



MGM UNIVERSITY, CHHATRAPATI SAMBHAJINAGAR

ACADEMIC SECTION

NOTIFICATION

No. 95/2023

17th August 2023

Enclosed Format of Curriculum Booklet




Registrar 17/8/23
Registrar
MGM University
Aurangabad

To,

All Deans and Principals / Directors / HoD's

Copy to :

1. PS of Hon'ble Chancellor - For kind information please,
2. PS of Hon'ble Vice-Chancellor
3. The Controller of Examinations
4. The ERP section
5. The Website Team
6. The Deputy Registrar (Academics)



MGM University

Chhatrapati Sambhajinagar

Name of Faculty – Engineering & Technology

Name of Institute – Institute of Information and Communication Technology

Name of Programme – B. Tech Computer Science and Engineering (Artificial Intelligence) Multidisciplinary Minor

CURRICULUM BOOKLET

(With effect from Academic year 2025-26)

MGM University
Chhatrapati Sambhajinagar

MGMUNIVERSITY

Published by –

**Academic Section,
Registrar Office,
MGM University**

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MGMUNIVERSITY

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Vision

- To ensure sustainable human development which encourages self-reliant and self-content society.
- To promote activities related to community services, social welfare and also Indian heritage and culture.
- To inculcate the culture of non-violence and truthfulness through vipassanna meditation and Gandhian Philosophy.
- To develop the culture of simple living and high thinking

Mission

- To impart state of art education and technical expertise to students and give necessary training to teachers to create a self-reliant society for future.
- To encourage students to participate in Indian and International activities in sports, literature, etc. so that future generation becomes base for free and liberal society
- To educate students in areas like Management, Finance, Human relations to inculcate philosophy of simple living and high thinking value of simple economic society.
- To inculcate a culture of non-violence and truthfulness through Vipassana.

To sustain activities of Indian culture (viz. classical dance, music and fine arts) through establishing institutes like Mahagami, Naturopathy, etc.

विद्यापीठ गीत

अत्त दिप भव भव प्रदिप भव,
 स्वरूप रूप भव हो
 ज्ञान सब्ब विज्ञान सब्ब भव,
 सब्ब दिप भव हो
 अत्ताहि अत्त नो नाथो,
 अत्ताहि अत्त नो गति
 अत्त मार्गपर अप्रमादसे है तुझे चलना
 सब्ब का कल्याण हो,
 वो कार्यकुशल करना
 सब्ब का उत्तम मंगल, पथप्रदर्शक हो
 अत्त दिप भव भव प्रदिप भव,
 स्वरूप रूप भव हो
 ज्ञान सब्ब विज्ञान सब्ब भव,
 सब्ब दिप भव हो
 बुद्धमं शरनं गच्छामि :
 धम्मं शरनं गच्छामि :
 संघं शरनं गच्छामि :

Institute of Information and Communication Technology (IICT) at a Glance

The Institute of Information and Communication Technology (IICT) offers emerging courses in Information Technology, with a focus on Internet of Things (IoT), Blockchain, and Big Data Analytics (BDA). Additionally, it provides undergraduate degrees in Artificial Intelligence & Machine Learning (B.Tech. AI and ML) and Data Science (B.Tech. Data Science). IICT also offers B. Tech CSE(AI) in collaboration with IBM. Furthermore, the department offers Master of Technology Degrees in Data Science (M.Tech. Data Science) and AI & ML (M.Tech. AI and ML) and UG Diploma in Cyber Security and Digital Forensics. Moreover, IICT offers a PhD program in IT.

Vision

IICT shall be a center of excellence fostering innovation, entrepreneurship, and technological advancement with social and global perspectives. It will develop skilled professionals and contribute to industry, research, and interdisciplinary growth.

Mission

- Empower students with human values, ethical conduct, and environmental responsibility.
- Foster interdisciplinary technocrats contributing to sustainable industrial growth.
- Promote expertise in emergent technologies through research, innovation, and industry collaboration to solve real-world challenges.
- Encourage entrepreneurship and leadership, preparing students for future challenges.

