

I Semester
CSD2108 : Lab Introduction to Computer Programming

SN	Unit	Name Of The Practical	Remark	CO'S Mapped	PO'S Mapped
10	V	Write a C program to print the transpose of matrix.	2D Array	CO 5	PO 1, PO 2, PO 3
11	V	A)Write a program in C to find the length of a string without using library function	Strings	CO 5	PO 1, PO 2, PO 3
12	VI	Define a structure called cricket that will describe the following information: player name,team name, batting average. Using cricket,declare an array player with 5 elements and write a program to read the information about all the 5 players and print a team-wise list containing names of player with their batting average.	Structures	CO 6	PO 2, PO 3
13	VI	Write a C program to Copy one file to another file in C	Files	CO 6	PO 2, PO 3

I Semester
GE2131- Universal Human Values (Audit Course)

COURSE OBJECTIVE:	COURSE OUTCOMES
This introductory course input is intended ➢ To help the students appreciate 'VALUES' and 'SKILLS' ➢ To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity ➢ To highlight plausible implications of Holistic understanding in terms of ethical human conduct.	**On completion of this course, students will be able to** ➢ Experiential validation through the way to verify right or wrong. ➢ Practice living in harmony with natural acceptance ➢ Understand the importance of relationships.

Unit No.	Contents	Max. Hrs.
1	**Course Introduction** **Need, Basic Guidelines, Content and Process for Value Education** ➢ 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	6
2	**Understanding Harmony in the Human Being - Harmony in Myself!** ➢ 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"	6
3	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship** ➢ Understanding Harmony in the family – the basic unit of human interaction ➢ Understanding values in human-human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhay-tript; 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 ➢ Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sahasttva as comprehensive Human Goals	5

	➢ Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family! ➢ Practice Exercises and Case Studies will be taken up in Practice Sessions	
4	**Understanding Harmony in the Nature and Existence - Whole existence as Co-existence** ➢ Understanding the harmony in the Nature ➢ Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature ➢ Understanding Existence as Co-existence (Sah-asttva) 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 Practice Session	6

Text Books :

The primary resource material for teaching this course consists of

a. The text book R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

Reference Books :

The teacher's manual
R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010.

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 2021

2nd Semester

(Department of Information Technology)

Computer Science and Design

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 2021-22

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

(Department of Information Technology)

Computer Science and Design

SoE No. CSD-203.1

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
First Semester															
1	1	BS	GE	CSD2101	Calculus, Sequences and Series	T	3	0	0	3	3	30	20	50	3 Hours
2	1	BS	GE	CSD2102	Applied Physics	T	3	0	0	3	3	30	20	50	3 Hours
3	1	BS	GE	CSD2103	Lab.: Applied Physics	P	0	0	2	2	1		60	40	
4	1	HS	GE	CSD2104	Constitution of India	T	3	0	0	3	3	30	20	50	3 Hours
5	1	BES	CV	CSD2105	Engineering Mechanics	T	3	0	0	3	3	30	20	50	3 Hours
6	1	BES	CV	CSD2106	Lab.:Engineering Mechanics	P	0	0	2	2	1		60	40	
7	1	BES	IT	CSD2107	Introduction to Computer Programming	T	3	0	0	3	3	30	20	50	3 Hours
8	1	BES	IT	CSD2108	Lab.: Introduction to Computer Programming	P	0	0	2	2	1		60	40	
					TOTAL FIRST SEM		**15**	**0**	**6**	**21**	**18**				
List of Audit Course															
1	1	HS	GE	GE2131	Universal Human Value	**T**	2	0	0	0	0				
2	1	HS	GE	AU2121	YCCE Communication Aptitude Preparation (YCAP1)	**A**	3	0	0	3	0				
3	2	HS	GE	AU2122	YCCE Communication Aptitude Preparation (YCAP2)	**A**	3	0	0	3	0				
Second Semester															
1	2	BS	GE	CSD2151	Probability & Statistics	T	3	0	0	3	3	30	20	50	3 Hours
2	2	BS	GE	CSD2152	Applied Chemistry	T	3	0	0	3	3	30	20	50	3 Hours
3	2	BS	GE	CSD2153	Lab: Applied Chemistry	p	0	0	2	2	1		60	40	
4	2	HS	GE	CSD2154	Technical Communication	T	3	0	0	3	3	30	20	50	3 Hours
5	2	HS	GE	CSD2155	Lab:Technical Communication	P	0	0	2	2	1		60	40	
6	2	BES	EE	CSD2156	Digital Circuit Design	T	3	0	0	3	3	30	20	50	3 Hours
7	2	BES	EE	CSD2157	Lab.:Digital Circuit Design	P	0	0	2	2	1		60	40	
8	2	BES	EL	CSD2158	Basic Electrical Machines	T	3	0	0	3	3	30	20	50	3 Hours
9	2	BES	EL	CSD2159	Lab:Basic Electrical Machines	P	0	0	2	2	1		60	40	
10	2	BES	ME	CSD2160	Lab.: Engineering Design	P	0	0	4	4	2		60	40	
					TOTAL SECOND SEM		**15**	**0**	**12**	**27**	**21**				

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

TA ** = for Theory : 5 marks on lecture quizzes, 11 marks on TA2+TA4 activitied decided by course teacher, 4 marks on class attendance

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

		June 2022	**1.01**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**

Applicable for AY 2022-23 Onwards

II Semester

CSD2151 – Probability & Statistics

Objective	Course Outcome
1. This course provides an indication of the relevance and important of the probability theory in solving practical problems in the field of multidisciplinary engineering applications. 2. To provide undergraduate foundation in both probability distributions and mathematical statistics relevant to engineering problems. 3. To teach mathematical skill sustained from this course to form a suitable base for analytical and theoretical concept encountered in engineering profession.	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 estimates parameters of various problems. 4. Inspect scientific data, use proper curve fitting and find correlation, regression of variables.

Unit No.	Contents	Max. Hrs.
1	**Random Variables & Probability Distributions** Conditional probability, Baye's theorem. Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions. Independent Random variables, Conditional Distribution.	7
2	**Mathematical Expectation** Mathematical Expectation, Variance & Standard Deviation, Moments, Moment generating function, Skewness and Kurtosis.	7
3	**Special Probability Distributions** Binomial, Geometric, Poisson, Exponential, Normal distributions, Central Limit theorem.	6
4	**Sampling Theory** Population and sample. Statistical inference. Sampling with and without replacement. Population parameters, sample statistics. Sampling distribution of means. Sampling distribution of proportions.	6
5	**Estimation** 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.	7
6	**Curve Fitting** 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.	6

Text Books

1. Advanced Engineering Mathematics - by H.K. Dass, 8th Ed, 2007, S.Chand, Delhi.
2. Engineering Mathematics by Dr. B.S. Grewal
3. The theory and problems of probability and Statistics: M. R. Spiegel, Schaum series. (McGraw Hill)
4. Basic Statistics for Business and economics by E. K.Bowen, M. K.Star (McGraw Hill)

Reference Books

1. A First course in probability by Sheldon Ross, Sixth Edition, Pearson Education.
2. Fundamentals of Mathematical statistics by S. C.Gupta and V.K.Kapoor.
3. Probability and Statistics for Engineering 6th edition, Miller Freund and Johnson.
4. Higher Engineering Mathematics, Dr. V. Ramana , Tata McGraw Hill.

II Semester
CSD2152 – Applied Chemistry

Objective	Course Outcome
• To impart intensive and extensive knowledge of the subject enriching students to understand the roleof Chemistry in the field of engineering. • To keep students abreast with the latest developments and applications of modern materials. • To gain basic principles, instrumentation and applications of analytical techniques.	(1) Interpret different thermodynamic functions. (L2) (2) Describe basic concepts of electrochemistry and apply the knowledge for energy storage devices. (L3) (3) Illustrate chemical reaction rate. (L3) (4) Classify advanced engineering materials in technological applications. (L2) (5) Develop analytical and instrumental skills. (L3)

Unit No.	Contents	Max. Hrs.
1	**Energetics**: 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. Numericals on Internal energy and enthalpy change. Thermodynamic applications to physical and chemical equilibrium.	07
2	**Electrochemistry**: 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 Numericals. Industrial applications: Electroforming, Electrowinning, Electrolytic refining.	06
3	**Energy Storage Devices** **Basic concepts**: Primary and secondary battery. Energy density, power density, energy efficiency, cycle life, shelf life. Secondary battery: Ni-metal hydride battery, Lithium-ion battery. **\H_2-O_2 Fuel cell**: Principle, working, advantages, disadvantages, applications. Differences between battery and a fuel cell. **Supercapacitors**: Definition, types, characteristics and application.	06
4	**Chemical Kinetics** : 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 numericals.	06

Unit No.	Contents	Max. Hrs.
5	**Polymeric Materials :** **Conducting Polymers**: Intrinsic and extrinsic conducting polymers, doping, factors responsible for conduction. Synthesis and applications of conducting polymers like polyacetylene, polyaniline, polypyrrole. **Liquid Crystal Polymers**: Phases of LCP's, general properties and applications. **Biodegradable Polymers –** Synthesis, properties and applications of polylactic acid and polycaprolactone. **Smart materials:** Properties and applications of shape memory alloys, chromoactive, photoactive and magnetorheological materials.	07
6	**Advanced Materials :** **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. Threats of Nanomaterials. **Silicon Chips:** Introduction. Physical, chemical, electrical & mechanical properties and applications. **Polymers in electronic industries:** Piezo, pyroelectric**,** Ferroelectric polymers.	07

Text Books:

SN	Title	Edition	Authors	Publisher
1	A Textbook of Engineering Chemistry	Eleventh Edition.	S S. Dara	S.Chand & Co New Delhi
2	Engineering Chemistry	Sixteenth Edition	Jain & Jain;	Dhanpat Rai & sons New Delhi.
3	Physical Chemistry	(Eighth edition-2006).	P. W. Atkins,	Oxford Publications
4	Engineering Chemistry		B.Sivasankar	Tata McGraw-Hill

Reference Books:

SN	Title	Edition	Authors	Publisher
1	Chemistry in Engineering		Lloyd A.Munro	Prentice-hall
2	Applied chemistry for engineers		T.S.Gyngell	
3	Engineering Chemistry		B.K.Sharma Krishna Prakashan media private LTD	
4	Chemistry of Advanced Materials		CNR Rao	RSC Publications
5	Handbook of Semiconductor Silicon Technology	1st Edition.	William C. O'Mara, Robert B. Herring	NOYES PUBLICATIONS I "P I Park Ridge, New Jersey. USA.

Website / Data sheet:

SN	Title
1	Silicon Chips: What are Computer Chips Made Of? https://www.intel.com/content/www/us/en/history/museum-making-silicon.html
2	What is silicon, and why are computer chips made from it? https://www.extremetech.com/extreme/208501-what-is-silicon-and-why-are-computer-chips- made-from-it
3	**1) Wafer processing**https://www.hitachi- hightech.com/global/products/device/semiconductor/ process.html

II Semester
CSD2153 – Lab : Applied Chemistry

Course Outcome: After completion of the laboratory work, student will demonstrate the ability to

CO 2	Describe basic concepts of electrochemistry and apply the knowledge for energystorage devices. (L3)
CO4	Classify advanced engineering materials in technological applications. (L2)
CO 5	Develop analytical and instrumental skills. (L3)

Lab Experiment List:

Expt. No	Name of Experiment (Minimum 4 experiments from Group I & II each and Demonstrations on 2 experiments should be conducted)
	Group I:
1	To determine the strength of a given potassium dichromate solution with N/20 sodium thiosulphate solution.
2	Estimation of Nickel by complexometry.
3	Determination of copper by iodometric titration.
4	Estimation of Fe^{2+} ions by redox titration.
5	Estimation of Fe^{3+} ions by spectrophotometric method.
6	Synthesis of urea formaldehyde resin.
	Group II:
7	Preparation of Printed Circuit Board.
8	Determination of molecular weight of a polymer using Ostwald's viscometer.
9	Determination of ion exchange capacity of a cation exchange resin.
10	Proximate analysis of Coal.
11	Determination of thinner contain in oil paint.
12	Electroplating Copper on Stainless steel.
	Demonstration:
13	Determination of Faradays first law.
14	Determination of Faradays second law.
15	Determination of conductivity of water sample by conductivity meter

II Semester
CSD2154 : Technical Communication

Course Objectives	Course Outcome
1. To Explain the fundamentals of communication 2. To Classify the different speech sounds of English 3. To Apply Different components of oral communication 4. To Draft technical documents	Upon completion of the course, students will have the ability 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 No.	Contents	Max. Hrs.
1	**Basics of Communication** 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).	6
2	**English Phonetics** Speech Mechanism, Organs of speech, Consonant and Vowels sounds, Worde stress rules	6
3	**Interview Skills** 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	5
4	**Oral Skills** 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	6
5	**Presentation & Visual Communication** Presentation and audience analysis, Organizing content, Nuances of presentation, Visual Communication – Introduction & importance, Role & Psychology of color in visual communication.	6
6	**Technical Written Communication** Memo, Email, Report -Types, Characteristics, prewriting aspects of report and preparing writing aspects of report), Types of paragraphs.	6

Text Books :

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

Reference Books :

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

II Semester
CSD2155: Lab. - Technical Communication

Sr. No.	List of Experiment
1	Handson for Consonants and vowel sounds
2	Identifying the pragmatic meaning of the text
3	Mock Sessions for Interview
4	Grooming session for effective use of body language
5	Visual Media – preparing poster boards, advertising product
6	Group Discussion

II Semester
CSD2156 – Digital Circuit Design

Objective	Outcomes
➢ Develop a strong foundation of digital electronics. ➢ Understand concepts of combinational and sequential circuits. ➢ Analyze the synchronous and asynchronous logic circuits.	Students will be able to: 1. Simplify combination logic circuits using Boolean algebra. 2. Understand and demonstrate the various codes and illustrate their addition substraction. 3. Simply and exhibit the methods to solve logical functions using K-map and Quine Mc-Cluskey methods and apply it to implement combinational logic circuits. 4. Design and analyze Synchronous and Asynchronous sequential Circuits.

Unit	Contents	Hrs
1	Number system and codes:Binary: octal, hexadecimal and decimal Number systems and their inter conversion, BCD numbers (8421-2421), gray code, excess–3 code, ASCII codes. Binary addition and subtraction, signed and unsigned binary numbers, 1's and 2's complement representation.	6
2	Boolean Algebra: Basic logic circuits: Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR and their truth tables,), Universal Gates, Laws of Boolean algebra, De-Morgan's theorem.	6
3	Minimization Techniques: Min term, Max term, POS, SOP, K-Map, Simplification by Boolean theorems, don't care condition. Quine Mc-Cluskey method	6
4	Combinational Logic: The Half adder, the full adder, subtractor circuit. Multiplxer de-multiplexer, decorder, BCD to seven segment Decorder, encoders	6
5	Sequential Circuits: Flip flop, set-reset laches, R-S flip-flop, D-flip flop, J-K Flip-flop, Master slave Flip flop, T flip-flop, excitation table of flip-flops.	7
6	Registers & Counters: Synchronous/Asynchronous counter operation, Up/down synchronous counter, application of counter, Serial in/Serial out shift register, Serial in/Serial out shift register, Serial in/parallel out shift register, parallel in/ parallel out shift register, parallel in/Serial out shift register, Bi-directional register.	7

TEXT BOOKS

1. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 6thEdition, TMH, 2003.
3. Anandkumar- fundamental of digital circuit. 3rd edition. PHI

Reference Books:

1) Modern Digital Electronics , RP Jain, Tata McGraw Hill, 3rd Edition
2) Fundamentals of Logic Design, C.H.Roth, Public Work & Services, 3rd edition 2007.
3) Engg Approach to Digital Design, Fletcher, Prentice Hall of India 1993.
4) Digital Circuits & Microprocessors, Hebert Taub, Mc Graw Hill, 1988.

II Semester
CSD2157 : Lab.- Digital Circuit Design

Objective	Outcomes
➢ Develop a strong foundation of digital Electronics. ➢ Understand concepts of combinational and sequential circuits. ➢ Design and develop combinational and sequential circuits	Students will be able to: 1. Simplify combination logic circuits using Boolean algebra and exhibit the methods to solve logical functions using K-map and Quine-Mc-Clauskey methods. 2. Understand and apply the concept of combinational logic circuits in various digital systems. 3. Understand and demonstrate the various codes and illustrate concept of logic family with their characteristics. 4. Understand the working of Flip-flops and its use to design Synchronous counters and Design and demonstrate finite state machines.

Expt. No.	Name of Experiments
1.	Introduction to LogicAid software and commands. Verifications of functions using Logic Aid and comparing the results with manual results.
2.	Introduction to Bread Board and Verify Truth Tables of basic Logic gates using Bread Board.
	Virtual Lab: **An Initiative of Ministry of Human Resource Development Under the National Mission on Education through ICT**
3.	Construction of half/ full adder using XOR and NAND gates and verification of its operation.
4.	Verify Binary to Gray and Gray to Binary conversion using NAND gates only.
5.	Implementation of 4x1 multiplexer and 1x4 demultiplexer using logic gates.
6.	Verify the truth table of RS, JK, T and D flip-flops using NAND & NOR gates.
7	Design and verify the 4- Bit Synchronous/ Asynchronous Counter using JK Flip Flop.
	Using SPICE
8	Introduction to SPICE Digital model and commands. Verify Truth Tables of basic Logic gates & Universal Gates **using SPICE.**
9	Design & verify Truth Table of Half adder & Full adder circuits **using SPICE.**
10	Design & verify Truth Table of 4:1 Multiplexer & 1: 4 Demultiplexer circuits **using SPICE.**

II Semester
CSD2158 : Basic Electrical Machines

Course Objective:

The course objective is to impart knowledge of

- To impart fundamental knowledge of electricalcircuits and machinery.
- To provide problem solving experience and learningof concepts through it in electrical engineering.

Course Outcome: After completion of the course, student will demonstrate the ability to

CO 1	Reproduce fundamentals of dc circuits & ac circuits.
CO 2	Explain, construction, working and applications of various electrical machines.
CO 3	Analyze performance of various electrical machines.

CO-PO Articulation Matrix :

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	1	1							1		
CO2	3	3	3	2	2							1		
CO3	3	3	3	3	3							1		2

Unit	Content	Hours
1	**D.C. Circuits:** Basics of electrical circuits. Equivalent resistance, Kirchhoff's Laws. Current and Voltage division rule. Mesh and Nodal analysis of dc circuits. Superposition Theorem. **A.C. Fundamentals:** Generation of alternating voltage. Values of alternating quantity. Average and rms value by mid - ordinate method and method of integration. Form factor and peak factor. Concept of phasor and its mathematical representation. Concept of phasor diagram. Phasor algebra. Power in a.c. circuit. Concept of power factor, reactive power and apparent power with power triangle.	06
2	**Single Phase Transformer:** Working principle. EMF equation. Voltage ratio and turns ratio. Step up and step down transformers. Construction of single phase transformer. Ideal transformer. Transformer on no load with phasor diagram and equivalent circuit. Practical transformer and its equivalent circuit. Referred values. Voltage Regulation. Losses in transformer. Open circuit and Short circuit tests on transformer. Efficiency and condition for maximum efficiency. Types of transformer and their applications.	07
3	**D.C. Motor :** Principle, Torque Equation, Characteristics and applications of various types of D.C. Motors, Starting of D.C. Motors, Speed control of Series and Shunt motors, Power flow in DC machines, Losses and Efficiency in D.C. machines.	07

4	**Three Phase Induction Motor :** Construction. Production of rotating magnetic field. Principle of operation. Speed and slip. Frequency of rotor voltage and current. Relationship between rotor copper loss and rotor input. Developed Torque. Torque of an induction motor. Condition for maximum torque. Torque — slip and torque speed characteristics. Applications of three phase induction motor.	07
5	**Stepping Motors:** Principle of operation, Constructional features, Types of stepper Motors, Various modes of operation of Variable reluctance (VR) stepper motors, torque production in Variable Reluctance (VR) stepping motor, Multi stack VR stepper motor, Construction and working of Permanent Magnet (PM) stepper motor, Construction and working of Hybrid stepper motor, Torque angle characteristics of the stepper motor.	06
6	**Permanent Magnet Brushless DC Motors:** Fundamentals of Permanent Magnets, Principle of operation, Magnetic circuit analysis, EMF and Torque equations, Characteristics and control. **Servomotors:** AC Servomotors & DC Servomotors.	07

Text Books:

SN	Title	Edition	Authors	Publisher
1	Basic Electrical Engineering	1st Edition, 2005	T. K. Nagsarkar and M. S. Sukhija	Oxford Higher Education
2	Basic Electrical Engineering	2nd Edition,2006	V. N. Mittle and A. K. Mittal	The McGraw Hill Companies, New Delhi
3	Electrical Technology	2005	B.L.Theraja	S.Chand
4	Permanent Magnet and Brushless DC motors		T. Kenjo and S. Nugatory	England, Clarendon Oxford Press, 1989.

Reference Books:

SN	Title	Edition	Authors	Publisher
1	Basic Electrical Engineering	2nd Edition,2002	I J Nagrath and D. P.Kothari	McGraw Hill, New Delhi
2	Electrical Engineering Fundamentals	2nd Edition,2001	Vincent Del Toro	Prentice Hall India, New Delhi

II Semester
CSD2159 : Lab.: Basic Electrical Machines

Course Outcome: After completion of the laboratory work, student will demonstrate the ability to

CO 1	Perform laboratory experiments and demonstrate competency in collecting, interpreting, analysing data, communicate and present effectively through laboratory journals.

Lab Experiment List:

Expt. No	Name of Experiment
1	To verify Kirchhoff's voltage law and Kirchhoff's current law.
2	To verify Superposition theorem.
3	To perform O.C. and S.C. tests on a single phase transformer.
4	To find transformation ratio, regulation and efficiency of a single phase transformer.
5	To study speed control of dc motor.
6	To perform load test on dc motor.
7	To study speed control of three phase induction motor.
8	To perform load test on three phase induction motor.

II Semester
CSD2160 – Lab.: Engineering Design

Objectives:	Course outcomes:
1. The objective of learning Engineering Design is to make the students aware of how an industry communicates technical information graphically. 2. An engineer need to have three skills, he must be able to imagine, draw clearly and rapidly and to read the drawings drawn by others. 3. Engineering Design aims in teaching the principles of accuracy and clarity while presenting the information necessary for creation of products. 4. It also develops the critical thinking ability through visualisation that are essential while creation of successful design.	CO 1 Identify different orthographic views using knowledge of geometrical entities . CO 2 Translating the geometries from 2D to 3D and vice versa. CO 3 Visualisation of models using different rendering effects. CO 4 Record and Transform part and assembly motion into animation.