Programs offered at IICT

Undergraduate Programmes	Postgraduate Programmes	UG Diploma	PhD Programmes
B.Tech. in Information Technology	M.Tech. Data Science	Cyber Security and Digital Forensics	PhD in IT
B.Tech. in Artificial Intelligence and Machine Learning	M.Tech. AI and ML		
B.Tech. in Data Science			
B. Tech CSE(AI)			

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Name of Program – B. Tech. CSE (AI)**Duration – Four Years****Eligibility** –Passed HSC or its equivalent examination from science stream and obtained at least 45% marks (at least 40% marks, in case of Backward class categories belonging to Maharashtra State only) and the candidate should have appeared and secured non zero score in MGMU-CET 2024/MHT-CET 2024/PERA-CET 2024/JEE Mains 2024.**1. Maharashtra State Candidate**

(i) The Candidate should be an Indian National and having domicile of Maharashtra state and/or born in Maharashtra state.

(ii) Passed HSC or its equivalent examination with Physics and Mathematics as compulsory subjects along with one of the Chemistry or Biotechnology or Biology or Technical Vocational subject or Computer Science or Information Technology or Informatics Practices or Agriculture or Engineering Graphics or Business Studies, and obtained at least 45% marks (at least 40% marks, in case of Backward class categories and Persons with Disability candidates belonging to Maharashtra State only) in the above subjects taken together and the candidate should have appeared in MGMU-CET 2024/ MHT-CET 2024/ PERA CET 2024/ JEE (Main) Paper-I 2024 and should obtain non zero score in MGMU-CET 2024/ MHT-CET 2024/ PERA CET 2024/ JEE (Main) Paper-I 2024.. However, preference shall be given to the candidate obtaining non-zero positive score in MGMU-CET 2024 over the candidates who obtained non-zero score in MHT-CET 2024/ PERA CET 2024.

OR

(ii)Passed Diploma in Engineering and Technology and obtained at least 45% marks (at least 40% marks, in case of Backward class categories and Persons with Disability candidates belonging to Maharashtra State only).

2. All India Candidates

(i) The Candidate should be an Indian National.

(ii) Passed HSC or its equivalent examination with Physics and Mathematics as compulsory subjects along with one of the Chemistry or Biotechnology or Biology or Technical Vocational subject or Computer Science or Information Technology or Informatics Practices or Agriculture or Engineering Graphics or Business Studies , and obtained at least 45% marks (at least 40% marks, in case of Backward class categories and Persons with Disability candidates belonging to Maharashtra State only) in the above subjects taken together and candidate should have appeared in MGMU-CET 2024/ MHT-CET 2024/ PERA CET 2024/ JEE (Main) Paper-I 2024 and should obtain non-zero score in MGMU-CET 2024/ MHT-CET 2024/ PERA CET 2024/ JEE (Main) Paper-I 2024. However, preference shall be given to the candidate obtaining non-zero positive score in JEE Mains Paper-I over the candidates who obtained non-zero score in MGMU-CET 2024/ MHT-CET 2024/ PERA CET 2024.

OR

(ii) Passed Diploma in Engineering and Technology and obtained at least 45% marks (at least 40% marks, in case of Backward class categories and Persons with Disability candidates belonging to Maharashtra State only)

Name of Faculty: Faculty of Engineering and Technology

Name of the Department : Institute of Information and Communication Technology (IICT)

Name of the Programme: B. Tech. IT with Multidisciplinary Minor

Programme Type (UG/PG): UG

Duration: 4 Years

First Year - Semester I (Group B)												
Course Category	Course Code	Course Title	Nature of Course	No of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
BSC	APS21BSL101	Single and Multivariable Calculus	Theory	4	4	-	60	40	100	-	16	40
BSC	APS21BSL104	Engineering Chemistry	Theory	3	3	-	60	40	100	-	16	40
ESC	APS21ESL103	Engineering Mechanics	Theory	2	2	-	60	40	100	-	16	40
AEC	MGM54AEL101	Communicative English	Theory	1	1	-	30	20	50	-	8	20
ESC	ITY23ESL101	Applied Python Programming	Theory	3	3	-	60	40	100	-	16	40
VSEC	APS21VSP102	Workshop Practices	Practical	2	-	4	60	40	100	-	16	40
BSC	APS21BSP102	Engineering Chemistry Lab	Practical	1	-	2	30	20	50	-	8	20
ESC	APS21ESP104	Engineering Mechanics Lab	Practical	1	-	2	30	20	50	-	8	20
AEC	MGM54AEP101	Communicative English Lab	Practical	1	-	2	30	20	50	-	8	20
ESC	ITY23ESP101	Applied Python Programming Lab	Practical	2	-	4	30	20	50	-	8	20
CCA	MGM82CCP101 MGM82CCP102 MGM82CCP103	NCC / Yoga / Sports	Practical	2	-	4	50	-	50	20	-	20
TOTAL				22	13	18	500	300	800	-	-	-

First Year - Semester II (Group B)												
Course Category	Course Code	Course Title	Nature of Course	No of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
BSC	APS21BSL103	Linear Algebra and Differential Equations	Theory	4	4	-	60	40	100	-	16	40
BSC	APS21BSL102	Engineering Physics	Theory	3	3	-	60	40	100	-	16	40
ESC	APS21ESL102	Engineering Graphics	Theory	2	2	-	60	40	100	-	16	40
IKS	APS21IKL101	Indian Knowledge System	Theory	2	2	-	60	40	100	-	16	40
ESC	APS21ESL104	Building Programming logic in C	Theory	1	1	-	30	20	50	-	8	20
VSEC	ITY23VSL101	Design Thinking and Innovation	Theory	2	2	-	60	40	100	-	16	40
VSEC	ITY23VSP101	Design Thinking and Innovation Lab	Practical	1	-	2	30	20	50	-	8	20
BSC	APS21BSP101	Engineering Physics Lab	Practical	1	-	2	30	20	50	-	8	20
ESC	APS21ESP102	Engineering Graphics Studio	Practical	2	-	4	30	20	50	-	8	20
ESC	APS21ESP105	Building Programming logic in C Lab	Practical	1	-	2	30	20	50	-	8	20
ESC	APS21ESP103	Recent Trends in Integrated Technology	Practical	1	-	2	30	20	50	-	8	20
CCA	MGM82CCP104 MGM73CCP105 MGM73CCP106 MGM85CCP107 MGM82CCP201	NSS/ Fine Art/ Visual Art Cultural Activities Health and Wellness	Practical	2	-	4	50	-	50	20	-	20
TOTAL				22	14	16	530	320	850	-	-	-

(Semester III)												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching Contacts Hrs/week		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
PCC	ICS23PCL201	AI and ML Essentials	Lecture	3	3	-	60	40	100	-	16	40
PCC	ITY23PCL202	Data structures	Lecture	2	2	-	60	40	100	-	16	40
PCC	ITY23PCL203	Object Oriented Programming	Lecture	2	2	-	60	40	100	-	16	40
PCC	ICS23PCL202	Data Communication and Computer Network	Lecture	2	2		60	40	100	-	16	40
PCC	ITY23PCP202	Data structures Lab	Practical	1	-	2	30	20	50	-	8	20
PCC	ITY23PCP203	Object Oriented Programming Lab	Practical	1	-	2	30	20	50	-	8	20
MDM		Refer Course no.1 of selected MDM from Appendix A	Lecture	2	2	-	60	40	100	-	16	40
OE1		Refer MGMU Basket	Lecture	2	2	-	30	20	50	-	8	20
OE2		Refer MGMU Basket	Lecture	2	2		30	20	50		8	20
FP	ICS23FPJ201	Field Project	Project	1		2	50	-	50	20	-	20
EEMC	ITY23HSL201	Business Management and Financial Accounting	Lecture	2	2	-	60	40	100	-	16	40
VEC	MGM56VEL102	Constitution of India	Lecture	2	2	-	30	20	50	-	8	20
		TOTAL		22	19	6	560	340	900			

(Semester IV)												
Course Category	Course Code	Course Title	Nature of Course	Credit	Teaching Scheme		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
PCC	ITY23PCL252	Programming in JAVA	Lecture	2	2		60	40	100	-	16	40
PCC	ICS23PCL251	Computer Organisation and Architecture	Lecture	3	3	-	60	40	100	-	16	40
PCC	ICS23PCL252	ML Engineering	Lecture	3	3	-	60	40	100	-	16	40
PCC	ITY23PCP252	Programming in JAVA– Lab	Practical	1	-	2	30	20	50	-	8	20
PCC	ICS23PCP252	ML Engineering - Lab	Practical	1	-	2	30	20	50	-	8	20
MDM		Refer Course no.2 of selected MDM from Appendix A	Lecture	2	2	-	60	40	100	-	16	40
OE3		Refer MGMU Basket	Lecture	2	2	-	30	20	50	-	8	20
VSEC	ICS23VSP251	Mini Project 1	Project	2	-	4	30	20	50	-	8	20
EEMC	ITY23HSL252	Entrepreneurship Development	Lecture	2	2	-	60	40	100	-	16	40
VEC	MGM21VEL101	Environmental Studies	Lecture	2	2	-	30	20	50	-	8	20
AEC		Refer MGMU Basket	Lecture	2	2	-	30	20	50	-	8	20
		TOTAL		22	18	8	480	320	800			