List of Practicals
1. Basic introduction to geometrical entities
2. Visualizing different orthographic views for the given 3-D object
3. Creation of 3-D to 2-D views using any CAD software
4. Creation of 2-D to 3-D objects using any CAD software
5. Modification of 3-D objects using special geometrical features
6. Creation of realistic representation of models using any CAD software
7. Evaluating true-to-life models using textures and appearance effects
8. Rendering of models using different environments, lighting conditions, shading effects
9. Capturing the motion of parts and assemblies using any CAD software
10. Creation of animation and exporting the file to any windows based media software

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 2021

3rd Semester

(Department of Information Technology)

Computer Science and Design

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 2021-22

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

(Department of Information Technology)

Computer Science and Design

SoE No. CSD-203.1

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
Third Semester															
1	3	BS	GE	CSD2201	Linear Algebra	**T**	3	1	0	4	4	30	20	50	3 Hours
2	3	PC	IT	CSD2202	Microprocessors and Microcontrollers	**T**	3	0	0	3	3	30	20	50	3 Hours
3	3	PC	IT	CSD2203	Lab:Microprocessors and Microcontrollers	**P**	0	0	2	2	1		60	40	
4	3	PC	IT	CSD2204	Data Structures	**T**	4	0	0	4	4	30	20	50	3 Hours
5	3	PC	IT	CSD2205	Lab:Data Structures	**P**	0	0	2	2	1		60	40	
6	3	PC	IT	CSD2206	Computer System Organization	**T**	3	0	0	3	3	30	20	50	3 Hours
7	3	PC	IT	CSD2207	Theoretical Foundation of Computer Sciences	**T**	3	0	0	3	3	30	20	50	3 Hours
8	3	PC	IT	CSD2208	Software Lab-I	**P**	0	0	4	4	2		60	40	
					TOTAL THIRD SEM		**16**	**1**	**8**	**25**	**21**				
Fourth Semester															
1	4	BS	IT	CSD2251	Discrete Mathematics and Graph Theory	**T**	3	1	0	4	4	30	20	50	3 Hours
2	4	PC	IT	CSD2252	Operating Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
3	4	PC	IT	CSD2253	**Lab :** Operating Systems	**P**	0	0	2	2	1		60	40	
4	4	PC	IT	CSD2254	Computer Networks	**T**	3	0	0	3	3	30	20	50	3 Hours
5	4	PC	IT	CSD2255	Object Oriented Programming	**T**	3	0	0	3	3	30	20	50	3 Hours
6	4	PC	IT	CSD2256	**Lab:**Object Oriented Programming	**P**	0	0	2	2	1		60	40	
7	4	PC	IT	CSD2257	Design and Analysis of Algorithms	**T**	3	0	0	3	3	30	20	50	3 Hours
8	4	PC	IT	CSD2258	**Lab**.:Design and Analysis of Algorithms	**P**	0	0	2	2	1		60	40	
9	4	PC	IT	CSD2259	Software Lab-II	**P**	0	0	4	4	2		60	40	
					TOTAL FOURTH SEM		**15**	**1**	**10**	**26**	**21**				

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

TA ** = for Theory : 5 marks on lecture quizzes, 11 marks on TA2+TA4 activitied decided by course teacher, 4 marks on class attendance

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

List of Audit Course

1	3	HS		GE2121	Environmental studies	**T**	2	0	0	2	0	
2	3	HS		AU2123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0	
3	4	HS		AU2124	YCCE Communication Aptitude Preparation (YCAP4.1) for CV,ME,CT,IT,CSE, IIoT, AIML, CSD, AIDS	**A**	3	0	0	3	0	

		June 2022	**1.01**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**

Applicable for AY 2022-23 Onwards

III Semester
CSD2201 – Linear Algebra

Objective	Course Outcome
1. To provide mathematical knowledge required to analyze problems encountered in engineering. 2. The students are acquainted with the solution of system of linear equation, eigen values and eigen vectors. 3. To apply principles of matrix algebra to linear transformations and inner products. 4. Student can apply this course in many areas of engineering such as computer graphics, cryptography, wire-less communication, signal processing, robotics and animation.	1. Solve systems of linear equations using rank of matrix 2. Determine eigenvalues and eigenvectors and solve eigenvalue 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 No.	Contents	Max. Hrs.
1	**Elementary matrix operations** Introduction to Matrices and Determinants, Solution of Linear Equations, Cramer's rule, Inverse of a Matrix.	6
2	**Matrix Algebra** Rank of a matrix, Gaussian elimination, LU Decomposition (Crout's method), Solving Systems of Linear Equations using the tools of Matrices.	6
3	**Diagonalization of matrix** 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.	7
4	**Vector Space** Vector Space, Subspace, Sum of Sub space, linear combination, Linear dependence and independence, Span and basis, Spanning sets, Generators.	6
5	**Linear Transformation** Linear transformation, Ranges and Kernel (null space) of linear transformation, Inverse of linear transformation, Algebra of linear transformation, Singular and nonsingular linear transformation.	7

Unit No.	Contents	Max. Hrs.
6	**Inner product Spaces** 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.	7

Text Books :

1. Advance Engineering Mathematics (9th Edition), Kreyszig. Wiley
2. Higher Engineering Mathematics (40th edition), B.S. Grewal, Publisher: S.Chand & Company Limited
3. Advanced Engineering Mathematics (8th r edition), H.K. Dass
4. Linear Algebra,Hoffman and Kunze, prentice Hall of India, New Delhi
5. Linear Algebra and its Applications, Glbert Strang, Nelson Engineering (2007)

Reference Books :

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

III Semester

CSD2202 - Microprocessors and Microcontrollers

Objective	Course Outcome
The student should be able to 1) To introduce students with the architecture and operation of typical microprocessors and microcontrollers. 2) To familiarize the students with the programming and interfacing of microprocessors and microcontrollers. 3) To provide strong foundation for designing real world applications using microprocessors and microcontrollers. 4) 4. To understand interfacing of on and off chip peripherals with 8051 microcontrollers	**On completion of this course, the student will be able to** 1) Identify a detailed software & hardware structure of the Microprocessor and microcontroller 2) Determine the addressing modes and instruction sets related to programming of 8086 and 8051 3) Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller. 4) Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO	Identify a detailed software & hardware structure of the Microprocessor and microcontroller	3													
CO	Determine the addressing modes and instruction sets related to programming of 8086 and 8051	3	3					3							
CO	Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller	3	3	3				3							3
CO	Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.	3	3	3				3							3

Unit No.	Contents	Max. Hrs.
1	8086 architecture- Internal architecture & pin diagram of 8086/8088 microprocessor, Minimum & Maximum mode, even & odd memory banks, Accessing memory & I/O ports, Memory mapping in minimum mode.	6
2	Programming with 8086/8088: Addressing Modes, Instruction set, Instruction encoding format, Timing diagram Assembler directives, 8086 programming examples, String operations, File I/O processing, Far & Near procedures, Macros	5
3	Interfacing with 8086/8088: Memory interfacing, Intel 8255 PPI, Block diagram & interfacing with ADC DAC, Modes & initialization.	5
4	Overview of 8051 Microcontroller family, Introduction to MCS 51 family, Architecture, Memory organization, Internal RAM, Flag Register, Register Banks, SFRs , Functional pin description and various resources of MCS 51. Hardware Overview	5
5	Addressing modes, Instruction set and Assembly language programming Programs using look up table, Bit manipulation, 8051 I/O programming, Delay Programs	6
6	I/O Interfacing such as LED, switches, 7segment display, keyboard matrix programming, 8051 programming in C: Data types and time delay, I/O programming, Logic operations, Data conversion programs, Lookup table access.	6

Text Books

SN	Title	Edition	Authors	Publisher
1	Advanced microprocessors and peripherals	2nd edition 2006	A.K ray and K.M.Bhurchandani	TMH
2	The 8051 Microcontroller and Embedded systems using assembly & C	2nd edition	Muhammad Ali Mazidi	Pearson Education Asia LPE

Reference Books

SN	Title	Edition	Authors	Publisher
1	The 8051 Microcontrollers, Architecture and programming and Applications		K.Uma Rao, Andhe Pallavi	Pearson,2009
2	Microprocessors and Interfacing: Programming and Hardware	Third edition	Douglas V.Hall	TMH
3	The 8051 microcontroller	3rd edition	Kenneth.J.Ayala	Cengage learning,2010

		June 2021	1.00	Applicable for AY 2021-22 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

III Semester
CSD2203 -LAB.: Microprocessors and Microcontrollers

Objective	Course Outcome
The student should be able to 1) To introduce students with the architecture and operation of typical microprocessors and microcontrollers. 2) To familiarize the students with the programming and interfacing of microprocessors and microcontrollers. 3) To provide strong foundation for designing real world applications using microprocessors and microcontrollers. 4) 4. To understand interfacing of on and off chip peripherals with 8051 microcontrollers	**On completion of this course, the student will be able to** 1) Identify a detailed software & hardware structure of the Microprocessor and microcontroller 2) Determine the addressing modes and instruction sets related to programming of 8086 and 8051 3) Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller. 4) Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Identify a detailed software & hardware structure of the Microprocessor and microcontroller	3													
CO2	Determine the addressing modes and instruction sets related to programming of 8086 and 8051	3	3					3							
CO3	Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller	3	3	3				3							3
CO4	Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.	3	3	3				3							3

List of Practical's

Sr.	Problem Statements
1	Data block transfer using 8086 microprocessor
2	Find the maximum data byte in a block using 8086 microprocessor
3	Count even numbers present in a data block using 8086 microprocessor
4	Convert packed BCD number to its equivalent Hexadecimal number using 8086 microprocessor
5	Convert gray code into binary code using 8086 microprocessor
6	Generate square waveform using DAC using 8051
7	Generate sawtooth waveform using DAC using 8051
8	To find average of numbers using 8051 microcontroller
9	Toggle LED connected to port pin of micro-controller 8051
10	Display BCD no. on seven segment display

III Semester
CSD2204 - Data Structures

Objective	Course Outcome
1) To Study the algorithms for efficiency using Asymptotic Notations. 2) To study and acquire the knowledge of Basic Data Structures. 3) To understand the Data Structure for problem solving.	1) Compute and analyze the algorithms for efficiency using Asymptotic Notations. 2) Understand basic data structures like array, list, stack, queue, tree, graph. 3) Develop knowledge of basic data structures such as arrays, linked lists, 4) Apply appropriate data structures in problem solving. 5) Design application by using data structures and algorithms for real world problems.

CO	Statement	Mapped PO												PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Compute and analyze the algorithms for efficiency using Asymptotic Notations	3	3												
CO2	Understand basic data structures like array, list, stack, queue, tree, graph	3													
CO3	Develop knowledge of basic data structures such as arrays, linked lists			3											

CO4	Apply appropriate data structures in problem solving.	**3**		**3**										
CO5	Design application by using data structures and algorithms for real world problems			**3**										

Unit No.	Contents	Max. Hrs.
1	Data structures basics, Mathematical /algorithmic notations & functions, Complexity of algorithms, Sub algorithms. Big oh and theta notations and omega notations, Average, best and worst case analysis String processing: storing strings, character data type, string operations, word processing, and pattern matching algorithms.	5
2	Linear arrays and their representation in memory, traversing linear arrays, inserting & deleting operations, sorting Techniques, Linear search and Binary search algorithms. Multidemensional arrays, Pointer arrays. Record structures and their memory representation. Matrices and sprase matrices.	6
3	Linked lists and their representation in memory, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion deletion opeartions on linked lists. Header linked lists, Two- way linked lists. polynomial representations and manipulations are using linked list, circular linked list, doubly linked list, Generalized list.	7
4	Stacks and their array representation. Arithmetic expressions: Polish notation. Quick sort, an application of stacks, Recursion. Tower of Hanoi problem. Implementation of recursive procedures by stacks, Queues. , Circular queues, Priority Queues, Dequeue .	6
5	Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms using stacks, Header nodes : threads. Threaded Binary Trees, Binary search trees, searchng, inserting and deleting in binary trees. Applications, The concept of balancing and its advantages, B-Trees, B+ Trees, AVL Trees. Heap and heapsort. General trees.	6
6	Graphs and digraphs: Representations, Breadth and depth first searches, connected component, spanning trees, shortest path–single source & all pairs , activity networks, topological sort, Hamiltonian path. Graph theory, sequential representations of graphs, Warshalls' algorithm, Linked representation, operations & traversing the graphs. Posets & Topological sorting. hash functions,	6

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Data Structures using C and C++		Y. Langsam,	Pearson Education
2	Theory & Problems of Data Structures		Seymour Lipschutz	
3	Data Structures using C		Tanenbaum	Pearson Education
Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Fundamentals of Data Structures	2nd Edition 2009	Ellis Horowitz, Sartaj Sahni, Dinesh Mehta	CBS Publications
2	An Introduction to Data Structures with Applications		Trembley, Sorenson	

III Semester
CSD2205 - LAB.: Data Structures

Sr. No.	List of Experiment
1	Write a program to perform following operations on Array. a) Traverse b) Insertion c) Deletion
2	Write a program to implement Sorting and Searching Techniques.
3	Program for allocating memory dynamically for single dimensional array and sort it using quick sort and merge sort
4	Write a program to implement following Operations in Linked List a) Traverse b) Insertion c) Deletion
5	Write an application to implement Tower of Hanoi Problem Algorithm.
6	Write an application to implement Abstract data type stack.
7	Write a program to evaluate Post fix expression using stack.
8	Write a program to implement Preorder Traversal of a binary tree.
9	Program to create file for storing details of all the items needed for playing any game of your choice also perform display, insertion of new record at any location, deletion of any record.
10	Write a Program to Perform insertion or search in a specified level of a stack implemented tree- structured symbol table

III SEMESTER
CSD2206 - Computer System Organization

Objective	Course Outcome
1. Study the fundamentals of computer organization and its relevance to classical and modern problems of computer Architecture. 2. Learn how to generate control signals for instructions using different architecture 3. Learn control units operations and its performance issues. 4. Study the different arithmetic operation including the algorithms & implementation for fixed-point and floating-point numbers. 5. Study the hierarchical memory system including cache memories and virtual memory 6. Study the different ways of communicating with I/O devices and standard I/O interfaces and advanced concept of computer architecture.	1. Students will be able to describe fundamentals of computer architecture and organization. 2. Students will be able to write control sequence for instructions. 3. Students will be able to identify control unit operations and understand performances issue in processor and memory. 4. Students will be able to perform arithmetic operations and describe its storage formats. 5. Students will be able to design main memory organization that uses banks for different word size operations and describe the concept of cache mapping techniques. 6. Students will be able to describe the concept of I/O organization and discuss some advanced methods for improving systems performance.

Unit No.	Contents	Max.
1	Basic Structure of Computer Hardware and Software: Functional Units, Basic Operational Concepts, addressing methods and machine program sequencing : Memory Locations , addressing and encoding of information, Main memory operation . Instruction Format, limitations of Short word- length machines, High level language considerations	7
2	Processing Unit: Some fundamental concepts, Single, two, three bus organization, Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instruction, Instruction sequencing, addressing modes. Case study – instruction sets of some common CPUs.	8
3	Hardwired Control : Design Micro-programmed Control: Microinstructions, Grouping of control signals, Micro program sequencing, Micro Instructions with next Address field, Perfecting microinstruction, Emulation, Bit Slices. Case study – design of a simple hypothetical CPU	7
4	Arithmetic: 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, Integer Division, Floating point numbers and operations.	8
5	The main Memory: some basic concepts, semiconductor RAM memories, Memory system consideration, semiconductor ROM memories, Multiple module memories and interleaving, Cache Memory, Mapping techniques, Replacement algorithms, write policies Virtual memories, memory management requirements.	8
6	Computer Peripherals: I/O Devices, I/O device interface, DMA, Interrupt handling Role of interrupts in process state transitions, I/O device interfaces – SCII, USB Introduction to Pipelining, Throughput and speedup, pipeline hazards Introduction to parallel processors.	7

Text Books			
Sr.No.	**Title**	**Authors**	**Publisher**
1	Computer Organization and Design: The Hardware/Software Interface	David A. Patterson and John L. Hennessy	5th Edition Elsevier.
2	Computer Organization and Embedded Systems	Carl Hamacher .	McGraw Hill Higher Education 6th Edition
3	Computer architecture and organization	Carl Hamacher	McGraw Hill Higher Education 4th Edition
Reference Books			
1	Computer Architecture and Organization	John P. Hayes,	WCB/McGraw-Hill 3rd Edition
2	Computer Organization and Architecture: Designing for Performance	by William Stallings,	10th Edition Pearson Education.
	Computer System Design and Architecture	Vincent P. Heuring and Harry F. Jordan,	2nd Edition Pearson Education

III SEMESTER
CSD2207 - Theoretical Foundation of Computer Sciences

Objective	Course Outcome
• To understand the basic properties of formal languages & Finite Automata • To understand basic properties of regular expression and the basic concept of Regular Grammar • To study of different types of grammars and the properties of Context Free Grammar • To understand the basic properties of CFL & Designing of Push Down Automata • To understand the basic properties of Turing machine and study of Recursive Language • To understand the basic properties of concept of undeciadibility, post Correspondence problem & Recursive enumerable language	• After completion of the course students will be able to: • To apply basic properties of formal languages & to design Finite automata. • To analyze & formulate Regular Expression & Regular Grammar. • Understand Context Free Grammar & Construct CFG for the formal language • To apply properties of CFL & design of Push Down Automata • To analyze & design Turing machine & demonstrate basic concept of Recursive Language • To demonstrate the understanding of key notions such as undeciadibility, post Correspondence problem & Recursive enumerable language

Course Outcomes	Statement	Mapped PO												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
IT	To apply basic properties of formal languages & to construct Finite automata.	M	M	H											
IT	To analyze & formulate Regular Expression & Regular Grammar.	M	M												
IT	Understand Context Free Grammar & Construct CFG for the formal language	M	M	H											
IT	To apply properties of CFL & design of Push Down Automata	M	M	H											
IT	To analyze & design Turing machine & demonstrate basic concept of Recursive Language	M	M	H											
IT	To demonstrate the understanding of key notions such as undeciadibility, post Correspondence problem & Recursive enumerable language	M	M												
		M	M	H											

Unit No.	Contents	Max. Hrs.
1	Introduction: Alphabet, Symbols, Sets, Strings, Language, Operations, Relations, Finite Automata: Design of Finite Automata, Acceptance of strings and languages, Deterministic Finite Automation , Non-Deterministic Finite Automation, Equivalence between NFA and DFA , NFA with ε-transition, Minimization of FA.	05
2	Regular sets, Regular expressions, Manipulation of regular expressions, Equivalence between RE and FA. Pumping Lemma for regular languages, closure properties of regular sets, properties of regular languages, Chomsky hierarchy of languages, Regular grammars, Right linear and left linear regular grammars, interconversion, Equivalence between regular grammar and FA, Interconversion between RE and RG.	05
3	Context free grammar, Derivation trees (Parse tree), Syntax tree , Ambiguous Grammar, Context Free Language (CFL), Closure properties of CFL, Simplification of CFG, Normal Forms of grammar: Chomsky Normal Form (CNF), Greibach Normal Form (GNF), CYK algorithm.	07
4	Push down automata, definition and model, acceptance of CFL by empty Stack and by final state, Design of PDA for the CFL, equivalence CFG and PDA, Inter conversion, DPDA & NDPDA.	09
5	Turing machine, Definition, Model of TM, Design of Turing Machine, Computable functions, Recursive enumerable language, Recursive Language, Properties of Recursive enumerable language, Variants of Turing machines, non deterministic TMs and equivalence with deterministic TMs, context sensitive language (CSG), Linear bounded automata.	08
6	Undecidability: Church-Turing thesis, Undecidable Problems related to Recursive enumerable language and Turing Machine, post correspondence problem (PCP), Universal Turing Machine, The universal and diagonalization languages, reduction between languages and Rice's theorem, Recursive function: Basis functions and operations on them. Bounded minimization, unbounded minimization, preemptive recursive function and μ recursive function.	06

Text Books

Sr. No.	Title	Authors	Publisher
01	T1: Introduction to Automata Theory, Languages and computation	John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman	Pearson Education Asia 2nd edition, 2000
02	T2: Introduction to languages and the Theory of Automata	John C. Martin	Tata McGraw Hill 3rd edition, 2003.

Reference Books

1	R1: Elements of the Theory of Computation	Harry R. Lewis and Christos H. Papadimitriou	Pearson Education Asia
2	R2: Introduction to the Theory of Computation	Michael Sipser	PWS Publishing
3	R3: Theory of Computation	O.G. Kakde	USP 2008

III SEMESTER
CSD2208 - Software Lab

Course Learning Objective	Course Outcomes
1. Understanding data types, data structures, control , and Loop statements in Python. 2. Learn def function definitions, and modules. 3. Learn basic object oriented concepts using Python. 4. Developing applications in Python using customized and built in modules and packages.	After learning the course, the students will be able to 1. Understand the basic data types, built in data structures, control statements and loops and write simple programs in Python 2. To understand the concepts of functions modules and packages and write complex programs using them. 3. To understand defining and handling Python objects and develop classes required for the given application 4. To develop a useful application in Python.

Course Outcomes	Statement	Mapped PO												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
IT1---.-	Understand the basic data types, built in data structures, control statements and loops and write simple programs in Python	3													
IT1---.-	To understand the concepts of functions modules and packages and write complex programs using them.	3	1												
IT1---.-	To understand defining and handling Python objects and develop classes required for the given application	3	1												
IT1---.-	To develop an useful application in Python	2	2	2	1	1				2			2	1	1

Contents:

Module 1: Introduction: Build-in Data types: Data type & Variables, Python numbers, Python Strings, Python built in data structures: Lists, Dictionaries, Tuples, Sets, Arrays. Datatype conversion. Statements: Assignment statement, import statement, print statement, input statement, Python Control Statements: if, if – else, elif statements, Loop statements: For, while, continue and break, try and except statement, raise, with statements, case statement.

Module 2: Python Functions, Modules and Packages: The def statement, returning values, parameters, arguments, local variables, global variables and global statement, doc strings for functions, Mathematical Function, Generating Random numbers, File Handling.

Module 3: Python Object and Classes: A simple class, defining methods, member variables, The constructor, calling methods, adding inheritance, class variables, class methods and static methods, Interfaces, New-style classes, Doc strings for classes, Private members, Python Operator Overloading, Python inheritance and polymorphism, Exception Handling, Python Modules.

Module 4: Developing applications in Python using built in and customized modules and packages.

Sr. .	Topics to be Covered	Sample Problem Statement
1.	Demonstration of Build-in Data types: Data type & Variables, Python numbers	Write a Python program to compute the roots of a quadratic equation
2.	Demonstration of Python Lists.	Write a Python program to perform following operations: **i)** Insertion of element in a given list **ii)** Deletion of element from the given list
3.	Demonstration of different Statements: Assignment statement, import statement, print statement, input statement	Write a Python program to find square root of a number
4.	Demonstration of control statements: if, if – else, elif statements	Write a Python program to enter day number (1-7) and print the corresponding day of week name using if else. (e.g 5 then Friday)
5.	Demonstration of Loop statements: For, while, break, continue	Write a Python program to print all prime numbers from 1 to 100 (using nested loops, break and continue)
6.	Demonstration of try and except statement, raise, with statements, case statement	Write a Python program which take character as input and determine about vowels and consonants using case statement.
7.	Demonstration of Python Functions: The def statement, returning values, parameters, arguments	Write a Python program using user defined function to find the sum of following series. 1/1! + 2/2! + 3/3! + ……1/N!
8.	Demonstration of Python Mathematical Function	Write a Python Program to implement some mathematical functions
9.	Demonstration of Python File Handling	Write a Python program to read data from "Input.txt" file using File Input Class and write output to "Output.txt" using File Output class.
10.	Demonstration of Python Object and Classes: A simple class, defining methods, member variables	Write a program to define a class Employee with four data members such as Emp_name, Emp_id, Salary and department_id. Define appropriate methods to initialize and display the values of data members. Also calculate Gross salary of employee based on Basic Salary, TA, DA and HRA of employee
11.	Demonstration Python inheritance	Create a class Account that stores the customer name, account, number and type of account. From this derive the classes Current-acct and Saving-acct to make them more specific to their requirement. Include necessary methods in order to achieve the following tasks: (a) Accept deposit from a customer and update the balance. (b) Display the balance (c) Compute and deposit interest. (d) Permit withdrawals (e) Check the minimum balance, impose penalty, if necessary and update the balance
12.	Demonstration of Python Exception Handling.	Write a program to implement Exception handling in Python.
13	Building Application	Develop some useful application in Python

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 2021

4th Semester

(Department of Information Technology)

Computer Science and Design

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 2021-22

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

(Department of Information Technology)

Computer Science and Design

SoE No. CSD-203.1

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
Third Semester															
1	3	BS	GE	CSD2201	Linear Algebra	**T**	3	1	0	4	4	30	20	50	3 Hours
2	3	PC	IT	CSD2202	Microprocessors and Microcontrollers	**T**	3	0	0	3	3	30	20	50	3 Hours
3	3	PC	IT	CSD2203	Lab:Microprocessors and Microcontrollers	**P**	0	0	2	2	1		60	40	
4	3	PC	IT	CSD2204	Data Structures	**T**	4	0	0	4	4	30	20	50	3 Hours
5	3	PC	IT	CSD2205	Lab:Data Structures	**P**	0	0	2	2	1		60	40	
6	3	PC	IT	CSD2206	Computer System Organization	**T**	3	0	0	3	3	30	20	50	3 Hours
7	3	PC	IT	CSD2207	Theoretical Foundation of Computer Sciences	**T**	3	0	0	3	3	30	20	50	3 Hours
8	3	PC	IT	CSD2208	Software Lab-I	**P**	0	0	4	4	2		60	40	
					TOTAL THIRD SEM		**16**	**1**	**8**	**25**	**21**				
Fourth Semester															
1	4	BS	IT	CSD2251	Discrete Mathematics and Graph Theory	**T**	3	1	0	4	4	30	20	50	3 Hours
2	4	PC	IT	CSD2252	Operating Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
3	4	PC	IT	CSD2253	**Lab :** Operating Systems	**P**	0	0	2	2	1		60	40	
4	4	PC	IT	CSD2254	Computer Networks	**T**	3	0	0	3	3	30	20	50	3 Hours
5	4	PC	IT	CSD2255	Object Oriented Programming	**T**	3	0	0	3	3	30	20	50	3 Hours
6	4	PC	IT	CSD2256	**Lab:**Object Oriented Programming	**P**	0	0	2	2	1		60	40	
7	4	PC	IT	CSD2257	Design and Analysis of Algorithms	**T**	3	0	0	3	3	30	20	50	3 Hours
8	4	PC	IT	CSD2258	**Lab**.:Design and Analysis of Algorithms	**P**	0	0	2	2	1		60	40	
9	4	PC	IT	CSD2259	Software Lab-II	**P**	0	0	4	4	2		60	40	
					TOTAL FOURTH SEM		**15**	**1**	**10**	**26**	**21**				

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

TA ** = for Theory : 5 marks on lecture quizzes, 11 marks on TA2+TA4 activitied decided by course teacher, 4 marks on class attendance

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

List of Audit Course

1	3	HS		GE2121	Environmental studies	**T**	2	0	0	2	0	
2	3	HS		AU2123	YCCE Communication Aptitude Preparation (YCAP3)	**A**	3	0	0	3	0	
3	4	HS		AU2124	YCCE Communication Aptitude Preparation (YCAP4.1) for CV,ME,CT,IT,CSE, IIoT, AIML, CSD, AIDS	**A**	3	0	0	3	0	

		June 2022	**1.01**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**

Applicable for AY 2022-23 Onwards

IV Semester
CSD2251 – Discrete Mathematics and Graph Theory

Objective	Course Outcome
1. This course will provide the mathematical fundamentals needed to understand computer application. 2. To provide the mathematical concepts necessary in the study of propositional and predicate logic. 3. To discuss the concepts of algebraic systems like semi groups and groups. 4. To use graph theory to analyze the complex structure which helps in writing efficient code.	With the completion of this syllabus 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 No.	Contents	Max. Hrs.
1	**Mathematical Logic and Set Theory:** 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.	6
2	**Relations and Functions:** 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.	6
3	**Group Theory:** 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.	7
4	**Rings:** Definitions and Examples, sub ring, Integral domain, ring homomorphism, ideal of ring polynomial.	7
5	**Field and Lattices :** 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.	7
6	**Graph Theory:** 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.	7

Text Books:

1. Discrete Mathematics Structure with application to Computer Science by J. P. Tremblay & R. Manohar ,23rd re-print,2005,Tata McGraw-Hills Publication Company Limited, New Delhi.

2. Discrete Mathematics by Lipschutz Schaums's Outline series,2nd edition,Tata McGraw-Hills Publication Company Limited, New Delhi.

Reference Books:

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

IV SEMESTER

CSD2252 – Operating Systems

Course Learning Objective	Course Outcomes
Student will study : 1. To understand the role, components, and designing issues associated with operating systems. 2. To understand processes and threads, CPU scheduling algorithms, and process synchronization mechanisms 3. To comprehend the concepts of memory management including virtual memory. 4. To understand issues related to file system interface and implementation, and disk scheduling.	**After undergoing this course students will be able to** 1. understand the fundamental concepts in Operating Systems (OS) and understand how various hardware features support OS functionality. 2. explain various OS mechanisms and policies for managing system resources. 3. analyze algorithms and techniques for managing various OS resources in a multiprogramming and other environments. 4. evaluate the performance of algorithms for managing various OS resources.

Unit No.	Contents	Max. Hrs.
1	**Introduction to OS:** evolution of OS, basic hardware support necessary for modern operating systems, Layered Structural of OS, Services provided by OS, system calls, Dual mode of operation. Input-output Management : Basics of I/O hardware, Polling, Interrupts and DMA.	(6)
2	**Process management:** introduction, process control block, process states, process context switch, introduction to threads, CPU scheduling, goals of scheduling, Algorithmic evaluation of CPU scheduling algorithms.	(5)
3	**Interposes communication:** process cooperation and synchronization, race condition, critical region, mutual exclusion and implementation, semaphores, classic problems of Synchronization using semaphores.	(6)
4	**File systems : introduction,** Access methods, Directory Structure disk space management and space allocation strategies, disk arm scheduling strategies: FCFS, SSTF, SCAN, CSACN, LOOK, CLOOK, Selecting a disk scheduling algorithm.	(5)
5	**Memory management techniques:** -contiguous allocation, static and dynamic partitioning, and non-contiguous, paging and segmentation, translation look aside buffer (TLB) and overheads.	(5)
6	**Virtual memory:** demand paging, page replacement algorithms, thrashing, working set model. **Deadlocks**: necessary conditions, deadlock detection, deadlock avoidance, deadlock prevention, recovery from deadlock.	(7)

Text Books			
Sr. No.	**Title**	**Authors**	**Publisher**
1	Operating system concepts	8th Edition	Silberchatz & galvin
2	Operating System	5th Edition	William Staling
Reference Books			
1	Modern operating systems	2nd Edition	A.S. Tanenbaum
2	Operating system concepts	2nd Edition	Milan MilenKovic

IV SEMESTER
CSD2253 –Lab: Operating Systems

Objective	Course Outcome
To understand the working of Operating System services, algorithms and mechanism practically .	Students will be able to: 1 Understand the advanced OS commands 2 understand the working of processes and threads and their synchronization practically. 3 Understand various algorithms and techniques used by OS for managing resources through software simulation.

Sr. No	Problem Statements
1	Study of Advanced Linux shell commands (Process management, Memory management, Networking, etc.)
2	Study of Window task manager (about its applications, processes, services, networking, performance etc.)
3	Write a program that illustrates the creation of child process using fork system call. Each child and parent Processes perform different task.
4	Write a multithreaded program to multiply two given matrices.
5	Simulate any two of the following CPU Scheduling Algorithms (One each from preemptive and non-preemptive types) : FCFS, SJF, SRTN, Round Robin, Preemptive priority, Non-preemptive priority
6	Simulate any one of the following Dynamic Memory allocation algorithms First Fit, Best Fit, Worst Fit.
7	Simulate any one of the following Page replacement algorithms: FIFO, LRU, Optimal
8	Write a program to perform Inter-Process-Communication using shared memory OR, pipes OR message queues.
9	Write a program that gives a deadlock and starvation free solution to the Dining philosophers problem using semaphores
10	Write a program to simulate Banker's Deadlock avoidance algorithm.

IV SEMESTER
CSD2254 – Computer Networks

Objective	Course Outcome
Student will study : 1. To understand the modern network architectures from a design and 2. Models perspective. 3. Understand the basic of hardware, software and types of transmission media used in computer networks. 4. Understand the concept of various protocols used in data link layer 5. Understand the Concept of adaptive and no adaptive routing algorithms 6. Understand the concept of Quality of Service provided by the transport layer 7. Understand the concept of knowledge cryptography techniques for network security.	After completion of the course students will be able to: 1. Explain the functions of the different layer of architectures and Models. 2. Demonstrate basic understanding of hardware, software and types of transmission media used in computer networks. 3. Describe the concept of various protocols used in data link layer 4. Demonstrate the knowledge of adaptive and no adaptive routing algorithms 5. Demonstrate the concept of Quality of Service provided by the transport layer 6. Apply basic knowledge cryptography techniques for network security.

Course Outcomes	Statement	Mapped PO												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
	Explain the functions of the different layer of architectures and Models	**3**													
	Demonstrate basic understanding of hardware, software and types of transmission media used in computer networks		**2**												
	Describe the concept of various protocols used in data link layer		**2**												
	Demonstrate the knowledge of adaptive and no adaptive routing algorithms	**2**	**2**												
	Demonstrate the concept of Quality of Service provided by the transport layer		**2**												
	Apply basic knowledge cryptography techniques for network security	**2**		**2**			**2**								
		2	2	2			2								

Unit No.	Contents	Max. Hrs.
1	The use of computer networks, LAN‟s, MAN‟s, WAN‟s. topologies and their characteristics, wireless networks, 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 model	05
2	Physical layer: theoretical basis for data communication, Guided transmission media, wireless transmission: electromagnetic spectrum, radio transmission, infrared transmission. Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.	05
3	Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA	07
4	Network layer: design issues, Classful and classless Internet Addresses, subnet addressing, implementation of subnet with mask, supernetting, Address block and CIDR notation, examples. Routing algorithms, congestion control algorithms, quality of service, internetworking, network layer in Internet: IP protocol, Internet control protocols, OSPF, BGP, Internet multicasting	09
5	**Transport Layer:** Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm. Performance issues: performance problems in networks, network performance measurement.	08
6	**Application Layer:** Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Network security: cryptography, introduction to symmetric and public key algorithms, digital signatures, authentication protocols, e-mail and web security.	06

IV SEMESTER
CSD2255 – Object Oriented Programming

Objective	Course Outcome
Student will : 1. Learn the Concepts of Java programming language 2. Learn Java's syntax, idioms, patterns, and styles to write simple JAVA program. 3. To develop object centric thinking and to use object oriented features of JAVA to write complex programs. 4. Learn the essentials of the Java class library, and learn how to learn about other parts of the library when you need them in application development 5. Understand How to handle exceptions appropriately. Become familiar with the concept of an I/O stream 6. Learn and Understand development of JAVA applets vs. JAVA applications	After completion of the course students will be able to: 1. Understand basic features of JAVA as an object oriented-programming language. 2. Write, compile, test and run simple Java programs 3. Write object based programs with object oriented features 4. Demonstrate the ability to use simple data structures like arrays in a Java program. Use and explain the difference between a String and a StringBuffer object 5. Demonstrate exceptions that can be recognized and handled by the Java programming language, Understand stream classes, Use it to save and read the data in a file 6. Be able Use Java programming language features to design and create Java applets.

Course Outcomes	Statement	Mapped PO												PSPO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
	Understand basic features of JAVA as an object oriented-programming language.	1	2										2	1	
	Write, compile, test and run simple Java programs	2	3										2	2	
	Write object based programs with object oriented features	3	1										2	1	
	Demonstrate the ability to use simple data structures like arrays in a Java program. Use and explain the difference between a String and a String Buffer object	3	2										2	2	
	Demonstrate exceptions that can be recognized and handled by the Java programming language, Understand stream classes, Use it to save and read the data in a file.	2	2										2	1	
	Be able Use Java programming language features to design and create Java applets.	2	1										2	2	

Unit No.	Contents	Max. Hrs.
1	UNIT I : Introduction to Object oriented programming, Introduction to Java as OOP language: Importance of java, Parts of the java language, Java Environment, Structure Of A Java Program. Building blocks of java, Data types, Variable declarations ,operators and Assignments ,control structures, objects and classes, Declaring Classes and objects, Creating Classes and objects, methods, argument passing, Recursion, this keyword, constructors ,Visibility control	08
2	UNIT II : Java as OOP language, Other Class Modifiers: static, final, Abstract, Method overloading, Super keyword, Overriding (polymorphism), nested inner classes, packages (encapsulation), Interfaces (multiple Inheritances)	07
3	UNIT III : Arrays, Strings Arrays, One Dimensional Arrays, Two Dimensional Arrays, variable size arrays, Strings and String Buffer classes, Wrapper Classes,	08
4	UNIT IV : exception handling mechanism: Fundamentals exception types, uncaught exception, try-catch Block, displaying description of an exception, multiple catch clauses, nested try-catch statements, throw, throws, finally, built in exceptions, creating own exception subclasses,	07
5	UNIT V : Collection Vector and Framework: Introduction to collection framework, Vectors, Array List, Linked list, Hashset, Treeset, Hashmap	07
6	UNIT V I : IO Steam, applets and Thread: Introduction to stream classes, use of stream classes, I/O stream, bytes stream, character stream, pre-defined stream, reading console input, reading character, reading string, writing console output, the print write class, reading & writing files, transient and volatile modifiers, Introduction to applets, applet lifecycle, creating and executing applets, Introduction to multithreading, life cycle of Thread, Runnable interface and Thread class.	08

Text Books			
Sr.No	**Title**	**Authors**	**Publisher**
1	Thinking in Java	Bruce Eckel	Prentice Hall
Reference Books			
1	Java2 Complete Reference	Herbert Schildt	McGraw-Hill
2	Programming with Java	E. Balagurusamy	TATA McGraw-Hill

IV SEMESTER
CSD2256 –LAB. – Object Oriented Programming

Objective	Course Outcome
1. Be able to use the JAVA SDK environment to create, debug and run simple JAVA programs.	1. Design, develop, test, and debug programsusing object oriented principles using java s.

Course Outcomes	Statement	Mapped PO												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
IT	Design, develop, test, and debug programs using object oriented principles using java														

Sr. No	Experiments Base On
1.	Introduction of JAVA Programming Environment
2.	Data Types and Control Structures
3.	Class and constructor
4.	Overloading
5.	Overriding
6.	Interface
7.	Arrays and String
8.	Exception
9.	Collection
10.	Applet

IV Semester
CSD2257 – Design & Analysis of Algorithms

Objective	Course Outcome
The student should be able to 1. Study asymptotic notations and recurrence relation. Analysis of iterative and recessive algorithms, complexity of algorithms 2. Use of various algorithmic design techniques in problem solving 3. Performance analysis (time and space complexities) of algorithms in best, worst and average cases. 4. How to synthesize and design efficient algorithms for real world problems	**After completion of the course students will be able to** 1. Understand asymptotic analysis of iterative and recursive algorithms, complexity of algorithms 2. Apply important algorithmic design techniques for problem solving 3. Analyze the performance of algorithms 4. Synthesize and design efficient algorithms for real world problems

Unit No.	Contents	Max Hrs.
1	Mathematical foundations, summation of arithmetic and geometric series, recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions.	7
2	Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, amortized analysis, External Sorting, lower bound proof.	6
3	Divide and conquer basic strategy, quick sort, merge sort etc. Greedy method – basic strategy, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path etc.	7
4	Dynamic Programming basic strategy, multistage graphs, all pair shortest path, optimal binary search trees, Matrix-chain Multiplication, traveling salesman problem.	7
5	Connected components, Branch and bound, Backtracking basic strategy, 8 – Queen's problem, graph coloring, Hamiltonian cycles etc.	7
6	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	7

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Computer Algorithms	2nd Edition	Horowitz, Sahani, Rajsekharan	Silicon Press
2	Introduction to Algorithm	3rd Edition, 2009	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein	MIT press
3	Fundamentals of Algorithms	1st edition,1995	Brassard, Bratley	Prentice Hall
4	The Algorithm Design Manual	2nd Edition	Steven S. Skiena	Springer

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Introduction to the Theory of Computation,	3rd Edition, 2013	Michael Sipser	Cengage Learning
2	Algorithms	1st Edition, 2006	S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani	
3	The art of Computer programming Vol. 3	2nd Edition, 1998	Donald E. Knuth	Addison-Wesley

IV Semester
CSD2258 – Lab- Design & Analysis of Algorithms

Course Learning Objective	Course Outcomes
Students will study : 1. Study of different analysis method 2. Study of different techniques of algorithm like divide and conquer, greedy and dynamic.	Students will be able to: 1. Understand different analysis method and analyze it. 2. Understand different techniques and apply it.

Course Outcomes	Statement	Mapped PO												PSPO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
IT2352.1	Understand different analysis method and analyze it	3													
IT2352.2	Understand different techniques and apply it		3												
IT2352		3	3												

List of Practical's

Sr. No..	Problem Statements
1	Implement and analyze different sorting algorithms.
2	Practical Based on Amortized Analysis
3	Practical Based on Minimum Cost Spanning Tree
4	Practical Based on An Activity Scheduling Problem
5	Practical Based on Single Source Shortest Path
6	Practical Based on Dynamic Programming
7	Practical Based on divide and conquer

IV Semester
CSD2259 – Software Lab-II

Objective	Course Outcome
The student should be able to 1. Understanding data types, data structures, control , and Loop statements in C#. 2. Learn def function definitions, and modules. 3. Learn basic object oriented concepts using C#. 4. Developing applications in C# using customized and built in modules and packages.	**On completion of this course, the student will be able to** 1. Understand the basic data types, built in data structures, control statements and loops and write simple programs in C#. 2. To understand the concepts of functions modules and packages and write complex programs using them. 3. To understand defining and handling C# objects and develop classes 4. To develop a useful application in C#.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PS	P
CO	Understand the basic data types, built in data structures, control statements and loops and write simple programs in C#.	3				3									
CO	To understand the concepts of functions modules and packages and write complex programs using them	3				3									
CO	To understand defining and handling C# objects and develop classes	3				3									
CO	To develop a useful application in C#.		3	3		3				3				3	

List of Practical's

Expt. no.	Name of Experiment / Problem Statement	Topic	CO Mapped
MSPA-1			
1	Implementing Edit Functionality for the Students List	Introduction	CO-1
2	Creating Methods, Handling Exceptions, and Monitoring Applications	Methods	CO-1
3	Extending the Class Enrolment Application Functionality	Inbuilt Application	CO-1
4	Basic types and constructs of Visual C#	Basic Data Type	CO-1
5	Writing the Code for the Grades Prototype Application	Simple Example	CO-1
MSPA-2			
6	Creating Classes and Implementing Type-Safe Collections	Classes	CO-2
7	Adding Data Validation and Type-Safety to the Application	Validation	CO-2
8	Creating a Class Hierarchy by Using Inheritance	Class Hierarchy	CO-2
MSPA-3			
9	Refactoring Common Functionality into the User Class	User Classes	CO-2
10	Reading and Writing Local Data, Accessing a Database	Database Accessing	CO-3
MSPA-4			
11	Implementation of an application for the given problem statement using Python using built in and customized modules and packages.	C# Application Development	CO-4

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 2021

5th Semester

(Department of Information Technology)

Computer Science and Design

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 2021-22

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

(Department of Information Technology)

Computer Science and Design

SoE No. CSD-203.1

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
Fifth Semester															
1	5	HS	IT	CSD2301	Cyber Laws & Professional Ethics	**T**	3	0	0	3	3	30	20	50	3 Hours
2	5	PC	IT	CSD2302	Database Management Systems	**T**	3	0	0	3	3	30	20	50	3 Hours
3	5	PC	IT	CSD2303	**Lab:** Database Management Systems	**P**	0	0	2	2	1		60	40	
4	5	PC	IT	CSD2304	Principles of Compiler Design	**T**	3	0	0	3	3	30	20	50	3 Hours
5	5	PC	IT	CSD2305	**Lab.:**Principles of Compiler Design	**P**	0	0	2	2	1		60	40	
6	5	PE	IT		**Professional Elective-1**	**T**	3	0	0	3	3	30	20	50	3 Hours
7	5	PE	IT		**Lab : Professional Elective-1**	**P**	0	0	2	2	1		60	40	
8	5	OE	IT		**Open Elective - 1**	**T**	3	0	0	3	3	30	20	50	3 Hours
9	5	OE	IT		**Open Elective - 2**	**T**	3	0	0	3	3	30	20	50	3 Hours
10	5	STR	IT	CSD2306	Seminar	**P**	0	0	2	2	1		100		
					TOTAL FIFTH SEM		**18**	**0**	**8**	**26**	**22**				
Professional Elective 1															
1	5	**PE1**	IT	CSD2310	Digital Image Processing										
	5	**PE1**	IT	CSD2311	**Lab:** Digital Image Processing										
2	5	**PE1**	IT	CSD2312	Machine Learning										
	5	**PE1**	IT	CSD2313	**Lab:** Machine Learning										
3	5	**PE1**	IT	CSD2314	Data Visualization										
	5	**PE1**	IT	CSD2315	**Lab:** Data Visualization										
4	5	**PE1**	IT	CSD2316	Computer Graphics										
	5	**PE1**	IT	CSD2317	**Lab:** Computer Graphics										
5	5	**PE1**	IT	CSD2318	Internet of Things										
	5	**PE1**	IT	CSD2319	**Lab**: Internet of Things										
Open Elective 1 & 2															
1	5	**OE1**	IT	CSD2331	Computer Graphics										
2	5	**OE1**	IT	CSD2332	Multimedia Design										
3	5	**OE2**	IT	CSD2341	Advanced Web Designing										
4	5	**OE2**	IT	CSD2342	Virtual Reality										

Audit Courses															
1	5	HS		AU2126	YCCE Communication Aptitude Preparation (YCAP5.1) for CV,ME,CT,IT,CSE, IIoT, AIDS, CSD, AIML	**A**	3	0	0	3	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 : 5 marks on lecture quizzes, 11 marks on TA2+TA4 activitied decided by course teacher, 4 marks on class attendance

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

		June 2022	**1.01**	**Applicable for AY 2022-23 Onwards**
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**	

V Semester
CSD2301- Cyber Laws and Professional Ethics

Objectives	Outcomes
➢ To Recognizing the importance and differentiate between engineering and other profession ➢ To Illustrate several Ethical Theories and Issues in Engineering Practice ➢ To understand the background and structure of Constitution ➢ To analyze federalism in the Indian context ➢ To make aware of fundamental rights, duties and directive principles	**Students will be able** – ➢ State the importance of Engineering Ethics and differentiate between engineering and profession ➢ Employ various Ethical Theories and Practice Ethical Engineering ➢ Illustrate background and structure of constitution. ➢ State federalism in the Indian Context ➢ Identify fundamental rights, duties and directive principles enshrined under Constitution of India

Unit No.	Contents	Max. Hrs.
1	**Unit-I: Historical background of Constitution** • Origin of history of Constitution, Concept of Preambles • Meaning of the constitution law and constitutionalism • Parliamentary Form of Government in India – The constitution powers and status of the President of India	6
2	**Unit-II: Federalism** • Salient features of Federalism • Structures and features of Indian Federalism, • Difference between Indian and Federation of other states.	6
3	**Unit-III Fundamental Rights and Directive Principles** • Scheme of the Fundamental rights • The scheme of the Fundamental duties and its legal status • Directive principles of state policy	6
4	**Unit-IV-Professionalism and Codes of Ethics** • Is Engineering a Profession • Difference between Engineering and other professions • Codes of Engineering society • Solving Ethical Problems	6
5	**Unit-V- Ethical Theories** • History of Ethical Thoughts • Ethical Theories(Moral, Utilitarianisms, cost benefit Analysis, duty ethics & right ethics,Corporate morality) • Kohlberg's Stages of moral Development, Piaget,s Theory, Carol Gilligen Theory	6

V Semester
CSD2301- Cyber Laws and Professional Ethics

Unit No.	Contents	Max. Hrs.
6	**Unit-VI- Ethical Issues** • Conflict Problems and Whistle Blowing • Cross -Cultural Issues • Environmental Ethics • Computer Ethics • Ethics and Research • Intellectual Property Rights(IPRs)	6

References/ Text Books for Enrichment:

- G. Austin (2004) Working of a Democratic Constitution of India, New Delhi: Oxford University Press.
- Basu, D.D (2005), An Introduction to the Constitution of India, NewDelhi, Prentice Hall.
- A.G. Noorani(2000): Constitution questions in India: The President, Parliament and the Status, New Delhi: Oxford University Press.
- Singh, M.P & Saxena, R (2008) Indian Politics: Contemporary Issues and Concerns. New Delhi: PHI Learning.
- Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
- Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.

V Semester
CSD2302 - Data Base Management Systems

Objective	Course Outcome
The student should be able to 1. Understand Database management system's basic operations & design process using ER, EER diagram, SQL and with the use of Normalization. 2. Understand Transaction with ACID properties and their implementation. 3. Understand various storage structures, Query Processing and query optimization techniques to build a robust database management system. 4. Understand concurrency control mechanism using various concurrency control protocols.	**On completion of this course, the student will be able to** 1. To obtain sound knowledge in the theory, principles and applications of database management system. 2. Design and develop data model given their specifications and within performance and cost constraints. 3. Acquire and understand new knowledge, use them to develop data centric application and to understand the importance of lifelong learning. 4. Perform experiments in different disciplines of database management system.

Unit No.	Contents	Max. Hrs.
1	Introduction to Database Management System: General File System vs. DBMS, Data Abstraction, Data Independence, Keys, Data Modeling using the Entity Relationship(ER) Model, The enhanced Entity Relationship(EER) model.	8
2	Relational Model: Structure of Relational Databases, The Relational Algebra and Relational Calculus(TRC & DRC) Introduction to SQL Programming: (DDL, DML, Joins, Nested Queries/Sub Queries/Inner Queries) Integrity Constraints.	7
3	Database Design: Functional Dependency and Normalization for Relational Databases, Desirable properties of decomposition.	7
4	Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions. Query Optimization: Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Results.	8
5	Transaction Processing: Introduction to Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels.	8
6	Concurrency control Techniques: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, and Timestamp-Based Protocols. Data Control Language: GRANT, REVOKE; Concept of Triggers and Views.	8

V Semester
CSD2302 - Data Base Management Systems

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Fundamentals of Database System	5th Edition(2006)	Elmasri & Navathe	
2	Database System Concepts	6th Edition, (2010)	Abraham Silberschatz, Henry F. Korth and S. Sudarsha	McGraw-Hill Education
3	Database Management Systems	Second Edition	Raghu Ramakrishnan, Johannes Gehrke	McGraw-Hill, 2002

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Database in Depth – Relational Theory for Practitioners		C.J. Date	O`Reilly Media, 2005
2	Database design, Application Development and Administration	4th Edition(2008)	Michael Mannino	

V Semester
CSD2303 - – LAB.: Data Base Management Systems

List of Practical's

Sr. No..	Problem Statements
1	Database design using E-R Model for: Payroll processing system, Banking system Library Information System Student Information System, etc.
2	Mapping of E-R model to relational Schema and creation of Tables using DDL (Data DefinitionLanguage).
3	Modification of Database objects using DDL and DML
4	Querying the Database based on various inbuilt functions (Date Function, Numeric Function, Character Function, Conversion Function, Miscellaneous Function, etc.).
5	Querying the Database based on Set, Arithmetic and Logical operator.
6	Implementation of Joins(all types).
7	Queries based on Data Grouping Restricting and sorting.
8	To create and manipulate various database objects of the Table using Views:
9	Querying the Database based on to create triggers for various events such as insertion, updation, etc.
10	Exploring NOSQL Database.