Semester V												
Course Category	Course Code	Course Title	Nature of Course	Credit	Teaching Scheme		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
PCC	ITY23PCL301	Design and Analysis of Algorithms	Lecture	3	3	-	60	40	100	-	16	40
PCC	ICS23PCL301	Deep Learning	Lecture	3	3	-	60	40	100	-	16	40
PCC	ITY23PCL303	Database Management Systems	Lecture	2	2	-	60	40	100	-	16	40
PCC	ITY23PCP301	Design and Analysis of Algorithms – Lab	Practical	1	-	2	30	20	50	-	8	20
PCC	ICS23PCP301	Deep Learning - Lab	Practical	1	-	2	30	20	50	-	8	20
PCC	ITY23PCP303	Database Management Systems – Lab	Practical	1	-	2	30	20	50	-	8	20
VSEC	ICS23VSP301	Mini Project 3	Project	1	-	2	30	20	50	-	8	20
Program Elective - I												
PEC	ITY23PEL301	Basics of blockchain	Lecture	3	3	-	60	40	100	-	16	40
	AIM23PEL302	Mathematical Foundation for Cyber Security										
	ICS23PEL301	Introduction to Data Science										
PEC	ITY23PEP301	Basics of Blockchain Lab	Practical	1	-	2	30	20	50	-	8	20
	AIM23PEP302	Mathematical Foundation for Cyber Security Lab										
	ICS23PEP301	Introduction to Data Science Lab										
MDM		Refer Course no.3 of selected MDM from Appendix A	Lecture	4	4	-	60	40	100	-	16	40
OE4		Refer MGMU Basket	Lecture	2	2	-	30	20	50	-	8	20
		TOTAL		22	17	10	480	320	800			

Semester VI												
Course Category	Course Code	Course Title	Nature of Course	Credit	Teaching Scheme		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
PCC	ICS23PCL351	Computer Vision	Lecture	3	3	-	60	40	100	-	16	40
PCC	ITY23PCL352	Theory of Computation	Lecture	3	3	-	60	40	100	-	16	40
PCC	ITY23PCL353	Operating Systems	Lecture	2	2	-	60	40	100	-	16	40
PCC	ICS23PCP351	Computer Vision - Lab	Practical	1	-	2	30	20	50	-	8	20
PCC	ITY23PCP353	Operating Systems- Lab	Practical	1	-	2	30	20	50	-	8	20
Program Elective - II												
PEC	ITY23PEL351	Smart Contract	Lecture	3	3	-	60	40	100	-	16	40
	AIM23PEL352	Cryptography and Data Compression										
	ICS23PEL351	Computational Data analytics										
PEC	ITY23PEP351	Smart Contract - Lab	Practical	1	-	2	30	20	50	-	8	20
	AIM23PEP352	Cryptography and Data Compression Lab										
	ICS23PEP351	Computational Data analytics Lab										
Program Elective - III												
PEC	ITY23PEL354	Decentralized Applications	Lecture	3	3	-	60	40	100	-	16	40
	AIM23PEL354	Steganography and Digital Watermarking										
	ICS23PEL352	Analysing, Visualizing and Applying data science with python										
PEC	ITY23PEP354	Decentralized Applications-Lab	Practical	1	-	2	30	20	50	-	8	20
	AIM23PEP354	Steganography and Digital Watermarking Lab										
	ICS23PEP352	Analysing, Visualizing and Applying data science with python Lab										
MDM		Refer Course no.4 of selected MDM from Appendix A	Lecture	2	2	-	60	40	100	-	16	40
VSEC	ITY23VSP301	Mobile Application Development	Practical	2	-	4	30	20	50	-	8	20
TOTAL				22	16	12	510	340	850			