V Semester
CSD2304 - Principles of Compiler Design

Objective	Course Outcome
The student should be able to 1. To study the basic concept of compiler fundamentals & design of lexical analysis 2. To study the different parsing techniques. 3. To study the construction of parsers for different CFG. 4. To study Syntax Directed Translation of different programming language constructs. 5. To study symbol table organization & error detection & recovery 6. To study code optimization & designing of code	**On completion of this course, the student will be able to** 1. Understand different phases of compilation process and lexical analyzer tool "Lex" OR "Flex" 2. Apply parsing techniques to design and implement parsers using YACC /Bison tool 3. Apply syntax directed translation scheme to programming language constructs and analyze errors in lexical and syntactic phase of compiler 4. Apply different optimization techniques in the design of compiler and generate target code Software Lab-II

Unit No.	Contents	Max. Hrs.
1	Introduction to Abstract Model & Grammar , Introduction to Compilation Process, Compilers & Translators, Phase structure of Compiler, Role of Lex, Design of Lexical Analysis.	6
2	Specifying Syntactic Structure of Programming Language using Context Free Grammars, The role of Parser, Top-down Parsing, and Bottom up Parsing, Predictive Parsers, and Recursive Decent Parser	8
3	Construction of efficient LR Parsers (SLR, CLR & LALR), Canonical Collection of set of items and construction of Parsing table, Implementation of LR Parsing table	7
4	Syntax Directed Translation: Intermediate Code, Postfix notation, Parse tree and Syntax Trees, Three address codes, quadruples, triples, Translation of Arithmetic Expression, Boolean expressions, Control Statements. Array references, Procedure Calls, Declarations, Case Statements, Use of Compiler writing tools (Lex/Flex, Yacc /Biason).	8
5	Symbol Tables: Contents, Representing scope information. Error detection and Recovery: Error handling, Lexical-phase, Syntactic phase and semantic phase	6
6	Introduction to Code Optimization, The principle sources of optimization, Loop optimization, The DAG representation, Introductory Data Flow analysis, Introduction to Code Generation: Object programs, Problems in Code Generation, Register allocation and assignment, Code generation from DAG, Peephole optimization.	8

V Semester
CSD2304 - Principles of Compiler Design

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Compilers Principles, Techniques & Tools	2nd Edition	Alfred V. Aho , Ravi Sethi , Jeffrey D.	Addison Wesley.
2	Principles of Compiler Design	2nd Edition	Alfred V. Aho ,Jeffrey D. Ullman	Addison Wesley.

Reference Books				
SN	Title	Edition	Authors	Publisher
1	Compiler Design	4th edition	O.G. Kakde	Laxmi Publication
2	Introduction to Compiling Techniques: First Course Using ANSI C, LEX and YACC	2nd Revised edition Edition	J.P. Bennett	Alfred Waller Ltd

V Semester
CSD2305- : Lab - Principles of Compiler Design

Course Learning Objective	Course Outcomes
Students will study: 1. To study the different phases and passes of compiler design. 2. To write a program using Lex Tool. 3. To write a program using YACC Tool	After completion of the course: 1. Students will be able to understand and apply Lex Tool for the development of program. 2. Students will be able to understand and apply YACC Tool for the development of program.

List of Practical's

Sr. No	Experiments Base On
1	LEX TOOL
2	YACC TOOL

V Semester
CSD2310 - PE1: Digital Image Processing

Objectives	Course Outcome
1. To introduce basic concept of Image processing in the spatial and frequency domain 2. To introduce basics of image representation and description. 3. To introduce the basics of color image processing, image segmentation and morphological operations on images 4. To learn various algorithms for image processing	**On completion of this course, the student will be able to** 1. Understand basic concepts of image processing, in the spatial and frequency domain 2. understand basics of image representation and description. 3. comprehend the basics of color image processing, image segmentation and morphological operations on images 4. understand various algorithms for image processing and apply them on given image data

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand basic concepts of image processing, in the spatial and frequency domain	3	2	3										1	
CO2	understand basics of image representation and description.	3	2	2										1	
CO3	comprehend the basics of color image processing, image segmentation and morphological operations on images	3	2											2	
CO4	understand various algorithms for image processing and apply them on given image data	3	2	2										2	

V Semester
CSD2310 - PE1: Digital Image Processing

Unit	Contents
1	**Introduction**: Fundamental Steps in Image Processing, Elements of DIP systems, Elements of Visual Perception. Fundamentals of Image processing: A Simple Image Model, Sampling and Quantization, Basic Image operations: Subtraction, Averaging, multiplication, etc., Basic Relationships between Pixels
2	**Image Enhancement in the Spatial Domain**: Introduction to Spatial and Frequency methods, Basic Gray Level Transformations, Histogram Equalization, Histogram Processing, Local Enhancement, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.
3	**Image Enhancement in the Frequency Domain:** Introduction to the Fourier Transform, Discrete Fourier Transformation, Properties of DFT, Filtering in the Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency-Domain Filters, Homomorphic Filtering
4	**Image Segmentation**: Point Detection, Line Detection, Edge Detection, Gradient Operator, Edge Linking and Boundary Detection, Hough transform, Thresholding Region-oriented Segmentation.
5	**Image Representation and description**: Chain Codes, Polygonal Approximations, Signatures, Boundary Segments, Skeleton of a Region, Description: Boundary Descriptors, Shape Numbers, Fourier Descriptors, Regional Descriptors, Simple Descriptors, Topological Descriptors
6	**Basics of morphological Image Processing**, **Introduction to colour image processing**: colour models, pseudo colour image processing, introduction to image file formats: TIFF, JPEG, BMP, etc.

Notes: Assignments in TA should be based on Programming on Image Processing concepts learned.

Text Books				
SN	Title	Edition	Authors	Publisher
1	Digital Image Processing	3rd edition	Rafael C. Gonzalez and Richard E. Woods	Prentice Hall, 2007

Reference Books				
SN	Title	Edition	Authors	Publisher
1	Image Processing Principles & Applications	--	TinkuAcharya&Ajoy K. Ray	Willey Inter-Science, 2005

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V Semester
CSD2312 - PE1: Machine Learning

Objective	Course Outcome
The student should be able to 1. To introduce basic concepts of machine learning and explain the relative strengths and weaknesses of different machine learning Methods. 2. To understand the different aspects of supervised learning 3. To understand the concepts of unsupervised learning 4. To understand different methods of evaluation of machine learning models	After undergoing the course, student will be able to: 1. Understand various models of supervised and unsupervised learning 2. analyze a problem and identify the machine learning algorithm appropriate for its solution 3. apply supervised learning for the given set of labelled samples and design the model to meet the desired needs 4. apply unsupervised learning for the given set of samples, and design the model to meet the desired needs

Unit No.	Contents	Max. Hrs.
1	**Introduction to machine learning**. What Is Machine Learning, Examples of Machine Learning Applications, Learning Associations, Classification, Regression, Supervised and Unsupervised Learning, Reinforcement Learning, Generalization, Over-fitting, and Under-fitting	(6)
2	**Supervised Learning-1:** k-Nearest Neighbors, linear Models, Naive Bayes Classifiers, Decision Trees	(6)
3.	**Supervised Learning-2:** Kernelized Support Vector Machines, Uncertainty Estimates from Classifiers, The Decision Function, predicting Probabilities, Uncertainty in Multiclass Classification, multivariate classification and regression.	(6)
4	**Unsupervised Learning**: *k*-Means Clustering , Expectation-Maximization Algorithm, Supervised Learning after Clustering , Hierarchical Clustering, Choosing the Number of Clusters	(6)
5	**Design and Analysis of Machine Learning Experiments:** Factors, Response, and Strategy of Experimentation, Randomization, Replication, and Blocking, Guidelines for Machine Learning Experiments , Cross-Validation and Resampling Methods, K-Fold Cross-Validation, Bootstrapping, Measuring Classifier Performance, Hypothesis Testing, Assessing a Classification Algorithm's Performance, Comparing Two Classification Algorithms.	(5)
6	**Advances in Machine Learning**: Combining multiple learners, bagging and boosting, introduction to learning using Neural networks, shallow and deep networks.	(6)

V Semester
CSD2312 - PE1: Machine Learning

SN	Title	Edition	Authors	Publisher
1	Introduction to Machine Learning, Second Edition		Ethem Alpaydın	The MIT Press
2	Introduction to Machine Learning with Python, A Guide for Data Scientists		Andreas C. Müller and Sarah Guido	ORIELLY

Reference Books				
SN	Title	Edition	Authors	Publisher
1	Machine Learning		Tom M. Mitchel	McGraw Hill

V Semester
CSD2313 - PE1: LAB. : Machine Learning

Sr. No..	Problem Statements
1	Experiment on k-Nearest Neighbors, ,
2	Experiment on Naive Bayes Classifiers
3	Experiment on Decision Trees
4	Experiment on Kernelized Support Vector Machines
5	Experiment on *k*-Means Clustering
6	Experiment on Hierarchical Clustering
7	Experiment on K-Fold Cross-Validation
8	Experiment on combining multiple learners
9	Experiment on neural networks using backpropagation algorithm
10	Experiment on deep neural networks

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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

B. Tech SoE and Syllabus 2021-22

(Scheme of Examination w.e.f. 2021-22 onward)

Computer Science and Design

V Semester

CSD2314 - : PE-1: Data Visualization

Objective	Course Outcome
1. To make student aware about various types of data. 2. To familiarize students with the stages of the visualization pipeline, including data modeling, mapping data attributes to graphical attributes, perceptual issues, 3. To know the existing visualization paradigms, techniques, and tools, and 4. To evaluate the effectiveness of visualizations for specific data, task, and user types.	1. To know the history of data visualization and its connection with computer graphics. 2. To know categories of visualization and application areas. 3. To understand the types of transformation the data has undergone to improve the effectiveness of the visualization. 4. To know the methods and algorithms used to map data to graphical depictions 5. To understand the techniques that has been applied to spatial data.

CO	Statement	Mapped PO												PSO	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P0 10	PO 11	PO 12	PS O1	PS O2
CO1	To know the history of data visualization and its connection with computer graphics.														
CO2	To know categories of visualization and application areas														
CO3	To understand the types of transformation the data has undergone to improve the effectiveness of the visualization														
CO4	To know the methods and algorithms used to map data to graphical depictions														
CO5	To understand the techniques that has been applied to spatial data.														

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V Semester
CSD2314 - : PE-1: Data Visualization

Unit No.	Contents	Max. Hrs.
1	Introduction: Introduction to data visualization, what it is and why required, A reasons for using visualization, visualization pipeline and its relationship to other data analysis pipelines, Data foundation, Human Perception and Information Processing,	4
2	Visualization foundations, Visualization Techniques for Spatial Data, Visualization Techniques for Geospatial Data, Visualization Techniques for Time-Oriented Data, Visualization Techniques for Multivariate Data	6
3	Text and Document Visualization, Interaction Concepts, Interaction Techniques	6
4	Designing Effective Visualizations, Comparing and Evaluating Visualization Techniques	6
5	Visualization Systems,	6
6	Research Directions in Visualization	6

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Data Visualization: A Practical Introduction		Kieran Healy and Kieran Joseph Healy	
2	Data Visualisation: A Handbook for Data Driven Design		Andy Kirk	

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

V Semester
CSD2315- PE-1: LAB.:Data Visualization

Sr. No.	List of Experiment
1	Introduction to Data Visualization and installation of tableau.
2	Connect Tableau to various Datasets: Excel and CSV files
3	Create the bar charts, maps and pie charts according to specific data,
4	Create Table Calculations
5	Create Dual Axis Charts
6	Create Area Charts
7	Create Scatterplots
8	Create Treemaps
9	Creating Data Extracts in Tableau

V Semester
CSD2316- : PE-1: Computer Graphics

Course Learning Objective	Course Outcomes
Student will study : 1. To introduce basic concepts of computer graphics. 2. To understand various algorithms of object drawing and various transformation and apply them. 3. To comphend the basic operations on segments, windowing and viewing transformations. 4. Understand some classic 3D graphics algorithms. 5. To understand the basic knowledge of curves and splines. 6. To understand the basic functions of animation.	After completion of the course students will be able to: 1. Understand basics of computer graphics. 2. Apply basic algorithms for line, circle and to solve, apply and list geometric transformation matrices including rotation, translation, scaling and reflection to transform a 2D object. 3. Apply basic algorithms and methods for segments, clipping and viewing transformation. 4. Understand and implement 3D graphics algorithms. 5. To solve and plot curve and splines. 6. Understand various tools and apply to design the animation.

Course Outcomes	Statement	Mapped PO												PSPO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	Understand basics of computer graphics.	H		M						L		L	M		
2	Apply basic algorithms for line, circle and to solve, apply and list geometric transformation matrices including rotation, translation, scaling and reflection to transform a 2D object.	M		H						L		L	M		
3	Apply basic algorithms and methods for segments, clipping and viewing transformation.	M		H						L		L	L		
4	Understand and implement 3D graphics algorithms.	H		M						L		L	H		
5	To solve and plot curve and splines.	H		M						L		L	L		
6	Understand various tools and apply to design the animation.	L		L						H		H	L		
		M		M						L		L	L		

V Semester
CSD2316- : PE-1: Computer Graphics

Unit No.	Contents	Max. Hrs.
1	**UNIT I** : Geometry and line generation: points, lines, pixels, planes and frame buffers, types of display devices: Raster Scan display, Flat Panel, LCD, LED Display, 3D Viewing devices, Virtual Reality Systems.Introduction of GPU.Illumination Models.	8
2	**UNIT II :** DDA and Bresenham's line algorithms, Bresenham's algorithm for circle generation, algorithm for ellipse generation.Algorithms for polygon generation, polygon filling algorithms, NDC (normalized device co-ordinates), pattern filing, 2D transformation: scaling, rotation, translation, rotation about arbitrary point reflection, zooming.	8
3	**UNIT III :** Graphics primitives: displays file, Segment tables, operations on segments, Graphics file formats (jpeg, Tiff, Bmp, etc). Windowing and clipping: Window, view port, viewing transformation, clipping, line and polygon clipping.	8
4	**UNIT IV :** 3D Graphics: 3D primitives, projection, parallel perspective, isometric, viewing transformations, hidden surfaces and line removal, painter's algorithm, Z-buffers, Warnock's algorithm.	8
5	**UNIT V :** Bezier and B-spline, sweeping, method of interpolation, Cubic Splines.	8
6	**UNIT VI :** Animation: Definition & introduction to animation, Basics: Animation target objects, Types, animation timings. Design of an animation sequence, general computer animation functions, raster animation, computer animation language.	8

Textbooks:			
1	Computer Graphics C Version	Second Edition (1997)	Donald Hearn & M. Pauline Baker
2	Computer Graphics Principles and Practice	2nd edition,1996	Foley, Vandam, Feiner and Huges
Reference Books:			
1	Procedural Elements for Computer Graphics	1998	David F. Rogers
2	Computer Graphics, A Programming Approach	2nd edition, 1987	Steven Harrington

V Semester
CSD2318-PE-1: Internet of Things:

Course Objective	Course Outcome
The student will study 1. The students will be able to describe IoT as a Process, its architecture and Management, compare and contrast old and new challenges in IoT 2. The students will be able to Apply various communication protocol and its building blocks in IoT applications. 3. The students will be able to Illustrate relevance of IoT with cloud and Web and analyze various security challenges and also evaluate various control strategies for the same 4. The students will be able to create, Design and Develop various applications based on IoT concepts	On completion of this course, the student will be able to 1. Students will able to describe various communication protocol and its building blocks. 2. Students will able to describe relevance of IoT with cloud and the application areas of IOT. 3. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor 4. Able to understand building blocks of Internet of Things and characteristics. 5. The students will study and implement IoT project by studying different IoT components, electronic board and their uses.

Unit No.	Contents	Max. Hrs.
1	Introduction to IoT: History of IOT, Concepts, Products and Examples. IOT Paradigm, The Layering concepts of IOT, IOT Communication Model, IOT Architecture, The 6LoWPAN,Domains of IOT, M2M vs IOT, Management of IOT, IOT Platforms, IOT Languages, IOT Physical Systems, Tools for IOT	8 hrs
2	IoT Communication Protocols: Protocol Standardization for IOT, Issues with IOT Standardization, M2M and WSN Protocols, SCADA and RFID Protocols, IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee Architecture, Unified Data Standards.	8 hrs
3	Web of Things: Web of Things versus Internet of Things, The Two Pillars of the Web, Architecture Standardization for Web of Things, Platform Middleware for Web of Things, Unified Multitier Web of Things Architecture, Web of Things Portals and Business Intelligence	7 hrs
4	Cloud of Things: Grid/SOA and Cloud Computing, Cloud Middleware, Cloud Standards, Cloud Providers & Systems, Mobile Cloud Computing, Cloud of Things Architecture. Models of Implementation, Service Level Agreement (SLA), Examples of Applications.	7 hrs
5	Security Aspects: Security in IOT: Introduction, Purpose, Issues, Challenges. IOT Threats to Individual and Organizations, Challenges to Secure IOT Development, Recommended Security Controls. Cybersecurity and IOT. Layered Security Protections to Defend IOT Assets.	7 hrs
6	IoT Applications: IOT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IOT electronic equipment. Use of Big Data and Visualization in IOT. Role of IOT for Increased Autonomy and Agility in Collaborative Production Environments, Resource Management in the IOT.	7 hrs

V Semester
CSD2318-PE-1: Internet of Things:

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Internet of Things: A Hands-on-Approach		Arshdeep Bahga & Vijay Madisetti	Orient Blackswan Publisher
2	The Internet of Things: Key Applications and Protocols		Olivier Hersent, David Boswarthick & Omar Elloumi	Wiley publication

V Semester
CSD2319-PE-1: LAB. : Internet of Things:

Objective	Course Outcome
Student will study: 1. The students will be able to Illustrate relevance of IoT with cloud and Web and analyze various security challenges and also evaluate various control strategies for the same 2. The students will be able to create, Design and Develop various applications based on IoT concepts	After completion of the course students will be able to: 1. Students will able to describe relevance of IoT with cloud and the application areas of IOT 2. The students will study and implement IoT project by studying different IoT components, electronic board and their uses.

List of Practical's

Sr. No.	Problem Statements
1	Study of Ardunio Kit
2	Study of Raspberry Pi Kit
3	Study of different electronics components
4	Study of different sensors in IoT
5	Case study: Smart Irrigation System using IoT and cloud
6	Case Study: IOT Car Parking System
7	Case Study: IOT Based ICU Patient Monitoring System
8	Case Study: Smart Dustbin With IOT Notifications
9	Project: Designing of Home Automation System
10	Mini Project

V Semester

CSD2331 - OE-1: Computer Graphics

Course Learning Objective	Course Outcomes
Student will study : 1. To introduce basic concepts of computer graphics. 2. To understand various algorithms of object drawing and various transformation and apply them. 3. To comphend the basic operations on segments, windowing and viewing transformations. 4. Understand some classic 3D graphics algorithms. 5. To understand the basic knowledge of curves and splines. 6. To understand the basic functions of animation.	After completion of the course students will be able to: 1. Understand basics of computer graphics. 2. Apply basic algorithms for line, circle and to solve, apply and list geometric transformation matrices including rotation, translation, scaling and reflection to transform a 2D object. 3. Apply basic algorithms and methods for segments, clipping and viewing transformation. 4. Understand and implement 3D graphics algorithms. 5. To solve and plot curve and splines. 6. Understand various tools and apply to design the animation.

Course Outcomes	Statement	Mapped PO												PSPO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	Understand basics of computer graphics.	H		M						L		L	M		
2	Apply basic algorithms for line, circle and to solve, apply and list geometric transformation matrices including rotation, translation, scaling and reflection to transform a 2D object.	M		H						L		L	M		
3	Apply basic algorithms and methods for segments, clipping and viewing transformation.	M		H						L		L	L		
4	Understand and implement 3D graphics algorithms.	H		M						L		L	H		
5	To solve and plot curve and splines.	H		M						L		L	L		
6	Understand various tools and apply to design the animation.	L		L						H		H	L		
		M		M						L		L	L		

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V Semester
CSD2331 - OE-1: Computer Graphics

Unit No.	Contents	Max. Hrs.
1	Geometry and line generation: points, lines, pixels, planes and frame buffers, types of display devices: Raster Scan display, Flat Panel, LCD, LED Display, 3D Viewing devices, Virtual Reality Systems.Introduction of GPU.Illumination Models.	8 Hrs
2	DDA and Bresenham's line algorithms, Bresenham's algorithm for circle generation, algorithm for ellipse generation.Algorithms for polygon generation, polygon filling algorithms, NDC (normalized device co-ordinates), pattern filing, 2D transformation: scaling, rotation, translation, rotation about arbitrary point reflection, zooming.	8 Hrs
3	Graphics primitives: displays file, Segment tables, operations on segments, Graphics file formats (jpeg, Tiff, Bmp, etc). Windowing and clipping: Window, view port, viewing transformation, clipping, line and polygon clipping.	8 Hrs
4	3D Graphics: 3D primitives, projection, parallel perspective, isometric, viewing transformations, hidden surfaces and line removal, painter's algorithm, Z-buffers, Warnock's algorithm.	8 Hrs
5	Bezier and B-spline, sweeping, method of interpolation, Cubic Splines.	8 Hrs
6	Animation: Definition & introduction to animation, Basics: Animation target objects, Types, animation timings. Design of an animation sequence, general computer animation functions, raster animation, computer animation language.	8 Hrs

Textbooks:			
1	Computer Graphics C Version	Second Edition (1997)	Donald Hearn & M. Pauline Baker
2	Computer Graphics Principles and Practice	2nd edition,1996	Foley, Vandam, Feiner and Huges
Reference Books:			
1	Procedural Elements for Computer Graphics	1998	David F. Rogers
2	Computer Graphics, A Programming Approach	2nd edition, 1987	Steven Harrington

V Semester
CSD2332 - OE-1: Multimedia Design

Objective	Course Outcome
The student should be able to 1. To learn the basics and Fundamentals of Multimedia. 2. The objective of this course is to provide concept about an application, which uses a collection of multiple media sources e.g. text, graphics, images, audio, animation and video. 3. Students will learn about Multimedia, which is a field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.	**On completion of this course, the student will be able to** 1) Define what is multimedia and how it works. 2) Understand multimedia components using various tools and techniques. 3) Discuss about different types of media format and their properties. 4) Justify the right way of manipulating multimedia systems. 5) To analyze the different compression algorithms. 6) To design Multimedia Application.

CO	Statement	Mapped PO												PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Define what is multimedia and how it works.	2	2								1			1	
CO2	Understand multimedia components using various tools and techniques.	2	2								1			1	
CO3	Discuss about different types of media format and their properties.	2	2								1			1	
CO4	Justify the right way of manipulating multimedia systems.	2	2								2			1	
C05	To analyze the different compression algorithms.													1	
CO6	To design Multimedia Application	2	2							2	2			1	

V Semester
CSD2332 - OE-1: Multimedia Design

Unit No.	Contents	Max. Hrs.
1	**Introduction to Multimedia:** Definition of Multimedia, Multimedia objects: Text, Graphics, Animation, Audio, images, Video. Definition of HyperText and HyperMedia. Multimedia Applications in Education, Entertainment. Advertising world etc. Components of a Multimedia System, Desirable Features for a Multimedia System, requirements of Multimedia Communication, Applications of multimedia – benefits and problems.	6
2	**Representation of Multimedia Objects:** Representation of Analog Signals, A/D: Sampling and quantization. Text: Font and their representation (bitmap, true type) Graphics: Raster & Vector representation, aliasing problems Image: (bit depth, resolution, color (RGB, CMYK, HSB), introduction to BMP, GIF, TIFF, PNG and JPEG formats) Audio (speech and wideband audio, sampling rate and aliasing, quantisation, introduction to MP3, WMA, WAV, MIDI etc.) Video (frame rate and resolution, interlaced and non-interlaced video, colour planes (YCBCR, YUV), Video broadcast standards (PAL, NTSC, SECAM), HD Video, 3D TV, Video representation: AVI, MPEG, Quick Time, real video (.rm)	6
3	**Concepts of Multimedia Editing:** Digital Audio, Music Sequencing and Notation, Image/Graphics Editing, Video Editing (Linear, Non-linear), Subtitling	5
4	**Introduction to Compression Technology :** Concept of lossy and lossless compression. Concept of rate-distortion characteristics, Basics image compression (JPEG, JPEG 2000), Basics of Audio compression (MP3, MP4), Basics of Video Compression (MPEG, H.264)	5
5	**Multimedia Application Design:** Content design, technical design, visual design, design metaphors, example studies, interactivity	6
6	**Multimedia Authoring and Publishing :** Definition of an Authoring System, uses of an authoring system, Definition and function of Authoring Metaphor, Different Metaphors. Offline Publishing: Flash, Power Point. Online Publishing: HTML5, Dreamweaver	6

Text Books

SN	Title	Edition	Authors	Publisher
1	Fundamentals of Multimedia		Li & Drew	Pearson Education, 2009.
2.	Multimedia Systems		Rajneesh Aggarwal & B. B Tiwari	Excel Publication, New Delhi, 2007.
3.	Multimedia making it work		Tay Vaughan	Tata McGraw-Hill, 2008.

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V Semester
CSD2332 - OE-1: Multimedia Design

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Principles of Multimedia		Parekh Ranjan	Tata McGraw-Hill, 2007
2	Introduction to Computer Graphics and Multimedia	Second Edition	Anirban Mukhopadhyay and Arup Chattopadhyay	Vikas Publishing House.

V Semester
CSD2341 - OE-2: Advanced Web Designing

Objective	Course Outcome
The student should be able to 1) Get familiar with basics of HTML, HTML tags, DHTML CSS. 2) Get familiar with client server architecture and able to develop a web application using java technologies. 3) Get familiar with markup languages with their structures and syntax. 4) To get familiarized with JS frame work	**On completion of this course, the student will be able to** 1) Understand the different tags of HTML and Implement interactive web pages using HTML , DHTML and CSS. 2) Understand client server architecture and Develop interactive web pages using java script and client and server side programming. 3) Understand the concept of Markup languages and Make the use of mark up languages in development of web pages. 4) Understand the concepts of Node JS and Angular JS and Develop web applications using Node and Angular JS.

CO	Statement	Mapped PO												PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the different tags of HTML and Implement interactive web pages using HTML , DHTML and CSS.														
CO2	Understand client server architecture and Develop interactive web pages using java script and client and server side programming.														
CO3	Understand the concept of Markup languages and Make the use of mark up languages in development of web pages.														
CO4	Understand the concepts of Node JS and Angular JS and Develop web applications using Node and Angular JS.														

V Semester
CSD2341 - OE-2: Advanced Web Designing

Unit No.	Contents	Max. Hrs.
1	Creation of web pages: HTML tags, special characters, images, tables, forms, the hyperlinks, Frames	8
2	Dynamic HTML (DHTML): Introduction, Cascading Style Sheets (CSS), DHTML Document Object Model and Collections [8 Hrs]	8
3	Scripting Languages:- Java Script objects and forms, server side and client side scripting languages	6
4	XML:XML basics, understanding mark-up languages, structures and syntax, valid Vs. Well formed XML, DTD (document type Definitions) classes, Element Type Declaration, Attribute Declarations, Limitations of DTDs, XML processor, Introduction to Schema, Complex Types, Extensible Style sheet Language Transformations (XSLT),Basics of Parsing	7
5	The importance of being asynchronous, Blocking vs. non-blocking code, Server-side JavaScript, What is Node.js?, Why use Node.js?,Features, Process Model, Setup Node.js Development Environment, Node.js Basics, Node.js Module, File System	7
5	The importance of being asynchronous, Blocking vs. non-blocking code, Server-side JavaScript, What is Node.js?, Why use Node.js?,Features, Process Model, Setup Node.js Development Environment, Node.js Basics, Node.js Module, File System	7
6	Introduction to AngularJS, AngularJS Expressions: Numbers, Strings, Objects, Arrays, Expressions using {{ }} and ng-bind. Modules: Creating a module, adding a controller & directive, myApp.js, myCtrl.js, Loading library. Directives: Data Binding, ng-init, ng-repeat, ng-app & ng-model directives, custom directives.2 way binding, Validating User Input, Status, ng-empty, ng-touched, ng-valid, ngpending. Data Binding: Synchronization between model and view. AngularJS Controllers: ng-controller, Controller Methods, External Files.Scope: $scope, understanding the scope, $rootScope	7

Text Books

SN	Title	Edition	Authors	Publisher
1	The Complete Reference HTML and XHTML	5th Edition	Thomas A.Powell	McGraw Hill Pub
2	Learning angular JS		Dayley, Brad Dayley	

Reference Books

SN	Title	Edition	Authors	Publisher
1	Learning PHP, MySQL, JavaScript, and CSS: A Step-by-Step Guide to Creating Dynamic Websites	3rd	**Robin Nixon**	O'RELLY

V Semester
CSD2342 - OE2 – Virtual Reality

Objective	Course Outcome
The student should be able to	**On completion of this course, the student will be able to**
1) This course is designed to give historical and modern overviews and perspectives on virtual reality. 2) It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.	1. Describe how VR systems work and list the applications of VR. 2. Understand the design and implementation of the hardware that enables VR systems tobe built. 3. Understand the system of human visionand its implication on perception and rendering. 4 Explain the concepts of motion and tracking in VR systems.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1															
CO2															
CO3															
CO4															

V Semester
CSD2342 - OE2 – Virtual Reality

Unit No.	Contents	Max Hrs
1	**Introduction to Virtual Reality:** Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark.	**7**
2	**Representing the Virtual World** Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR	**8**
3	**The Geometry of Virtual Worlds &The Physiology of Human Vision** Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR.	**7**
4	**Visual Perception & Rendering** Visual Perception - Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates	**7**
5	**Computer Graphics And Geometric Modelling:** Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, Colour theory, Conversion From 2D to 3D, 3D space curves, 3D boundary representation, Simple 3D modelling, 3D clipping, Illumination models, Reflection models, Shading algorithms. Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection.	**7**
5	**Computer Graphics And Geometric Modelling:** Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, Colour theory, Conversion From 2D to 3D, 3D space curves, 3D boundary representation, Simple 3D modelling, 3D clipping, Illumination models, Reflection models, Shading algorithms. Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection .	**7**
6	**AR / VR Applications:** Introduction, Engineering, Entertainment, Science, Training	**7**

V Semester
CSD2342 - OE2 – Virtual Reality

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Virtual Reality		M. LaValle	Cambridge University Press, 2016
2	,Understanding Virtual Reality", Interface, Application and Design		William R Sherman and Alan B Craig	(The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	3D User Interfaces, Theory and Practice",		Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev	Addison Wesley, USA, 2005.

V Semester
Audit Course
AU2126 : YCCE Communication Aptitude Preparation (YCAP5.1)

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 2021

6th Semester

(Department of Information Technology)

Computer Science and Design

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 2021-22

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

(Department of Information Technology)

Computer Science and Design

SoE No. CSD-203.1

SN	Sem	Type	BoS	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE
							L	T	P	Hrs		MSEs*	TA**	ESE	
Six Semester															
1	6	HS	IT	CSD2351	Management Studies	**T**	3	0	0	3	3	30	20	50	3 Hours
2	6	PC	IT	CSD2352	Software Architecture & Design	**T**	3	0	0	3	3	30	20	50	3 Hours
4	6	PC	IT	CSD2353	Computer Game Design and Programming	**T**	3	0	0	3	3	30	20	50	3 Hours
5	6	PC	IT	CSD2354	Lab: Computer Game Design and Programming	**P**	0	0	2	2	1		60	40	
6	6	PE2	IT		**Professional Elective-II**	**T**	3	0	0	3	3	30	20	50	3 Hours
7	6	PE2	IT		**Professional Elective-II Lab**	**P**	0	0	2	2	1		60	40	
8	6	STR	IT	CSD2355	Design Workshop	**P**	0	0	4	4	2		60	40	
9	6	OE3	IT		**Open Elective-III**	**T**	3	0	0	3	3	30	20	50	3 Hours
10	6	OE4	IT		**Open Elective-IV**	**T**	3	0	0	3	3	30	20	50	3 Hours
					TOTAL SIX SEM		**18**	**0**	**8**	**26**	**22**				

Professional Elective 2					
1	6	**PE2**	IT	CSD2361	Multimedia Design & Processing
	6	**PE2**	IT	CSD2362	**Lab:** Multimedia Design & Processing
2	6	**PE2**	IT	CSD2363	Advanced Web Designing
	6	**PE2**	IT	CSD2364	**Lab**: Advanced Web Designing
3	6	**PE2**	IT	CSD2365	Design Manufacturing and Assembly
	6	**PE2**	IT	CSD2366	**Lab.:** Design Manufacturing and Assembly
4	6	**PE2**	IT	CSD2367	UX &UI Design
	6	**PE2**	IT	CSD2368	**Lab.** UX &UI Design
5	6	**PE2**	IT	CSD2369	Introduction to Deep Learning
	6	**PE2**	IT	CSD2370	**Lab.:** Introduction to Deep Learning
Open Elective -III					
1	6	**OE3**	IT	CSD2381	Computer Graphics
2	6	**OE3**	IT	CSD2382	Multimedia Design
Open Elective- IV					
3	6	**OE4**	IT	CSD2391	Advanced Web Designing
4	6	**OE4**	IT	CSD2392	Virtual Reality

Audit Courses												
1	6	HS		AU2130	YCCE Communication Aptitude Preparation (YCAP6.3) for CT, IT, CSE, IIoT, AIDS, CSD, AIML	**A**	3	0	0	3	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 : 5 marks on lecture quizzes, 11 marks on TA2+TA4 activitied decided by course teacher, 4 marks on class attendance

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

		June 2022	1.01
Chairperson	**Dean (Acad. Matters)**	**Date of Release**	**Version**

Applicable for AY 2022-23 Onwards

VI Semester
CSD2351- MANAGEMENT STUDIES

Objectives	Outcomes Students will be able to
1. To introduce the fundamentals and legal provision of management 2. To introduce the Human Resource and Financial practice of Organisation 3. To introduce the Project Management 4. To provide knowledge of Marketing activities of Management	1. Explain the legal provision and function of management 2. Analyze the role of Human Resource and Financial Management in the Organisation 3. Analyze the Project life Cycles 4. Identify tools and techniques for the marketing of goods and services

Unit No.	Contents	Max. Hrs.
1	**Unit – 1 - Principle of Management** 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.	6
2	**UNIT-2: Legal Aspects of Management** The Indian Contract Act, 1872 – Formation of Valid Contract, Discharge of Contract, Quasi Contract, Indemnity and Guarantee. The Indian Partnership Act, 1932- Essentials of Partnership, The Companies Act – Nature and Definition of Company, Registration and Incorporation, Memorandum and Article of Association, Kinds of companies, Winding up of the Company.	6
3	**UNIT-3: Human Resource Management** Human Resource Management-Meaning and Scope, Principles of HRD, Job Analysis – Job Description and Job Specification, Job Enrichment, Job Rotation, Training and Development – Purpose and Methods, Performance Appraisal- Purpose, Procedure and Techniques, Grievance Redressal Procedure .	6
4	**UNIT-4: Engineering Project Management** Concept, Classification and Characteristics of Project, Project Life Cycle, Project Proposal, Tools and Techniques of Project Management, Network techniques - Introduction and Use of CPM &PERT for planning, SWOT Analysis, Project Risk Analysis, Project Control.	6
5	**UNIT-5: Marketing Management** 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.	6
6	**UNIT-6: Financial Management** Definition & Functions of Finance department, Sources of finance, Types of capital, Profit maximization vs. Wealth maximization, Functions of Finance Manager in Modern Age, Concept of Risk and Return , Break Even Analysis, Budgets & Budgetary Control, Make or Buy Analysis, Introduction to financial statement – profit and loss A/c and Balance Sheet.	6

Text book and Reference

1. Harold Koontz Ramchandra, Principles of Management, Tata McGrow hills
2. Bare Acts – Indian Contract Act, Indian Partnership Act and Company Law
3. Dr. V.S.P.Rao - Human Resource Management - Text and Cases
4. C.B.Mamoria and S.V.Gankar, A Text book of Human Resource Management,
5. Lock, Gower - Project Management Handbook
6. Ramaswamy V.S. and Namakumari S - Marketing Management: Planning, Implementation and Control (Macmillian, 3rd Edition).
7. Rajan Saxena: Marketing Management, Tata McGraw Hill.
8. Fabozzi - Foundations of Financial Markets and Institutions (Pretice hall, 3rd Ed.)
9. Parameswaran- Fundamentals of Financial Instruments (Wiley India)
10. Bhole L M - Financial Institutions and Markets (Tata McGraw-Hill, 3rd edition, 2003)
11. Khan M Y - Financial Services (Tata Mc Graw Hill, 19)

VI Semester
CSD2352 - Software Architecture & Design

Objective	Course Outcome
The student should be able to 1. To understand the different Software Process Model and Architectural Style for Developing a Software 2. To acquire knowledge of Different Software Testing Techniques 3. To understand the various UML Diagrams 4. To understand different Tools and Techniques for Engineering Practice.	**On completion of this course, the student will be able to** 1. Analyze and evaluate the different software process model and appropriate architectural style while developing a software 2. Understand and Apply the software testing techniques in a variety of ways to test the software. 3. Analyze and design various UML diagram and UML based design and analysis with the help of various diagrams. 4. Demonstrate an ability to use the techniques and tools necessary for engineering practice

Unit No.	Contents:	Max. Hrs.
1	Introduction to Software Engineering .A Generic View of process, and project management, Process model, CMM, Requirement Engineering : Eliciting Requirement ,Developing Use Case ,Analysis Model, Negotiation, Validation , Building the Analysis model : Requirement Analysis ,Analysis Modeling Approaches, Data Modeling	8
2	Design Engineering: Design Concept, Design Model, Pattern Based Software Design, Architectural Design: Software Architecture., Data Design, Architectural style, Architectural design , Mapping Data Flow into a Software Architecture ,Component Level Design , User Interface Analysis and Design ,Interface Analysis, Interface Design steps, Design Evaluation	8
3	Testing Strategies: Strategic Approach, Strategic issues, Strategies for conventional Software, Validation Testing, Testing Tactics: White Box Testing, basic Path testing, Control Structure Testing, Black Box Testing, Object Oriented Testing Method, Testing Method applicable at class Level, Interclass Test Case Design. Metrics: Software Quality.	6
4	Project Management, KPES for project management, Metrics for Process and Projects, Project Estimation, Project Scheduling, Risk Management, Quality Management and Change Management	7
5	Overview of UML, Conceptual Models of the UML, UML and Design Patterns, Applying the UML, UML Diagrams for Payroll processing systems, ATMS, small companies etc	7
6	Advanced Topics in Software Engineering: Case studies based on recent Trends, Reengineering, and CASE tools, client server software Engineering. CORBA	6

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Software Engineering -A Practitioner's Approach	Seventh Edition	Roger S. Pressman	Pressman
2	Object Oriented Software Engineering	2nd Edition,2005	Lethbridge and Pearson	Pearson Education

Reference Books				
SN	Title	Edition	Authors	Publisher
1	Software Engineering	10th Edition, 2014,	I. Somerville	Oxford University Press
2	An integrated approach to software Engineering'	3rd Edition,1991,	Dr. Pankaj Jalota	Narosa Pub

VI Semester

CSD2353 - Computer Game Design and Programming

Objective	Course Outcome
The student should be able to 1) To be familiar with the workflow for creating 2D video games 2) To be familiar with usage of subcomponents of game engines such as graphics, physics and audio engines 3) be familiar with usage of subcomponents of game engines such as graphics, physics and audio engines. 4) get familiarity with creating game assets such as sprites, tiles, textures and audio	**On completion of this course, the student will be able to** 1) Understand different types/genres of video games and the components thereof. 2) Able to write scripts which control the behavior of different game components. 3) Able to create realistic scenes and environments. 4) Able to design, write and deploy 2D video games 5) Apply hands-on experience with game engines, e.g., Unity.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand different types/genres of video games and the components thereof	3												3	
CO2	Able to write scripts which control the behavior of different game components		3									2		3	
CO3	Able to create realistic scenes and environments			3								2		3	
CO4	Able to design, write and deploy 2D video games			3	3							2		3	
CO5	Apply hands-on experience with game engines, e.g., Unity.	3	3	3	3	3						2		3	

Unit No.	Contents	Max. Hrs.
1	Motivation; Types of games, Different aspects of game design; Different components in a game; Game engines; Geometric primitives, 2D and 3D linear transforms, Homogeneous matrices; Examples of games	6
2	Different image formats; Polygon file formats; Creating sprites; Rigging; Animations using sprite-sheets; Animations using key frames; Animation controllers. Setting up a project, Scene View, Game View, Inspector, Console ,Hierarchy ,GameObjects, Prefabs, Components	6
3	Scenes; Tiles, visual continuity in tiles; Adding objects to scene; Prefabs; Lighting, RGB space, transparency, texture mapping; Collectibles; Navigation and path finding,Input Methods,invoke(),Start() and Awake(), Game Loops,Update(), FixedUpdate() and LateUpdate(),Singletons,Coroutines, Enumerators.	6
4	Physics engines; Gravity simulation; Rigid body interaction; Collisions. Rigidbody Components, Unity Colliders, Physics Materials, Scripting Collision Events	6
5	Layout; Menu system; Visual components; Event system; Skins,Canvas,Buttons,Anchors ,Pivots ,RectTransform vs Transforms,UI Design Concepts	6
6	Audio assets; Different audio formats; Audio mixing.	5

Text Books

SN	Title	Edition	Authors	Publisher
1	Game Programming Patterns	3rd edition	Nystrom Robert	Genever Benning

Reference Books

SN	Title	Edition	Authors	Publisher
1	Unity Game Development Cookbook: Essentials for Every Game	1st Edition	Paris Buttfield-Addison	O'Reilly Media

VI Semester
CSD2354 - LAB.: Computer Game Design and Programming

Objective	Course Outcome
The student should be able to 1. To be familiar with the workflow for creating 2D video games 2. To be familiar with usage of subcomponents of game engines such as graphics, physics and audio engines 3. be familiar with usage of subcomponents of game engines such as graphics, physics and audio engines. 4. get familiarity with creating game assets such as sprites, tiles, textures and audio	**On completion of this course, the student will be able to** 1. Understand different types/genres of video games and the components thereof. 2. Able to write scripts which control the behavior of different game components. 3. Able to create realistic scenes and environments. 4. Able to design, write and deploy 2D video games 5. Apply hands-on experience with game engines, e.g., Unity.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand different types/genres of video games and the components thereof	3												3	
CO2	Able to write scripts which control the behavior of different game components		3									2		3	
CO3	Able to create realistic scenes and environments			3								2		3	
CO4	Able to design, write and deploy 2D video games			3	3							2		3	
CO5	Apply hands-on experience with game engines, e.g., Unity.	3	3	3	3	3						2		3	

List of Practical's

Sr.	Problem Statements
1	Introduction of C#, Variables, If else
2	Program by using Loops, Arrays, Enums
3	Installation of a game engine, e.g., Unity, familiarization of the GUI. Conceptualize the theme for a 2D game
4	Character design, sprites.
5	movement and character control
6	Level design: design of the world in form of tiles along with interactive and collectible objects
7	Design of interaction between the player and the world, optionally using the physics engine.
8	Design of menus and user interaction in mobile platform.
9	Insert audio
10	Project

VI Semester

CSD2361- PE2: Multimedia Design & Processing

Objective	Course Outcome
The student should be able to 1. To introduce Multimedia components and Tools. 2. The objective of this course is to provide a basic knowledge about processing and editing of multimedia content with more emphasis on image processing. 3. The students will be able to understand how to create, edit and modify the multimedia content using different software tools.	**On completion of this course, the student will be able to** 1. To understand concept of multimedia design & processing 2. To analyze the different multimedia design. 3. To apply various operations using Multimedia tool 4. To design user interface and case study on different android applications 5. Expert talk on the recent advancements of media, society and ethics.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	To understand concept of multimedia design & processing	2	2								2				
CO2	To analyze the different multimedia design.	2	2	3							2				
CO3	To apply various operations using Multimedia tool	2	2	3		2					2				
CO4	To design user interface and case study on different android applications	2	2	3		2					2				1
CO5-	Expert talk on the recent advancements of media, society and ethics.	2									3				1

Unit No.	Contents	Max. Hrs.
1	**Design Overview:** Need for design, Human factors, fundamentals of Human perception, Human skill level and behavior, dialogues and tasks, Learning and Learning Modes, Cognitive Domain Learning, Affective and Psychomotor Domain Learning, Multimedia Educational Software Modeling, System Quality, Elements of user Interface.	6
2	**Multimedia Authoring and User Interface**: Multi Media Authoring System and its type, Hypermedia Application Design consideration, User Interface Design, Information Access, Object Display / Playback Issues	6
3	**Human Computer Interface Design:** Information design, interaction and sensorial design, guidelines for user interface design, dialogue design, Cognitive Walkthrough- case studies/ examples – Different Android applications, like Talking Tom, Monkey Trap etc.	5
4	**Multimedia Tool** : Introduction to Multimedia tool – Flash, Creating & Modifying elements, Line tool, fill/attributes, different shapes, text tools & pen tool, Selecting lines fill with arrow tool, selecting shapes, using lasso tool ,performing basic editing tools, selecting & deselecting elements, modifying created objects.	5
5	**Animation Technology:** Definition, History of Animation, Types of Animation – 2D and 3D , Basic principles of animation. Introduction to Multimedia tool – Flash, Creating & Modifying elements, Line tool, fill/attributes, different shapes, text tools & pen tool, Selecting lines fill with arrow tool, selecting shapes, using lasso tool, performing basic editing tools, selecting & deselecting elements, modifying created objects.	6
6	**Animation Design:** i. Introduction & Learning perspective drawing - Drawing for Animation: Gesture Drawing, Action Drawing, Line of action, Dynamic Poses, Action Sketches (Key Poses) ii. 2D Design concepts & Composition. iii. Principles of Animation. iv. Process of 2D Animation film making. v. Editing & Animatics. vi. Input Sound- Sound Effects – Sound Recording. vii. Designing, Developing Characters (Realistic, Exaggerated & Stylized)	6

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Principles of Multimedia		Parikh	Tata McGraw Hill Education Pvt Ltd , New Delhi
2.	Multimedia Technologies		Rajneesh Aggarwal & B. B Tiwari	Excel Publication, New Delhi, 2007.
3.	Multimedia making it work		Tay Vaughan	Tata McGraw-Hill, 2008.

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Principles of Multimedia		Parekh Ranjan	Tata McGraw-Hill, 2007
2	Introduction to Computer Graphics and Multimedia	Second Edition	Anirban Mukhopadhyay and Arup Chattopadhyay	Vikas Publishing House.

VI Semester
CSD2362-PE2:LAB: Multimedia Design & Processing

List of Practical's

Sr. No.	Problem Statements
1	Installation of various multimedia software like Photoshop/GIMP, Blender, Flash, Director or any open source software
2	Installing and use of various multimedia devices - Scanner - Digital camera, web camera - Mike and speakers Touch screen - Plotter and printers - DVD - Audio CD and Video CD
3	Reading and writing of different format on CD/DVD
4	Transporting audio and video files
5	Using various features of Flash
6	Using various features of Photo-shop/GIMP
7	Using various features of Blender
8	Making multimedia presentations combining, Flash, Photo-shop/GIMP, such as department profile, lesson presentation, games and project presentations.

VI Semester
CSD2363-: PE-2: Advanced Web Designing

Objective	Course Outcome
The student should be able to 1) Get familiar with basics of HTML, HTML tags, DHTML CSS. 2) Get familiar with client server architecture and able to develop a web application using java technologies. 3) Get familiar with markup languages with their structures and syntax. 4) To get familiarized with JS frame work	**On completion of this course, the student will be able to** 1) Understand the different tags of HTML and Implement interactive web pages using HTML , DHTML and CSS. 2) Understand client server architecture and Develop interactive web pages using java script and client and server side programming. 3) Understand the concept of Markup languages and Make the use of mark up languages in development of web pages. 4) Understand the concepts of Node JS and Angular JS and Develop web applications using Node and Angular JS.

CO	Statement	Mapped PO												PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	and the different tags of HTML and Implement interactive web pages using HTML , DHTML and CSS.														
CO2	and client server architecture and Develop interactive web pages using java script and client and server side programming.														
CO3	and the concept of Markup languages and Make the use of mark up languages in development of web pages.														
CO4	and the concepts of Node JS and Angular JS and Develop web applications using Node and Angular JS.														

		June 2021	1.00	Applicable for AY 2021-22 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

Unit No.	Contents	Max. Hrs.
1	Creation of web pages: HTML tags, special characters, images, tables, forms, the hyperlinks, Frames	8
2	Dynamic HTML (DHTML): Introduction, Cascading Style Sheets (CSS), DHTML Document Object Model and Collections	8
3	Scripting Languages:- Java Script objects and forms, server side and client side scripting languages	6
4	XML:XML basics, understanding mark-up languages, structures and syntax, valid Vs. Well formed XML, DTD (document type Definitions) classes, Element Type Declaration, Attribute Declarations, Limitations of DTDs, XML processor, Introduction to Schema, Complex Types, Extensible Style sheet Language Transformations (XSLT),Basics of Parsing	7
5	The importance of being asynchronous, Blocking vs. non-blocking code, Server-side JavaScript, What is Node.js?, Why use Node.js?,Features, Process Model, Setup Node.js Development Environment, Node.js Basics, Node.js Module, File System	7
6	Introduction to AngularJS, AngularJS Expressions: Numbers, Strings, Objects, Arrays, Expressions using {{ }} and ng-bind. Modules: Creating a module, adding a controller & directive, myApp.js, myCtrl.js, Loading library. Directives: Data Binding, ng-init, ng-repeat, ng-app & ng-model directives, custom directives.2 way binding, Validating User Input, Status, ng-empty, ng-touched, ng-valid, ngpending. Data Binding: Synchronization between model and view. AngularJS Controllers: ng-controller, Controller Methods, External Files.Scope: $scope, understanding the scope, $rootScope	6

Text Books

Title	Edition	Authors	Publisher
The Complete Reference HTML and XHTML	5th Edition	Thomas A.Powell	McGraw Hill Pub
Learning angular JS		Dayley, Brad Dayley	

Reference Books

SN	Title	Edition	Authors	Publisher
1	Learning PHP, MySQL, JavaScript, and CSS: A Step-by-Step Guide to Creating Dynamic Websites	3rd	**Robin Nixon**	O'RELLY

VI Semester
CSD2365- Design for Manufacture and Assembly

Objectives:	Course outcomes:
1. Understand the complex interrelationships between design and manufacturing 2. Explore and understand basic manufacturing processes and the design for manufacturing (DFM) implications of design choices for specific manufacturing processes 3. Use assembly considerations and assembly costs in evaluations 4. Learn modern manufacturing philosophies and practices\ 5. Understand the role of software applications in evaluating designs for manufacturing and assembly costs; understand approaches and practices related to CAD model building and model checking for specific manufacturing processes such as models for sheet metal and models for casts and molds 6. Learn quality related programs in manufacturing	1. Understand that Design for Manufacture and Assembly (DFMA) is an important aspect of product development and promotes early involvement of manufacturing in design 2. Learn a systematic procedure to analyze a proposed design from the point of view of assembly and manufacturing 3. Quantitatively evaluate the impact of design choices on manufacturing cost 4. Get familiar with key concepts in various new manufacturing paradigms and practices related to lean manufacturing

Unit No.	Contents	Max. Hrs.
1	**Unit 1:Introduction to DFMA** History of DFMA, Steps for applying DFMA during product design, Advantages of applying DFMA during product design, Reasons for not implementing DFMA, Introduction to Manufacturing Process: Classification of manufacturing process, Basic manufacturing processes, Mechanical properties of material: Tensile properties, Engineering stress-strain, True stress strain, Compression properties, Shear properties, Introduction to materials and material selection: Classification of engineering materials, Material selection for product design	7
2	**Unit 2: Sand casting** Introduction to sand casting, Typical characteristics of a sand cast part, Design recommendation for sand casting, Investment casting: Introduction, Steps in investment casting, Design consideration of Investment casting, Typical characteristics and applications, Die casting: Introduction to die casting, Advantages of the die casting process, Disadvantages of the die casting process, Applications, Suitable material consideration, General design consideration, Specific design recommendation, Injection moulding: Introduction to injection moulding, Typical characteristics of injection moulded parts, Effect of shrinkage, Suitable materials, Design recommendations, Design for powder metal processing: Introduction to powder metal processing, Typical characteristics and applications, Limitations, Design recommendations.	7

Unit No.	Contents	Max. Hrs.
3	**Unit 3: Design for machining** Introduction to machining, Recommended materials for machinability, Design recommendations, Design for tuning operation: Process description, Typical characteristics and applications, Suitable materials, Design recommendations, Design for machining round holes: Introduction,Suitable materials, Design recommendations, Recommended tolerances, Parts produced by milling: Process description, Characteristics and applications of parts produced on milling machines, Design recommendations for milling, Dimensional factors and tolerances, Parts produced by planning, shaping and slotting: Process description, Design recommendation planning, Design for broached parts: Process description, Typical characteristics of broached parts, Suitable materials for broaching, Design recommendations.	7
4	**Unit 4 Metal Extrusion** Process, Suitable material for extrusion, Design recommendation for metal extrusion, Metal stamping: Process, Characteristics and application of metal stamping, Suitable materials for stamping, Design Recommendations for metal stamping, Fine blanked parts: Fine blanking process, Material suitable for fine blanked parts, Design recommendations for piece parts, Rolled formed section: Process, Design recommendations rolled section, Impact or cold extrusion: Process, Design recommendations for backward extrusion, Forward extrusion: Process, Design recommendations for forward extrusion, Design for Forging: Forging processes, Forging nomenclature, Suitable materials for forging, Design recommendations, Metal injection moulded parts: Process, Materials suitable, Design recommendations for metal injectionmolded parts.	8
5	**Unit 5 Design for cleaning** Introduction to cleaning process, In-process cleaning operations, Cleaning processes and their applications, Design recommendations, Design for polishing and plating: Introduction to Polishing processes, Design recommendations for polishing process, Design for plated surface: Electroplating process, Typical characteristics, Design recommendations for plating, Hot Dip Metallic Coating: Process, Design recommendations for Hot Dip Metallic coating, Thermal sprayed coating: Process, Design recommendations for thermal sprayed coating, Vacuum Metalized surfaces: The process, Typical characteristics and applications, Design recommendations, Design for heat treatment: Introduction to heat treatment, Heat treating process for steel, Applications of heat-treated parts, Design recommendations for heat treatment	8
6	**Unit 6 Introduction to Assembly** The assembly process, Characteristics and applications, Example of common assembly,Economic significance of assembly, General taxonomies of assembly operation and systems,Assembling a product, Design for Assembly: Introduction, Design consideration, Design for Fasteners: Introduction, Design ecommendation for fasteners.	7

VI Semester
CSD2367 - UX &UI Design

Objective	Course Outcome
The student should be able to 1. To study and understand interface design tools, and demonstrate the Interaction between the human and computer components 2. To study and understand the screen designing and its various concepts with design rules 3. To study and understand software tools related to Design process. 4. To understand the interaction devices.	**On completion of this course, the student will be able to** 1. Understand the definition and principles of UI/UX Design in order to design with intention. 2. Achieve a deep understanding of the entire life-cycle of design—the process, purpose, and tools. 3. Learn the basics of HCI (human-computer interaction) and the psychology behind user decision-making. 4. Discover the industry-standard tools and specific project deliverables in UI/UX.

CO	Statement	Mapped PO												PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the definition and principles of UI/UX Design in order to design with intention.	3	3	3		3								2	
CO2	Achieve a deep understanding of the entire life-cycle of design—the process, purpose, and tools.	2	2	2		3								2	
CO3	Learn the basics of HCI (human-computer interaction) and the psychology behind user decision-making	3	3	3		2								2	
CO4	Discover the industry-standard tools and specific project deliverables in UI/UX.	2	2	2		2								2	

Unit No.	Contents	Max. Hrs.
1	**INTRODUCTION** Human–Computer Interface – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.	6
2	**HUMAN COMPUTER INTERACTION** User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus.	5
3	**WINDOWS** Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– Device– Based Controls Characteristics– Screen – Based Controls – Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.	5
4	**MULTIMEDIA** Text For Web Pages – Effective Feedback– Guidance & Assistance– Internationalization– Accessibility– Icons– Image– Multimedia – Coloring.	5
5	**WINDOWS LAYOUT– TEST** Prototypes – Kinds Of Tests – Retest – Information Search – Visualization – Hypermedia – WWW– Software Tools.	6
6	**INTRODUCTION TO ACTIVE ELEMENTS OF INTERFACE DESIGN:** Static to Active, Functionality, Speed and Style, Composition and Structure, Buttons, Not Buttons, States and Changes	6

Text Books

SN	Title	Edition	Authors	Publisher
1.	Designing the user interface	3 rd Edition	Ben Shneiderman	Pearson Education Asia, 2004
2	The essential guide to user interface design	-	Wilbert O Galitz	Wiley DreamTech, 2009

Reference Books

SN	Title	Edition	Authors	Publisher
1	The Essential Of User Interface Design", Timings		Alan Cooper,	Wiley – Dream Tech Ltd., (published in 2002)

VI Semester
CSD2368 - Lab. UX &UI Design

Objective	Course Outcome
The student should be able to 1. To study and understand interface design tools, and demonstrate the Interaction between the human and computer components 2. To study and understand the screen designing and its various concepts with design rules 3. To study and understand software tools related to Design process. 4. To understand the interaction devices.	**On completion of this course, the student will be able to** 1. Understand the definition and principles of UI/UX Design in order to design with intention. 2. Achieve a deep understanding of the entire life-cycle of design—the process, purpose, and tools. 3. Learn the basics of HCI (human-computer interaction) and the psychology behind user decision-making. 4. Discover the industry-standard tools and specific project deliverables in UI/UX.

CO	Statement	Mapped PO												PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the definition and principles of UI/UX Design in order to design with intention.	3	3	3		3								2	
CO2	Achieve a deep understanding of the entire life-cycle of design—the process, purpose, and tools.	2	2	2		3								2	
CO3	Learn the basics of HCI (human-computer interaction) and the psychology behind user decision-making	3	3	3		2								2	
CO4	Discover the industry-standard tools and specific project deliverables in UI/UX.	2	2	2		2								2	

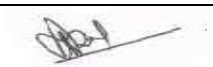
List of Practical's

Sr. No..	Problem Statements
1	PART-1 Lab based o Formal Elements of Interface Design (Introductory Part) (Demonstration of available open source tool for designing)
2	PART-2 Lab based Active Elements of Interface Design • Imagery • Typography
3	PART-2 Lab based Active Elements of Interface Design • Design Before Design • Look and Feel
4	PART-2 Lab based Active Elements of Interface Design • Language as a design tool • Color and Shape
5	PART-2 Lab based Active Elements of Interface Design • Language as a design tool • Color and Shape
6	PART-2 Lab based Active Elements of Interface Design • Icons
7	PART-3 Lab based composing the Elements of Interface Design • Static to Active • Functionality • Buttons
8	PART-3 Lab based composing the Elements of Interface Design • Speed and Style • Composition and Structure
9	PART-3 Lab based composing the Elements of Interface Design Not Buttons • States and Changes
10	Case study based on complete UI/UX Designing on the selected application with the use of open source tool.

VI Semester
CSD2369 - Introduction to Deep Learning

Objective	Course Outcome
• Understand complexity of Deep Learning algorithms and their limitations. • Understand modern notions in data analysis oriented computing; • Be capable of confidently applying common Deep Learning algorithms in practice and implementing their own; • Be capable of performing experiments in Deep Learning using real-world data.	**On completion of this course, the student will be able to** • Comprehend the neural networks as means for computational learning and to analyze the basic network architectures and algorithms for supervised and unsupervised learning. • Recognize the characteristics of deep learning models that are useful to solve real-world problems. • Understand the motivation for different neural network architectures and select the appropriate architecture for a given problem. • Build deep learning models and interpret the results

Unit No.	Contents	Max. Hrs.
1	**Fundamentals of Artificial Neural Networks:** Overview of Artificial Intelligence, Types of AI, Machine Learning, Types of Learning algorithms, relation between AI, ML, and DL, Overview of Neural Network, Types of ANN, Feed forward NN,The McCulloch-Pitts Network, Perceptron, Multi-Layer Perceptron Activation Functions : Sigmoid, ReLU, Leaky ReLU,Hyperbolic, Softmax.	7
2	**Gradient Descent and Backpropagation**: Gradient Descent, Stochastic Gradient Descent, Mini-Batch Gradient Descent, Backpropagation, Momentum based Gradient descent, Nestrov Accelerated Gradient, Some problems in ANN **Optimization and Regularization** : Error functions, Overfitting and Capacity, Cross Validation, Feature Selection, Weight Regularization, L1 & L2 Regularization, Hyper-parameters.	7
3	**Introduction to Convolutional Neural Networks:** Introduction to CNNs, Components of CNN Architecture: Convolutional layer, Pooling/Down-sampling layer, Flattening layer, Fully connected Layer, Receptive fields, Feature Maps, Filters and Activation Maps, Padding, Properties of CNN, Architecture of CNN(LeNet, AlexNet, ZFNet, GoogleNet, VGGNet, ResNet, DenseNet), Applications of CNN.	8
4	**Introduction to Recurrent Neural Networks:** Introduction to RNNs, Challenges with vanishing and exploding gradients, Unfolded RNNs, Seq2Seq RNNs, LSTM, Gated Recurrent Unit(GRU), RNN applications	8
5	**Deep Unsupervised Learning: Autoencoders :** Features, Types (Vanilla, Multilayer, Stacked, Deep, Denoising, Convolutional, Regularized), Variational Autoencoders, Generative Adversarial Networks, Cycle GAN	8
6	**Deep Learning applications**: Object Detection Method using CNN, Region based CNN, Fast R-CNN, Faster RCNN, Region Proposal Network, YOLO , SSD.	8

		June 2021	1.00	Applicable for AY 2021-22 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Deep Learning		Good fellow, I.,Bengio,Y., and Courville, A.	MIT Press, 2016.

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Pattern Recognition and Machine Learning		Bishop, C. ,M.	Springer, 2006.
2	Neural Network and Deep Learning		Charu C Agarwal	Springer
3	Lecture slides of Prof. Fei Fei Li's, Stanford University, USA. Andrew Ng, Coursera Course on CNN.			

VI Semester
CSD2381- OE-3: Computer Graphics

Course Learning Objective	Course Outcomes
Student will study : 1. To introduce basic concepts of computer graphics. 2. To understand various algorithms of object drawing and various transformation and apply them. 3. To comphend the basic operations on segments, windowing and viewing transformations. 4. Understand some classic 3D graphics algorithms. 5. To understand the basic knowledge of curves and splines. 6. To understand the basic functions of animation.	After completion of the course students will be able to: 1. Understand basics of computer graphics. 2. Apply basic algorithms for line, circle and to solve, apply and list geometric transformation matrices including rotation, translation, scaling and reflection to transform a 2D object. 3. Apply basic algorithms and methods for segments, clipping and viewing transformation. 4. Understand and implement 3D graphics algorithms. 5. To solve and plot curve and splines. 6. Understand various tools and apply to design the animation.

Course Outcomes	Statement	Mapped PO												PSPO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	Understand basics of computer graphics.	H		M						L		L	M		
2	Apply basic algorithms for line, circle and to solve, apply and list geometric transformation matrices including rotation, translation, scaling and reflection to transform a 2D object.	M		H						L		L	M		
3	Apply basic algorithms and methods for segments, clipping and viewing transformation.	M		H						L		L	L		
4	Understand and implement 3D graphics algorithms.	H		M						L		L	H		
5	To solve and plot curve and splines.	H		M						L		L	L		
6	Understand various tools and apply to design the animation.	L		L						H		H	L		
		M		M						L		L	L		

		June 2021	1.00	Applicable for AY 2021-22 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

UNIT I		**[08 Hrs.]**
Geometry and line generation: points, lines, pixels, planes and frame buffers, types of display devices: Raster Scan display, Flat Panel, LCD, LED Display, 3D Viewing devices, Virtual Reality Systems.Introduction of GPU.Illumination Models.		
UNIT II		**[08 Hrs.]**
DDA and Bresenham's line algorithms, Bresenham's algorithm for circle generation, algorithm for ellipse generation.Algorithms for polygon generation, polygon filling algorithms, NDC (normalized device co-ordinates), pattern filing, 2D transformation: scaling, rotation, translation, rotation about arbitrary point reflection, zooming.		
UNIT III		**[08 Hrs.]**
Graphics primitives: displays file, Segment tables, operations on segments, Graphics file formats (jpeg, Tiff, Bmp, etc). Windowing and clipping: Window, view port, viewing transformation, clipping, line and polygon clipping.		
UNIT IV		**[08 Hrs.]**
3D Graphics: 3D primitives, projection, parallel perspective, isometric, viewing transformations, hidden surfaces and line removal, painter's algorithm, Z-buffers, Warnock's algorithm.		
UNIT V		**[08 Hrs.]**
Bezier and B-spline, sweeping, method of interpolation, Cubic Splines.		
UNIT VI		**[08 Hrs.]**
Animation: Definition & introduction to animation, Basics: Animation target objects, Types, animation timings. Design of an animation sequence, general computer animation functions, raster animation, computer animation language.		

Textbooks:			
1	Computer Graphics C Version	Second Edition (1997)	Donald Hearn & M. Pauline Baker
2	Computer Graphics Principles and Practice	2nd edition,1996	Foley, Vandam, Feiner and Huges
Reference Books:			
1	Procedural Elements for Computer Graphics	1998	David F. Rogers
2	Computer Graphics, A Programming Approach	2nd edition, 1987	Steven Harrington

VI Semester

CSD2382- OE-3: Multimedia Design

Objective	Course Outcome
The student should be able to 1. To learn the basics and Fundamentals of Multimedia. 2. The objective of this course is to provide concept about an application, which uses a collection of multiple media sources e.g. text, graphics, images, audio, animation and video. 3. Students will learn about Multimedia, which is a field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.	**On completion of this course, the student will be able to** 1) Define what is multimedia and how it works. 2) Understand multimedia components using various tools and techniques. 3) Discuss about different types of media format and their properties. 4) Justify the right way of manipulating multimedia systems. 5) To analyze the different compression algorithms. 6) To design Multimedia Application.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO	Define what is multimedia and how it works.	2	2								1			1	
CO	Understand multimedia components using various tools and techniques.	2	2								1			1	
CO	Discuss about different types of media format and their properties.	2	2								1			1	
CO	Justify the right way of manipulating multimedia systems.	2	2								2			1	
C05	To analyze the different compression algorithms.													1	
CO	To design Multimedia Application	2	2							2	2			1	

		June 2021	1.00	Applicable for AY 2021-22 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

Unit No.	Contents	Max. Hrs.
1	**Introduction to Multimedia:** Definition of Multimedia, Multimedia objects: Text, Graphics, Animation, Audio, images, Video. Definition of HyperText and HyperMedia. Multimedia Applications in Education, Entertainment. Advertising world etc. Components of a Multimedia System, Desirable Features for a Multimedia System, requirements of Multimedia Communication, Applications of multimedia – benefits and problems.	6
2	**Representation of Multimedia Objects:** Representation of Analog Signals, A/D: Sampling and quantization. Text: Font and their representation (bitmap, true type) Graphics: Raster & Vector representation, aliasing problems Image: (bit depth, resolution, color (RGB, CMYK, HSB), introduction to BMP, GIF, TIFF, PNG and JPEG formats) Audio (speech and wideband audio, sampling rate and aliasing, quantisation, introduction to MP3, WMA, WAV, MIDI etc.) Video (frame rate and resolution, interlaced and non-interlaced video, colour planes (YCBCR, YUV), Video broadcast standards (PAL, NTSC, SECAM), HD Video, 3D TV, Video representation: AVI, MPEG, Quick Time, real video (.rm)	6
3	**Concepts of Multimedia Editing:** Digital Audio, Music Sequencing and Notation, Image/Graphics Editing, Video Editing (Linear, Non-linear), Subtitling	5
4	**Introduction to Compression Technology :** Concept of lossy and lossless compression. Concept of rate-distortion characteristics, Basics image compression (JPEG, JPEG 2000), Basics of Audio compression (MP3, MP4), Basics of Video Compression (MPEG, H.264)	5
5	**Multimedia Application Design:** Content design, technical design, visual design, design metaphors, example studies, interactivity	6
6	**Multimedia Authoring and Publishing :** Definition of an Authoring System, uses of an authoring system, Definition and function of Authoring Metaphor, Different Metaphors. Offline Publishing: Flash, Power Point. Online Publishing: HTML5, Dreamweaver	6

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Fundamentals of Multimedia		Li & Drew	Pearson Education, 2009.
2.	Multimedia Systems		Rajneesh Aggarwal & B. B Tiwari	Excel Publication, New Delhi, 2007.
3.	Multimedia making it work		Tay Vaughan	Tata McGraw-Hill, 2008.

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Principles of Multimedia		Parekh Ranjan	Tata McGraw-Hill, 2007
2	Introduction to Computer Graphics and Multimedia	Second Edition	Anirban Mukhopadhyay and Arup Chattopadhyay	Vikas Publishing House.

VI Semester
CSD2391- OE-4: Advanced Web Designing

Objective	Course Outcome
The student should be able to 1) Get familiar with basics of HTML, HTML tags, DHTML CSS. 2) Get familiar with client server architecture and able to develop a web application using java technologies. 3) Get familiar with markup languages with their structures and syntax. 4) To get familiarized with JS frame work	**On completion of this course, the student will be able to** 1) Understand the different tags of HTML and Implement interactive web pages using HTML , DHTML and CSS. 2) Understand client server architecture and Develop interactive web pages using java script and client and server side programming. 3) Understand the concept of Markup languages and Make the use of mark up languages in development of web pages. 4) Understand the concepts of Node JS and Angular JS and Develop web applications using Node and Angular JS.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	tand the different tags of HTML and Implement interactive web pages using HTML , DHTML and CSS.														
CO2	tand client server architecture and Develop interactive web pages using java script and client and server side programming.														
CO3	tand the concept of Markup languages and Make the use of mark up languages in development of web pages.														
CO4	tand the concepts of Node JS and Angular JS and Develop web applications using Node and Angular JS.														

Unit No.	Contents	Max. Hrs.
1	Creation of web pages: HTML tags, special characters, images, tables, forms, the hyperlinks, Frames	8
2	Dynamic HTML (DHTML): Introduction, Cascading Style Sheets (CSS), DHTML Document Object Model and Collections [8 Hrs]	8
3	Scripting Languages:- Java Script objects and forms, server side and client side scripting languages	6
4	XML:XML basics, understanding mark-up languages, structures and syntax, valid Vs. Well formed XML, DTD (document type Definitions) classes, Element Type Declaration, Attribute Declarations, Limitations of DTDs, XML processor, Introduction to Schema, Complex Types, Extensible Style sheet Language Transformations (XSLT),Basics of Parsing	7
5	The importance of being asynchronous, Blocking vs. non-blocking code, Server-side JavaScript, What is Node.js?, Why use Node.js?,Features, Process Model, Setup Node.js Development Environment, Node.js Basics, Node.js Module, File System	7
5	The importance of being asynchronous, Blocking vs. non-blocking code, Server-side JavaScript, What is Node.js?, Why use Node.js?,Features, Process Model, Setup Node.js Development Environment, Node.js Basics, Node.js Module, File System	
6	Introduction to AngularJS, AngularJS Expressions: Numbers, Strings, Objects, Arrays, Expressions using {{ }} and ng-bind. Modules: Creating a module, adding a controller & directive, myApp.js, myCtrl.js, Loading library. Directives: Data Binding, ng-init, ng-repeat, ng-app & ng-model directives, custom directives.2 way binding, Validating User Input, Status, ng-empty, ng-touched, ng-valid, ngpending. Data Binding: Synchronization between model and view. AngularJS Controllers: ng-controller, Controller Methods, External Files.Scope: $scope, understanding the scope, $rootScope	

Text Books

SN	Title	Edition	Authors	Publisher
1	The Complete Reference HTML and XHTML	5th Edition	Thomas A.Powell	McGraw Hill Pub
2	Learning angular JS		Dayley, Brad Dayley	

Reference Books

SN	Title	Edition	Authors	Publisher
1	Learning PHP, MySQL, JavaScript, and CSS: A Step-by-Step Guide to Creating Dynamic Websites	3rd	**Robin Nixon**	O'RELLY

VI Semester
CSD2392 : OE4 – Virtual Reality

Objective	Course Outcome
The student should be able to 1)This course is designed to give historical and modern overviews and perspectives on virtual reality. 2)It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.	**On completion of this course, the student will be able to** 1. Describe how VR systems work and list the applications of VR. 2.Understand the design and implementation of the hardware that enables VR systems tobe built. 3.Understand the system of human visionand its implication on perception and rendering. ain the concepts of motion and tracking in VR systems.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO															
CO															
CO															
CO															

Unit No.	Contents	Max hrs
1	**Introduction to Virtual Reality:** Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark.	**7**
2	**Representing the Virtual World** Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR	**8**
3	**The Geometry of Virtual Worlds &The Physiology of Human Vision** Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR.	**7**
4	**Visual Perception & Rendering** Visual Perception - Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates	**7**
5	**Computer Graphics And Geometric Modelling:** Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, Colour theory, Conversion From 2D to 3D, 3D space curves, 3D boundary representation, Simple 3D modelling, 3D clipping, Illumination models, Reflection models, Shading algorithms. Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection.	**7**
5	**Computer Graphics And Geometric Modelling:** Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, Colour theory, Conversion From 2D to 3D, 3D space curves, 3D boundary representation, Simple 3D modelling, 3D clipping, Illumination models, Reflection models, Shading algorithms. Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection.	**7**
6	**AR / VR Applications:** Introduction, Engineering, Entertainment, Science, Training	**7**

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Virtual Reality		M. LaValle	Cambridge University Press, 2016
2	,Understanding Virtual Reality", Interface, Application and Design		William R Sherman and Alan B Craig	(The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	3D User Interfaces, Theory and Practice",		Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev	Addison Wesley, USA, 2005.

VI Semester
Audit Course
AU2130 : YCCE Communication Aptitude Preparation (YCAP6.3)

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 2021

7th & 8th Semester

(Department of Information Technology)

Computer Science and Design

VII Semester
CSD2401: Virtual and Augmented Reality

Objective	Course Outcome
The student should be able to 1) This course is designed to give historical and modern overviews and perspectives on virtual reality. 2)It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems	**On completion of this course, the student will be able to** 1. Describe how VR systems work and list the applications of VR. 2. Understand the design and implementation of the hardware that enables VR systems to be built. 3. Understand the system of human vision and its implication on perception and rendering. 4 Explain the concepts of motion and tracking in VR systems.

CO	Statement	Mapped PO												PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO	Describe how VR systems work and list the applications of VR. .														
CO	Understand the design and implementation of the hardware that enables VR systems tobe														
CO	Understand the system of human visionand its implication on perception and rendering.														
CO	Explain the concepts of motion and tracking in VR systems														

Unit	Contents	Max.
1	**Introduction to Virtual Reality** Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output-Visual, Aural & Haptic Displays, Applications of Virtual Reality.	6
2	**Virtual Environment:** Input: Tracker, Sensor, Digital Gloves, Movement Capture, Video-based Input, 3D Menus & 3D Scanner etc. Output: Visual /Auditory / Haptic Devices. Generic VR system: Introduction, Virtual environment, Computer Environment, VR technology, Model of interaction, VR Systems. Animating the Virtual Environment: Introduction, The dynamics of numbers, Linear and Nonlinear interpolation, the animation of objects, linear and non-linear translation, shape & object in between, free from Deformation, particle system. Physical Simulation: Introduction, Objects falling in a gravitational field, Rotating wheels, Elastic collisions, projectiles, simple pendulum, Springs, Flight dynamics of an aircraft.	5
3	**Augmented Reality:** Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.	5
4	**Development Tools and Frameworks:** Human factors: Introduction, the eye, the ear, the somatic senses Hardware: Introduction, sensor hardware, Head-coupled displays, Acoustic hardware, Integrated VR systems. Software: Introduction, Modeling virtual world, Physical simulation, VR toolkits, Introduction to VRML	5

4	**Development Tools and Frameworks:** Human factors: Introduction, the eye, the ear, the somatic senses Hardware: Introduction, sensor hardware, Head-coupled displays, Acoustic hardware, Integrated VR systems. Software: Introduction, Modeling virtual world, Physical simulation, VR toolkits, Introduction to VRML	5
5	**Motion & Tracking** Motion in Real and Virtual Worlds- Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection Tracking- Tracking 2D & 3D Orientation, Tracking Position and Orientation, Tracking Attached Bodies	6
6	**Interaction & Audio** Interaction - Motor Programs and Remapping, Locomotion, Manipulation, Social Interaction. Audio -The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering	6

Text Books

SN	Title	Edition	Authors	Publisher
1	"Designing Virtual Systems:		Gerard Jounghyun Kim,	The Structured Approach", 2005.
2	, Virtual Reality Technology,		Grigore C. Burdea, Philippe Coiffet	Wiley 2016
3	"Spatial Augmented Reality:		Oliver Bimber and Ramesh Raskar,	Merging Real and Virtual Worlds", 2005.
4	Understanding Augmented Reality, Concepts and		Alan B. Craig,	Applications, Morgan Kaufmann, 2013.

Reference Books

SN	Title	Edition	Authors	Publisher
1	"3D User Interfaces, Theory and Practice",		Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev	Addison Wesley, USA, 2005.

VII Semester
CSD2402: LAB.- Virtual and Augmented Reality

Objective	Course Outcome
The student should be able to	**On completion of this course, the student will be able to**

CO	Statement	Mapped PO												PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO															
CO															
CO															
CO															

List of Practical's

Sr.	Problem Statements
1	Installation of Unity and Visual Studio, setting up Unity for VR development, understanding documentation of the same.
2	Demonstration of the working of HTC Vive, Google Cardboard, Google Daydream and Samsung gear VR.
3	Develop a scene in Unity that includes: i. A cube, plane and sphere, apply transformations on the 3 game objects. ii. Add a video and audio source.

4	Develop a scene in Unity that includes a cube, plane and sphere. Create a new material and texture separately for three Game objects. Change the colour, material and texture of each Game object separately in the scene. Write a C# program in visual studio to change the colour and material/texture of the game objects dynamically on button click.
5	Develop a scene in Unity that includes a sphere and plane. Apply Rigid body component, material and Box collider to the game Objects. Write a C# program to grab and throw the sphere using vr controller.
6	Develop a simple UI (User interface) menu with images, canvas, sprites and button. Write a C# program to interact with UI menu through VR trigger button such that on each successful trigger interaction display a score on scene.
7	Create an immersive environment (living room/ battlefield/ tennis court) with only static game objects. 3D game objects can be created using Blender or use available 3D models.
8	Include animation and interaction in the immersive environment created in Assignment 7.
9	Mini-Projects/ Case Study Create a virtual environment for any use case. The application must include at least 4 scenes which can be changed dynamically, a good UI, animation and interaction with game objects. (e.g. VR application to visit a zoo)

VII Semester
CSD2403: Computer Aided Design

Objectives:	Course outcomes:
To educate students on -Main concepts of computer aided design -Graphics representation of curves. -Surface and solids	After completion of the course students would be able to 1. Distinguish the various CAD CAM tools and also evaluate criteria for CAD CAM systems 2. Design 2D and 3D Transformation matrices 3. Calculate and analyse the parametric equations for wire frame. surface and solid modeling entities 4. Design the applications of modeling and evaluate data exchange formats

UNIT	HRS
Unit 1 CAD TOOLS	**6HRS**
Definition of CAD Tools, Types of system, CAD/CAM system evaluation Criteria, functional areas of CAD, Modelling and viewing, efficient use of CAD software.	
Unit2 Two/Three Dimensional Transformations	**8HRS**
Two & Three dimensional geometric and co-ordinate transformations like scaling, translation, rotation, reflection, shear. Concept of homogeneous representation and concatenated transformations. Inverse transformations.	
Unit 3 Wire Frame Modeling	**[7 hrs]**
Types of mathematical representation of curves, wire frame models, wire frame entities, parametric representation of analytical and synthetic curves- Hermit cubic splines, Bezier curves, B Splines	
Unit4 Surface Modeling	**8HRS**

Mathematical representation of surfaces, Surface model, Surface entities, surface representation, parametric representation of surfaces, plane surface, ruled surface, surface revolution, Tabulated surface.	
Unit 5 Solid Modeling &	**8HRS**
Solid Representation - Boundary Representation (B-rep), Constructive Solid Geometry (CSG) and other methods,	
Unit 6 Data Exchange	**[8 hrs]**
Evaluation of different data-exchange formats, IGES, STEP, ACIS, Para data representations and structure	

Textbooks:

1 CAD/CAM, theory & practice: Ibrahim Zeid
2 Procedural elements for computer graphics: D Rogers
3 Computer Graphics: D Hearn & M.P.Baker
4 Computer Graphics: S Harrington.
5 Mikell.P.Groover "Automation, Production Systems and Computer Integrated Manufacturing", Prentice Hall of India, 2008.
6 Radhakrishnan P, Subramanyan S. and Raju V., "CAD/CAM/CIM", 2nd Edition, New Age International (P) Ltd,
New Delhi,2000

VII Semester
CSD2404: Lab : Computer Aided Design

Objectives: To educate Main concepts of computer aided design & Manufacturing • To use Graphics representation of curves	**Course outcomes:** After completion of the course students would be able to 1. Study, design and develop the model for mechanical engineering parts. 2. Conceptualize & model any machine component 3. Build the CAD Model and CAM Model for simple machine elements.

List of Practical:-

1. Programs on 2-D transformations- scaling, rotation, reflection and translation

2. 2-D Wireframe object modeling

3. 3-D Wireframe object modeling

4. Basics of surface modeling using Extrude, Revolve, sweep, variable section sweep commands

5. Creating fill surfaces, lofted multi-section surfaces, blended surfaces

6. Creating objects through Solid modeling

7. Creating special features like hole, fillet, chamfer

8. To generate at least two simple assembly model

9. Exporting the cad file in different legacy Data Exchange Formats for various applications

10. Exporting CAD Geometry in Neutral file formats and analyzing their data structure with any open source viewer

VII Semester
CSD2411 : PE-3: GPU Computing

Objective	Course Outcome
1. To study different parallel processing architectures based on relationships between processing elements, instruction sequence, memory and interconnected networks. 2. To study and understand the concepts of dependence analysis. 3. Study and understand the concepts of GPU computing and heterogeneous parallel programming environments. 4. To study the Memory Model of GPU 5. To study the streams and concurrency of GPU	**On completion of this course, the student will be able to** • **Compare & Compute** speedup, efficiency, and scaled speedup of parallel computations. • **Analyze and resolve** the dependences in single, double and multi-level loops. • **Describe** common GPU architectures and programming models to implement efficient algorithm using kernels. • Given a problem, **implement** an efficient and correct code to solve it, analyze its performance, and give convincing written and oral presentations explaining the achievements.

VII Semester
CSD2411 : PE-3: GPU Computing

Unit	Contents	Max.
1	**Introduction to parallel computing**: Need of ever increasing performance, building parallel systems, need to write parallel programs, Parallel hardware, Parallel Software, Coordinating the processes/threads, Shared-memory, Distributed-memory, Programming hybrid systems. **Principles of Parallel Algorithm Design:** Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing.	6
2	**Dependence Concepts*:*** Basic introduction of dependence in single loop and double loop, Loop-carried and Loop-independent dependences, Techniques for extraction of parallelism, index and iteration spaces and perfect loop nest, test for dependences, GCD test, Bound test.	6
3	**Heterogeneous Parallel Computing With CUDA:** History, GPU Architecture, Clock speeds, CPU / GPU comparisons, Heterogeneity, Accelerators, Parallel Programming, CUDA OpenCL / OpenACC, Kernels Launch parameters, Thread hierarchy, Warps/Wavefronts, Threadblocks/Workgroups, Streaming multiprocessors, 1D/2D/3D thread mapping, Device properties, Simple Programs	7
4	**Memory:** Memory hierarchy, DRAM / global, local / shared, private / local, textures, Constant Memory, Pointers, Parameter Passing, Arrays and dynamic Memory, Multi-dimensional Arrays, Memory Allocation, Memory copying across devices, Programs with matrices, Performance evaluation with different memories.	7
5	**Synchronization:** Memory Consistency, Barriers (local versus global), Atomics, Memory fence. Prefix sum, Reduction. Programs for concurrent Data Structures such as Worklists, Linked-lists. Synchronization across CPU and GPU. **Functions:** Device functions, Host functions, Kernels functions, Using libraries (such as Thrust), and developing libraries.	7
6	**Support:** Debugging GPU Programs. Profiling, Profile tools, Performance aspects **Streams**: Asynchronous processing, tasks, Task-dependence, Overlapped data transfers, Default Stream, Synchronization with streams. Events, Event-based- Synchronization - Overlapping data transfer and kernel execution, pitfalls. Dynamic parallelism, Unified Virtual Memory, Multi-GPU processing.	8

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Introduction to Parallel Computing		Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar,	Pearson Edn.
2	Dependence Concept		Utpal Banerjee	Intel Corp.
3	CUDA by Example: An Introduction to General-Purpose GPU Programming		Jason Sanders, Edward Kandrot	Addison-Wesley

VII Semester
CSD2413 : PE-3: Digital Audio Design and Synthesis

Objective	Course Outcome
The student should be able to	**On completion of this course, the student will be able to**
1) Study the recording and transmission principles in digital audio. 2) Study the various compression techniques. 3) Study the digital audio editing. 4) Study the various application of digital audio.	1) Analyze the recording and transmission principles in digital audio. 2) Analyze the various compression techniques. 3) Design and analyze the digital audio editing. 4) Analyze the various application of digital audio.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO12	PS	PSO
CO	Analyze the recording and transmission principles in digital audio.	3	3											3	
CO	Analyze the various compression techniques	3	3											3	
CO	esign and analyze the digital audio editing.	3	3											3	
CO	nalyze the various application of digital audio.	3	3											3	

VII Semester
CSD … : PE-3: Digital Audio Design and Synthesis

Unit	Contents	Max.
1	Hi Fi Audio Amplifier Introduction to Amplifiers: Mono, Stereo, Public Address; Difference between stereo amplifier and Mono amplifier; Block diagram of Hi Fi amplifier and explanation; Graphic equalizer concept, circuit diagram and operation. (5 Point Circuit diagram); Dolby NR recording system; Types of speaker woofer, Midrange and Tweeter; Cross over network circuit and its function.	6
2	CD Player (6Hrs) CD – material used, size; Block diagram of CD player and explanation; Principle and working of detection used in CD player; Component used for CD mechanism (i) CD pick-up assembly, (ii) gear system, (iii) drive motors, (iv) CD lens; Function of controls; Parts, function of remote control (transmitter unit) and function of receiver used in CD player; Advantages of florescent display system used in CD player.	5
3	TV Fundamentals (6Hrs) Concept of Aspect ratio, image continuity, interlace scanning, scanning periods, horizontal and vertical, vertical resolution, horizontal resolution; Vestigial sideband transmission, bandwidth for Colour signal, picture tube, brightness, contrast, viewing distance luminance, hue, saturation, compatibility; Colour theory, primary colors and secondary colors, additive Colour mixing subtractive Colour mixing; Composite Video Signal, Pedestal height, Blanking pulse, Colour burst, Horizontal sync pulse details, Vertical sync pulse details, Equalizing pulses, CCIR Bstandards for Colour signal transmission and reception	5
4	Short time Fourier analysis- Linear Filtering interpretation, Filter bank summation method, Gamma tone filter, other considerations in filter bank design, speech spectrum analysis using FFT.	7
5	Linear predictive coding of speech- Basic principles of linear predictive analysis, Solution of LPC equations, Prediction error signal, Frequency domain interpretation, Relation between the various speech parameters, Synthesis of speech from linear predictive parameters, Applications	6
6	Audio Processing- Auditory perception and psychoacoustics - Masking, frequency and loudness perception, spatial perception, Digital Audio, Audio Coding - High quality, low-bit-rate audio coding standards, Multichannel audio - Stereo, Multichannel surround sound.	6

VII Semester
CSD2413 : PE-3: Digital Audio Design and Synthesis

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Speech and audio signal processing	1ST	Ben gold and N Morgan	John Wiley and sons
2	"Digital Processing of Speech Signals		L. R. Rabiner and R. W. Schafer	Pearson Education (Asia) Pte. Ltd., 2004
3	. Audio Video Systems		(R.G. Gupta)	Tata McGraw Hill

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Speech Communications: Human and Machine		O'Shaughnessy,	Universities Press
2	Fundamentals of Speech Recognition		L. R. Rabiner and B. Juang	Pearson Education (Asia)

VII Semester
CSD2414 : PE-3: LAB: Digital Audio Design and Synthesis

Objective	Course Outcome
The student should be able to Study the recording and transmission principles in digital audio. Study the various compression techniques. Study the digital audio editing. Study the various application of digital audio. On completion of this course, the student will be	On completion of this course, the student will be able to Analyze the recording and transmission principles in digital audio. Analyze the various compression techniques. Design and analyze the digital audio editing. Analyze the various application of digital audio

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO	Analyze the recording and transmission principles in digital audio.	3	3											3	
CO	Analyze the various compression techniques	3	3											3	
CO	Design and analyze the digital audio editing.	3	3											3	
CO	Analyze the various application of digital audio.	3	3											3	

List of Practical's

Sr.	Problem Statements
1	1. Study of circuit diagram of color TV receiver
2	2. CCVS for different test patterns

3	3. RF tuner
4	4. Video IF & detector
5	5. Video Amplifier
6	6. Sync separators (V & H)
7	7. Sound IF
8	Horizontal section
9	Vertical section
10	Trouble shooting of color TV

VII Semester
CSD2415 : PE-3: Special Effects Techniques

Unit No.	Contents
1	Introduction to the class. What are Visual Effects? – Photographic principles Photographic principles. Forced perspective: theory.
2	Intro to After Effects Introduction to the Interface. Basic Animation. Basic Rendering. Basic tools Rear Projection, Stop Motion Animation, Matte Paintings. Advanced Animation Anchor point, Key frames.
	Motion Sketch Special vs Visual Effects Stunts, explosions, water, fire – safety. Transparency Masks and the Pen tool. Planning a visual effect Storyboards, pre-viz, planning workflows. MID-TERMS In-class animation exercise.
3	Modern tools Models, Miniatures, Green Screen, Motion Control. Time & Layer control More on transparency. Editing in After Effects. Layer control.– The VFX Pipeline Planning & Management. Job specialization. Painting & Puppet Introducing two more tools – Motion Capture, Intro to CGI Old ideas – new technology. Peter Jackson's Lord of the Rings.
4	Parenting & Nesting Creating more complex animations through layer control. Computer-generated Images. Performance capture. Advanced visual effect techniques: Avatar. Track & Key Demo Introducing the tools in After Effects for advanced compositing.
5	Case Studies

Text Books			
Sr. No.	**Title**	**Authors**	**Publisher**
1	Special effects : The History & Techniques	Richard Rickitt Publisher	Watson-Guptil
2	Maya Visual effects : The innovator's guide	Eric Keller Publisher	Sybex Maya Documentation
Reference Books			
1			
2			

VII Semester
CSD2417: PE-3: Animation Principles & Design

Objective	Course Outcome
The student should be able to 1. To introduce students to the animation principles and produce 2. Show firm understanding of timing, animation principles and the scope of techniques animation can cover 3. The students will learn industry standard practices in applied creativity	**On completion of this course, the student will be able to**

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO	understanding of timing and motion through key-frames, holds and in-betweens														
CO	apply the 12 Animation Principles														
CO	Create well-designed and executed animation														

VII Semester
CSD2417 – Animation Principles & Design

Unit	Contents	Max.
1	History of Animation: Persistence of Vision, Early Animation Devices,The Digital Image - Analog v/s Digital and the Binary world - Digital Colour, Channels, bit depth and resolutions - Bitmap and Vector graphics - Boolean operations and Blend modes Getting Real world into the Digital Realm - Input tools like digital photography, video,	6
2	Principles of Animation: Key-frames, In-betweens, Cycles,Morphing 1,Timing and Spacing Charts, Squash and Stretch, Morphing2, Slow In, Slow Out, Squash and Stretch, Timing, Anticipation Visual Rhythm Transitions	5
3	**Walk Cycle,** Walk and Run, Overlapping Action, Attitude Rotoscope Technique, Cycles, Locomotion Staging • Solid Drawing • Appeal Character Design-Puppet • Reference • Personality • Visual Contrast • Replacement Parts	5
4	Concepts of Design • Composition of a scene • Color Design • Value • FG, MG, BG elements, Replacement Animation • Lip Sync • Stop Motion	5
5	Poetry, Music and Animation• Creating a mood • Visual Abstraction • Overview of Text **Writing a Treatment** Story vs Theme Visual Techniques for Theme/Story • Creating a mood • Color, Texture, Composition	6
6	Storyboarding Shot Composition Directing the Audience Transitions, Creating an Animatic	6

CSD2417 : PE-3: Animation Principles & Design

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	The Animator's Survival Kit		Richard Williams,	

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	The Human Figure in Motion		Eadweard Muybridge	

VII Semester
CSD2418: PE-3: LAB. : Animation Principles & Design

List of Practical's

Sr.	Problem Statements
1	Demonstration of using a timing sheet for the bouncing ball
2	Basic Animation- Key-framing (position/scale/rotation/opacity),
3	Anchor Point, Creating Shapes, Motion Paths, using Markers, Importing Audio
4	Animating a Puppet, Building Hierarchies (parenting, nesting, precomping)
5	Creating a Character Ready For Animation
6	Lip Sync Animation, Working with Sound, Using Audio Cues
7	Demonstration of storyboard setup in Photoshop
8	Show how to import storyboards and edit an animatic (sequencing and trimming layers

VII Semester
CSD2419 - PE-3: Product Design and Development

Objectives:	Course outcomes:
To understand the Product Life Cycle. Study different design techniques, product development phases, process selection, material selection and costs associated with PDD	Students will be able to: (1) Evaluate the product life cycle (2) Analyze and select the materials and manufacturing processes for designed product. (3) Evaluate the product for different design criteria like Value engineering/ analysis, robust design, benchmarking, DFX,etc and estimate the product costing. (4) Explain the various prototyping methods and its economics.

UNIT	Hours
Unit 1 Introduction Importance of product design, types of design, product definition, product specification, Phases of product development: conceptual, embodiment and detailed design, product and technology development cycle, concept generation and evaluation methods.	**7hrs**
Unit 2 Material and Process selection Material selection – Importance, classification, material performance characteristic, Selection criteria, Ashby Material selection chart. Process selection – Importance types of manufacturing processes and their classification, sources of information, selection criteria, Material and Process selection Methods- Expert systems, Computer Database Approach, Performance indices, decision matrix, AHP and fuzzy approach, introduction to material and process selection software	**7**
Unit 3 Benchmarking Benchmarking – DFM, DFA, DFX, Early supplier involvement, robust design, QFD and concurrent engineering.	**7**
Unit 4 Evaluation Product evaluation requirements, Five dimensions of evaluation criteria, Product Evaluation on the basis of different design criteria like testability, reusability, functionality, Value engineering/ analysis, robust design, etc.	**8**
Unit 5 Product Costing	**8**

Mathematics of Time Value of Money, Cost Comparison, Depreciation, Taxes, Inflation, Profitability of Investment and Investment Decision Analysis Sensitivity Analysis. Methods of Cost Estimates. Creative thinking, Ergonomics in Design.	
Unit 6 Rapid Prototyping Product Development Cycle and Importance of Prototyping, Types of Prototypes, Principle and Advantages & Different Type of Generative Manufacturing Process, Viz, Stereolithography, FDM, SLS etc. Factors Concerning to RP: Consideration for Adoptions, Advantages, Accuracy and Economic Considerations	**7**

Book for reference:

1. Dieter George E. "Engineering Design", McGraw Hill Pub. Company, 2000
2. Ulirich Karl T. and Eppinger Steven D., "Product Design and Development" McGraw Hill Pub. Company, 1995.
3. Bralla, James G., "Handbook of Product Design for Manufacturing" McGraw Hill Pub. Company, 1986
4. HARRY NYSTROM, " Creativity and innovation", John Wiley & Sons, 1979.
5. BRAIN TWISS, " Managing technological innovation", Pitman Publishing Ltd., 1992.
6. HARRY B.WATTON, " New Product Planning ", Prentice Hall Inc. 1992.
7. P.N.KHANDWALLA - " Fourth Eye (Excellence through Creativity) – Wheeler Publishing ",Allahabad, 1992.
8. I.P.R. Bulletins, TIFAC, New Delhi,A.K. Chitale and R. C. Gupta, Product Design and

VII Semester

CSD2431: PE-4 : Mobile Computing

Objective	Course Outcome
The student should be able to 1. Student will be able to study evolution of wireless telecom system. 2. Student will be able to study the concepts employed in wireless LAN systems and Protocol Architecture. 3. Student will be able to study the Ad Hoc networks and new trends in Mobile/wireless communication. 4. Student will be able to study the TCP and Mobile IP concepts.	**On completion of this course, the student will beable to** 1. Understand different wireless mobilearchitecture. 2. Understand control mechanism and RadioInterfaces. 3. Understand the concepts of Adhoc Network. 4. Understand the need and the trend towardmobility.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO	Understand different wireless mobile architecture	3	3												
CO	Understand control mechanism and Radio Interfaces.	3													
CO	Understand the concepts of Adhoc Network.	3		2											

CO	Understand the need and the trend toward mobility	**3**				**2**									

Unit No	Contents	Max Hrs.
1	Review of radio transmission, antennas, modulation & demodulation, Radio propagation. Concept of cellular working, Multiplexing in space, frequency time, Code division multiplexing, Spread spectrum medium access methods.	6
2	Wireless telecom Systems: Evolution, study of 2G system GSM. Network architecture, radio interface, System's internal interfaces, role of VLRs & HLRs. Handover algorithms, security, Operation Maintenance systems	6
3	3G Systems & beyond : Evolution towards 3G systems based on GSM & CDMA networks. Radio interface, system internal functioning, handover scenarios, security,	6
4	Wireless LAN systems : Medium access control mechanism in 802.11 networks. Radio interface, protocol architecture.	5
5	Mobile adhoc networks. Networking with a view of 4G Wireless Imperatives and Challenges ,Algorithms for routing & overall network function. Mobile satellite networks.	6
6	Support for mobility : Mobile IP, TCP for mobile hosts. Other developments in the TCP/IP stack for mobility support, Introduction to IoT, Introduction to 5G Technology.	5

Text Books			
SN	**Title**	**Authors**	**Publisher**
1	Mobile Communications	J.Schiller	Pearson Education
2	Mobile and Personal Communication Systems & Services	Raj Pandya	Prentice Hall

Reference Books			
SN	**Title**	**Authors**	**Publisher**
1	Mobile Ad Hoc Networking	Stefano Basagni,Marco Conti	Wiley India Edition

VII Semester

CSD2432 : PE-4 : Information Retrieval

Unit 1
Introduction to Information retrieval
Information retrieval process, Indexing, Information Retrieval model, Boolean retieval model
Dictionary and Postings
Tokenization, Stop words, Stemming, Invertedindex, Skip pointers, Phrase queries
Unit 2
Tolerant Retrieval
Wild card queries, Permuterm index, Bigram index,Spelling correction, Edit distance, Jaccard coefficient, Soundex
Term Weighting and Vector Space Model
Wild card queries, Permuterm index, Bigram index,Spelling correction, Edit distance, Jaccard coefficient, Soundex

Unit 3
Evaluation Precision, Recall, F-measure, E-measure,Normalized recall, Evaluation problems Latent Semantic Indexing Eigen vectors, Singular value decomposition, Lowrank approximation, Problems with Lexical Semantics

Unit 4
Query Expansion Relevance feedback, Rocchio algorithm,Probabilistic relevance feedback, Query Expansionand its types, Query drift
Probabilistic Information Retrieval
Probabilistic relavance feedback, Probability ranking principle, Binary Independence Model, Bayesian network for text retrieval

Unit 5
XML Indexing and Search
Data vs. Text-centric XML, Text-Centric XML retrieval, Structural terms Content Based Image Retrieval Introduction to content Based Image retrieval,Challenges in Image retrieval, Image representation, Indexing and retrieving images, Relevance feedback
Unit 6 Projects

Books:
1. **Introduction to Information Retrieval** by Christopher D. Manning
2. **Natural Language Processing And Information Retrieval** by *Tanveer Siddiqui and U. S. Tiwary*

VII Semester
CSD2433- PE-4 - Image & Video Processing

Objective	Course Outcome
The student should be able to 5) Provide an understanding of the theory behind various image and video processing techniques 6) Provide practical experience in accomplishing image and video processing tasks 7) introduce new concepts unique to spatio-temporal data such as timeline, motion, occlusions, etc	**On completion of this course, the student will be able to** 1) Demonstrate the understanding of image and video processing techniques 8) Apply edge detection, image segmentation,spatial and frequency domain image filters for image segmentation and enhancement. 9) Design image enhancement, image and video segmentation schemes, image and video filters for various applications

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO	Demonstrate the understanding of image and video processing techniques	3									3		3		
CO	Apply edge detection, image segmentation, spatial and frequency domain image filters for image		3	3							3		3		
CO	Design image enhancement, image and video segmentation schemes, image and video filters for various applications	3	3	3	3						3		3	3	3

VII Semester
CSD2433- PE-4 - Image & Video Processing

1	Digital Image Fundamentals- Simple image model, digital image formation, sampling, quantization, resolutions and representation, relationship among pixels, types of digital images. Color Image Processing: Color Representation, Chromaticity Diagram and Color Spaces, types of digital imaging and application areas. Enhancement- Point Processing: Contrast Stretching, Power-law and Gamma Transformation. Histogram Processing: Histogram Equalization and Matching.	6
2	Image Processing Techniques: Filtering- Degradation function and Noise Models, Spatial Domain Filtering: Correlation and Convolution, Smoothing Linear and Nonlinear Filters: Mean and Median Filters, Adaptive Filtering, Sharpening Linear and Nonlinear Filters: Derivative, Laplacian, Unsharp Masking, High-boost Filtering. Image Segmentation: Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation I	5
3	Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform (DCT), Discrete Wavelet transforms Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering, Butterworth and Gaussian Filtering, Unsharp Masking and High-Boost Filtering, Homomorphic Filtering, Periodic Noise Reduction and Inverse Filtering & Wiener Filtering.	5
4	Compression Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models : Lossy and Lossless, Huffmann coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEG standards	5
5	Basic Steps of Video Processing: Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation , Photometric Image formation, sampling of video signals, filtering operations	6
6	2-D Motion Estimation: Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.	6

VII Semester
CSD2433- PE-4 - Image & Video Processing

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Digital Image Processing	3rd edition	Gonzaleze and Woods	Pearson
2	Video processing and communication	1st edition	Yao wang, Joem Ostarmann and Ya – quin Zhang	PHI

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Digital video Processing		M. Tekalp	Prentice Hall International
2	Image acquisition and processing with LabVIEW,		Relf, Christopher G.	CRC press
3	Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms		Aner ozdemi	John Wiley & Sons
4	Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab		Chris Solomon, Toby Breckon	John Wiley & Sons,
5	Computer and Robot Vision	Vol I, II,	Robert Haralick and Linda Shapiro	Addison-Wesley, 1993.

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VII Semester
CSD2434-PE-4 - Computer Vision

Objective	Course Outcome
The student should be able to	**On completion of this course, the student will be able to**
1) To build an understanding on detailed models of image formation. 2) To expose the students to image feature detection and matching. 3) To introduce fundamental algorithms for pattern recognition. 4) To introduce various classification techniques. 5) To expose the students to various structural pattern recognition and feature extraction techniques.	1) Appreciate the detailed models of image formation. 2) Analyse the techniques for image feature detection and matching. 3) Apply various algorithms for pattern recognition. 4) Examine various clustering algorithms. 5) Analyze structural pattern recognition and feature extraction techniques.

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO		3	3												
CO		3	3	3											
CO		3	3	2											
CO		3	3	3											

VII Semester
CSD2434 - PE-4 - Computer Vision

Unit	Contents	Max.
1	Image formation and Image model- Components of a vision system- Cameras- camera model and camera calibration- Radiometry- Light in space- Light in surface - Sources, shadows and shading.	6
2	Multiple images-The Geometry of multiple views- Stereopsis- Affine structure from motion- Elements of Affine Geometry Affine structure and motion from two images- Affine structure and motion from multiple images- From Affine to Euclidean images.	5
3	High level vision- Geometric methods- Model based vision- Obtaining hypothesis by pose consistency, pose clustering and using Invariants, Verification.	5
4	Introduction to pattern and classification, supervised and unsupervised learning, Clustering Vs classification, Bayesian Decision Theory- Minimum error rate classification Classifiers, discriminant functions, decision surfaces- The normal density and discriminant-functions for the Normal density.	5
5	**Linear discriminant based classifiers and tree classifiers** Linear discriminant function based classifiers- Perceptron- Minimum Mean Squared Error (MME) method, Support Vector machine, Decision Trees: CART, ID3.	6
6	**Unsupervised Methods** Basics of Clustering; similarity / dissimilarity measures; clustering criteria. Different distance functions and similarity measures, K-means algorithm. **Recent Advances in Pattern Recognition** Neural network structures for pattern recognition, Pattern classification using Genetic Algorithms.	6

VII Semester
CSD2434 -PE-4 - Computer Vision

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Computer vision and Applications		Bernd Jahne and Horst HauBecker	Academic press, 2000.
2.	David A. Forsyth & Jean Ponce		Computer vision – A Modern Approach	Prentice Hall, 2002.

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Multiple View Geometry in Computer Vision	Second Edition	Richard Hartley and Andrew Zisserman	Cambridge University Press, 2004.

VII Semester
CSD2441 - PE-5- Spatial Computing

Objective	Course Outcome
The student should be able to	**On completion of this course, the student will be able to**
10) To distinguish traditional relational data and spatial data. 11) To apply relevant spatial data mining techniques to solve a variety of spatial problems. 12) • To apply spatial and temporal analysis to real world problem	5) Become familiar with technologies used in spatial and temporal data. 6) Use advanced technologies to build applications combined with geographical data. 7) Be familiar with tools and technologies to evaluate and compare systems.

CO	Statement	Mapped PO											PSO	
		PO	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO11	PO1	PSO	PS
CO	Become familiar with technologies used in spatial and temporal data.	3	3	3									2		
CO	Use advanced technologies to build applications combined with geographical data.	3	3	3									2		
CO	Be familiar with tools and technologies to evaluate and compare systems.	3	3	3									2		

VII Semester
CSD2441 - PE-5- Spatial Computing

Unit	Contents	Max.
1	Introduction: Geo-spatial science, systems and services, spatial concepts and data models: field vs object based, spatial query languages. Fundamental spatial algorithms: space filling curves, vornoi diagrams.	6
2	Spatial storage and indexing: Grid files, Quad trees and R-trees, query processing, join strategies, and optimization. Spatial networks: conceptual, logical and physical level design issues, temporal databases, time domain, granularity, temporal data models and extensions of SQL, Sequenced semantics	5
3	Spatial databases, Query processing in spatial network databases, spatial data mining: classification, association and clustering. Spatial statistics: hot-spot and distributions using Arc. Conceptualization of spatial relationships: spatial autocorrelation by distance, autocorrelation, nearest neighbor, hot-spot analysis.	5
4	Exploratory regression, OLS, Geographically weighted regression, Spatial computing systems: Geographic Information Systems: Open Source GRASS GIS, ESRI ArcGIS family.	5
5	Database Management Systems: PostgreSQL, PostGIS, IBM DB2 Spatial Extender, MS SQL Server Spatial. Spatial data mining platforms: R, standards opengeospatial.org, ISO TC 211. Spatial analysis in networks. Spatio-temporal computing: techniques of spatial and temporal analysis, point patterns, geostatistics, spectral analysis, wavelet analysis, interpolation, and mapping.	6
6	Spatial information services: virtual globes, location based services, enterprise consulting. Application programming interfaces: HTML5 Geolocation API, Google Maps API, Bing Maps API, Flickr location API, Twitter location API.	6

VII Semester
CSD2441 - PE-5- Spatial Computing

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Spatial Analysis: Modeling in a GIS Environment	1st	Paul Longley and Michael Batty	Wiley

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	CyberGIS for Geospatial Discovery and Innovation by Shaowen Wang	1st	Michael F. Goodchild,	Springer
2	Spatial Databases: A Tour by,	1st	Shashi Shekhar and Sanjay Chawla	Pearson.

VII Semester
CSD2442 - PE-5- Artificial Intelligence

Objective	Course Outcome
The student should be able to 1. Familiarity with AI and fundamental problem solving using AI 2. Understand the strengths and limitations of Various state-space search algorithms, and choose the appropriate algorithm for a problem. 3. Ability to implement and evaluate intelligent agents for representative AI problems – e.g., constraint satisfaction, automated theorem proving, etc. 4. Represent domain knowledge in propositional and first-order logic and in various knowledge represent 5. Ability to design intelligent agents for problem solving, reasoning, planning, and decision making. 6. Understand probabilistic reasoning techniques and use them to solve problems with noise, incomplete information, and uncertainty.	**On completion of this course, the student will be able to** 1. Students will able to understand basics of AI, apply and choose proper state space search algorithm for the given problem (1 & 2) 2. Students will able to make intelligent choices from among available algorithms and knowledge representation schemes subject to specific design and performance constraints. (3 & 4) 3. Students will able to solve problems with appropriate algorithms, perform its implementation and their experimental evaluation for incomplete and/or uncertain information (5 & 6)

CO	Statement	Mapped PO											PSO	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO	Students will able to understand basics of AI, apply and choose proper state space search algorithm for the given problem	3	3	3	3	2									2
CO	Students will able to make intelligent choices from among available algorithms and knowledge representation	3	3	3	3	2									2

	schemes subject to specific design and performance constraints.														
CO	Students will able to solve problems with appropriate algorithms, perform its implementation and their experimental evaluation for incomplete and/or uncertain information	3	3	3	3	2	3								2
		3	3	3	3	2	1								2

VII Semester
CSD2442 - PE-5 Artificial Intelligence

Unit	Contents	Max.
1	Introduction: -: What is AI?, History, Overview, Intelligent Agents, Performance Measure, Rationality, structure of agents, problem solving agents, Problem Formulation, searching for solutions – uniformed search	[08
2	Informed (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, Genetic Algorithms, Online search	[09
3	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, Games that include an Element of Chance	[09
4	Knowledge Based Agents: Logic, Propositional Logic, Inference, Equivalence, Validity and Satisfiability, Resolution, Forward and Backward Chaining, Local search algorithms, First Order Logic, Models for first order logic, Symbols and Interpretations, Terms, Atomic sentences, complex sentences, Quantifiers, Inference in FOL, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.	[08
5	Planning, Language of planning problems, planning with state-space search, forward and backward state-space search, Heuristics for state-space search, partial order planning, planning graphs, planning with propositional logic	[07

6	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 and Approximate inference in Bayesian Networks. Introduction to machine learning	[08

Text Books

SN	Title	Edition	Authors	Publisher
1	Artificial Intelligence a Modern Approach		Russel and Norvig	Pearson Education, 2nd edition
2	Artificial Intelligence – A Practical Approach		Patterson	Tata McGraw Hill, 3rd edition

Reference Books

SN	Title	Edition	Authors	Publisher
1	Artificial Intelligence		E.Rich and K.Knight	McGraw-Hill, 2nd edition
2	Introduction to Artificial Intelligence & Expert System		D.W Patterson	PHI, 2nd edition
3	Principles of Artificial Intelligence		N.J Nilsson	Narosa
4	Artificial Intelligence		George F. Lugar	Pearson Education, 4th edition

VII Semester
CSD2443 - PE-5- Cloud Computing

Course Learning Objective	Course Outcomes
1. To study the different Computing Systems with the comprehensive and in-depth knowledge of Cloud Computing. 2. To study the basics of Cloud Computing Concepts and Technology 3. To study the Cloud Computing architecture and its applications, Fundamental issues and Technologies. 4. To Study of Cloud application design considerations and its methodology 5. To Study basics of Cloud Computing Security mechanisms. 6. To Study applications of Hadoop and MapReduce in Cloud Computing	After completion of the Course Students will be able to CO1: Understand the different computing paradigm, analyze and apply cloud computing services, deployment model for building cloud CO2: Apply the concepts and techniques in cloud computing CO3: Analyze the problems and apply design considerations for cloud application CO4: Provide the appropriate cloud computing solutions for building cloud application

Unit	Contents	Max.
1	Overview of Computing Paradigm, Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Evolution of cloud computing, Business driver for adopting cloud computing, Introduction to Cloud Computing, Cloud Computing (NIST Model), History of Cloud Computing, Cloud service providers, Properties, Characteristics & Disadvantages of Cloud Computing, Benefits of Cloud Computing, Role of Open Standards.	[07
2	Cloud Computing Architecture, Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models (XaaS), Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS). Deployment Models, Public cloud Private cloud, Hybrid cloud, Community cloud	[08

3	Virtualization Technology: Fundamental concepts of compute, storage, networking, desktop and Application virtualization. Types of Virtualization, Virtualization benefits, server virtualization, Block and file level storage virtualization, Hypervisors, Hypervisor management software, Infrastructure Requirements, Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits.	[07
4	Service Management in Cloud Computing, Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data: Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing	[07
5	Cloud Security, Infrastructure Security: Network level security, Host level security, Application level security, Data security and Storage: Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations	[07
6	Case Study on Open Source & Commercial Clouds: Google App Engine, Microsoft Azure, Amazon EC2	[06

VII Semester
CSD2443 -PE-5- Cloud Computing

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Cloud Computing Bible		Barrie Sosinsky,	Wiley-India, 2010
2	Cloud Computing: Principles and Paradigms		RajkumarBuyya, James Broberg, Andrzej M. Goscinski	WileY, 2011

Reference Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Cloud Computing: Principles, Systems and Applications,		Nikos Antonopoulos, Lee Gillam,	Springer, 2012
2	Cloud Security: A Comprehensive Guide to Secure Cloud Computing		Ronald L. Krutz, Russell Dean Vines	Wiley-India, 2010
3	"Cloud Computing"		Kumar Saurabh	Wiley Pub

VII Semester
CSD2444 - PE-5: Industry 4.0

Objective	Course Outcome
Students will: 1) Able to learn an introduction to Industry 4.0 (or the Industrial Internet) 2) Will able to understand its applications in the business world. 3) Will able to understand Business Model and Reference Architecture in Industry 4) Will gain deep insights into how smartness is being harnessed from data and appreciate what needs to be done in order to overcome some of the challenges.	After completion of this course: 1) Students will be Understand the basics of IoT and basics of Industry 4.0. 2) Students will be Understand Business Model and Reference Architecture 3) Students will be able to understand the different Business issues in Industry 4.0 and how to solve them. 4) Students will be able to understand the need of Security and Fog Computing and applications of IIoT.

Unit No.	Contents	Max. Hrs.
1	Introduction to IoT: History of IOT, Concepts, Products and Examples. IOT Paradigm, The Layering concepts of IOT, IOT Communication Model, IOT Architecture, IoT Sensing and Actuation, IoT Connectivity, IoT Networking. Introduction to Industry 4.0: History, Concept, The Journey so far: Developments in USA, Europe, China and other countries, The Fourth Revolution, Compelling Forces and Challenges for Industry 4.0, Comparison of Industry 4.0 Factory and Today's Factory, Globalization and Emerging Issues.	7
2	Basics of Industry 4.0: Cyber Physical Systems and Next Generation Sensors, Collaborative Platform and Product Life-cycle Management, Augmented Reality and Virtual Reality, Introduction to Artificial Intelligence, Big Data and Advanced Analysis, Cyber-Security in Industry 4.0, Industrial Processes, Industrial Sensing & Actuation, Industrial Internet Systems.	7
3	Business Model and Reference Architecture: IIoT-Business Models, IIoT Reference Architecture, Industrial IoT-Layers: IIoT Sensing, IIoT Processing, IIoT Communication, IIoT Networking.	6
4	Business issues in Industry 4.0:IIoT case studies, Opportunities and Challenges, Future of Works and Skills for Workers in the Industry 4.0 Era, Strategies for competing in an Industry 4.0 world	6
5	Security and Fog Computing: Cloud Computing in IIoT, Fog Computing in IIoT, Security in IIoT. Application Domains: Factories and Assembly Line, Food Industry, Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications),	7
6	Industrial IOT- Application domain: Milk Processing and Packaging Industries, Manufacturing Industries, Virtual Reality Lab, Steel Technology Lab. Facility Management, Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries. Facility Management.	7

VII Semester
CSD2444 - PE-5: Industry 4.0

Text Books				
SN	**Title**	**Edition**	**Authors**	**Publisher**
1	Industry 4.0: The Industrial Internet of Things		Alasdair Gilchrist	Apress
2	Industrial Internet of Things: Cyber manufacturing Systems		Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat	Springer

VII Semester
CSD2445 - PE-5- Additive Manufacturing

Objective:	Course outcomes:
To introduce students the basics of additive manufacturing/rapid prototyping and its applications in various fields, reverse engineering techniques. To familiarize students with different processes in rapid prototyping systems. To teach students about mechanical properties and geometric issues relating to specific rapid prototyping applications.	Upon completion of this course the student will be able to: 1. Demonstrate the knowledge of Additive Manufacturing and Rapid Prototyping technologies. 2. Describe different RP techniques. 3. Discuss fundamentals of Reverse Engineering.

UNIT	HRS
Unit 1 Introduction to Additive Manufacturing (AM) General overview Introduction to reverse engineering Traditional manufacturing vis AM Computer aided design (CAD) and manufacturing (CAM) and AM Different AM processes and relevant process physics AM process chain Application level: Direct processes – Rapid Prototyping, Rapid Tooling. Rapid Manufacturing; Indirect Processes - Indirect Prototyping. Indirect Tooling, Indirect Manufacturing	**7**
Unit 2 Materials science for AM Discussion on different materials used Use of multiple materials, multifunctional and graded materials in AM Role of solidification rate Evolution of non-equilibrium structure property relationship Grain structure and microstructure.	**7**
Unit 3 AM technologies Powder-based AM processes involving sintering and melting (selective laser sintering, shaping, and electron beam melting. involvement). Printing processes (droplet based 3D Solid-based AM processes - extrusion based fused deposition modeling object Stereo lithography Micro- and Nano-additive.	**12**
Unit4 Mathematical Model for AM Transport phenomena models: temperature, fluid flow and composition, buoyancy driven tension driven free surface flow pool) Case studies: Numerical Modeling of AM process, Powder bed melting based process, Droplet based printing process Residual stress, part fabrication time, cost, optimal orientation and optimal Defect in AM and role of transport Simulations (choice of parameter, Mo de! validation for different)	**13**
Unit5 Process selection, planning, control for AM Selection of AM technologies using decision methods, Additive manufacturing process plan: strategies and post processing. Monitoring and control of defects, transformation	**7**
UNIT-6: INTRODUCTION TO REVERSE ENGINEERING Meaning, Use, RE-The generic process, Phase of RE–scanning, Contact Scanners, Noncontact Scanners, Point Processing, Application Geometric Model, Development.	**8**

VII Semester
CSD2445 - PE-5- Additive Manufacturing

Text Books:

1. Ian Gibson, David W. Rosen, Brent Stucker , "Additive Manufacturing Technologies" ,Springer,2009 2. Chua C. K., Leong K. F., and Lim C. S., "Rapid Prototyping: Principles and Applications", Second Edition, World Scientific Publishers (2003),. 3. Patri K. Venuvinod, Weiyin Ma "Rapid Prototyping: Laser-Based and Other Technologies" Springer , 2004

Reference Books :

1. Peter D. Hilton, Hilton/Jacobs, Paul F. Jacobs, "Rapid Tooling: Technologies and Industrial Applications", CRC Press,2000. 2. Burns. M, "Automated fabrication", Prentice-Hall,1993.

CSD2405 –– Mini Project

COURSE OBJECTIVES	COURSE OUTCOME
1. To apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning. 2. To design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data. 3. To work on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively. 4. To apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices.	On successful completion of the course students will be able to: 1. Understand the knowledge gained from the various courses undergone in earlier years. 2. Able to work in team and adapt professional ethics and practice and how to write technical documents in professional style, and to demonstrate the product/software to technical audience. 3. Able to evaluate and analyze critically evaluate and analyze different sources of data available in the literature. 4. Able to learn and to apply the knowledge of tools/Technology.
Mapped Program Outcomes : 1,2,3,4,5,6,7,8,9,10,11,12 **PSO** : i,ii	

The students group will be formed by the project coordinator, based on the field of interest project guides will be allotted to the groups. Students need to carry the literature survey and implementation under the guidance of their project guides. Project groups' needs to submit a project report based on their studies. Evaluation will be done continuously and viva voce conducted at the end of the semester.

Syllabus
VIII- Semester
B. Tech. in
Computer Science and Design

		October 2021	1.0	Applicable for AY2021-22 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

VIII SEMESTER
CSD2451 – Major Project

COURSE OBJECTIVES	COURSE OUTCOME
5. To apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning. 6. To design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data. 7. To work on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively. 8. To apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices.	On successful completion of the course students will be able to: 5. Understand the knowledge gained from the various courses undergone in earlier years. 6. Able to work in team and adapt professional ethics and practice and how to write technical documents in professional style, and to demonstrate the product/software to technical audience. 7. able to evaluate and analyze critically evaluate and analyze different sources of data available in the literature. 8. able to learn and to apply the knowledge of tools/Technology.
Mapped Program Outcomes : 1,2,3,4,5,6,7,8,9,10,11,12 **PSO** : i,ii	

The students will appear for the entrance examination of industry for Internship. After selection, students will join industry for a semester as a intern and will continue the project allotted by the industry
and also will submit a project report based on their studies. Evaluation will be done continuously and viva voce conducted at the end of the semester.

VIII SEMESTER
CSD2452 - Extra-Curricular Activity Evaluation

COURSE OBJECTIVES	COURSE OUTCOME
1. To organize co-curricular activities to make competitive spirit, cooperation, leadership, diligence, punctuality, team spirits. 2. To develop creative talent, self-confidence, sense of achievement. 3. To be able to design process on environmental, social, political, ethical, health and safety. 4. To develop broad education to understand the impact of engineering solution in a global economic, environmental, society.	1. An ability to work initially as well as part of team to achieve set goals. 2. An ability to work to serve society and for betterment of society. 3. An ability to communicate with people at large.
Mapped Program Outcomes : 1,2,3,45,6,7,9,10,11	

Due credits will be given to the students based on their performance and involvement in different extra and co-curricular activities conducted within the college or by other organizations/ institutions. Due credit will also be given to the student if they are successful in different competitive examinations conducted by different organizations. The guidelines as given in academic regulations will be followed for evaluation.