Semester VII												
Course Category	Course Code	Course Title	Nature of Course	Credit	Teaching Scheme		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
PCC	ICS23PCL401	Applied Large Language Model Development and Deployment	Lecture	3	3	-	60	40	100	-	16	40
PCC	ITY23PCL402	Cloud Computing	Lecture	2	2	-	60	40	100	-	16	40
PCC	ICS23PCP401	Applied Large Language Model Development and Deployment	Practical	1	-	2	30	20	50	-	8	20
PCC	ITY23PCP402	Cloud Computing Lab	Practical	1	-	2	30	20	50	-	8	20
MDM		Course no.5 of selected MDM	Lecture	2	2	-	60	40	100	-	16	40
PCC	ICS23PCL402	Explainable AI	Lecture	3	3	-	60	40	100	-	16	40
PCC	ICS23PCP402	Explainable AI- Lab	Practical	1	-	2	30	20	50	-	8	20
MDM		Course no.6 of selected MDM	Practical	2		4	30	20	50	-	8	20
RM	MGM21RML401	Research Methodology	Lecture	4	4	-	60	40	100	-	16	40
RP	ITY23RPJ401	Project	Project	4	-	8	60	40	100	-	16	40
				23	14	18	480	320	800			

Semester VIII												
Course Category	Course Code	Course Title	Nature of Course	Credit	Teaching Scheme		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
Program Elective - IV												
PEC	ITY23PEL451	A. Blockchain Platforms	Lecture	4	4	-	60	40	100	-	16	40
PEC	AIM23PEL452	B. Cyber Security and Digital Forensics										
PEC	ICS23PEL451	C. Web Data Mining										
Program Elective - V												
PEC	ITY23PEL454	Blockchain Security and Applications	Lecture	4	4		60	40	100	-	16	40
PEC	AIM23PEL453	IPR										
PEC	ICS23PEL452	Data Science Applications										
OJT/RP	ITY23JTI451 / ITY23RPJ451/	Internship/ Major Project	Internship	12	-	24	100	50	150	-	20	60
				20	8	24	220	130	350			

Semester I

Course code: APS21BSL101	Course name: Single Variable Calculus	Course category:
Basic Science		
Credits: 4 Teaching scheme: L-4 hrs/week Evaluation scheme: CA-60, ESE-40		
Duration of External Examination- 2 Hrs		
Pre-requisites: Pre-university mathematics.		
Course Objectives:		
1. To develop mathematical models using standard functions.		
2. To determine derivatives of function.		
Course Outcomes: At the end of the course, the students will be able to -		
CO1: Represent function verbally, numerically, visually, algebraically and formulate a mathematical model using standard functions.		
CO2: Find Limit of functions and use limit to find tangents and velocities which gives rise to derivative.		
CO3: Trace the Cartesian curve, Parametric curve and Polar curve. Find arc length, area, volume and surface area using integrals.		
CO4: Solve ordinary differential equations analytically and numerically and apply these methods to solve engineering problems.		

Contents –

Unit	Contents	Teaching Hours
1	Differentiation and its Applications Limit ,Continuity and Differentiation, Rate of Change in sciences and Engineering, Chain Rule and implicit differentiation, Related rates, Extreme value theorem, Rolle’s Theorem, Lagrange’s Mean value theorems, Nth derivatives, Taylor and Maclaurin series Expansions, Linear approximations and Differentials.	10
2	Integration and its Applications Integration, Reduction formulae, Beta and gamma function, Properties, Evaluation of integrals using Beta and gamma functions, Application of Definite integrals to volume, arc length, surface of revolution, Work and Fluid Forces..	10
3	Partial Differentiation and its Applications Limit and Continuity, Partial derivatives of first and higher orders, Total differentials, Errors and Approximations, Total derivative, Extreme values and saddle points, Method of Lagrange multipliers, Jacobians, Vector differentiation, Gradient, Curl and Divergence, directional derivatives.	10
4	Multiple Integrals and its Applications Double integrals ,Evaluation of Double integrals, Change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: Area and Volume, Root mean square value, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian),Volume by triple integration.	10
5	Vector Integration and its Applications Line integrals, Surface integrals, Green’s Theorem, Stokes Theorems, Divergence theorems	10

Text Books: 1. James Stewart, Calculus Early Transcendental, 7 th edition, Cengage.
2. George B. Thomas, Ross L. Finney, Calculus and Analytical Geometry, 9th edition, Pearson
3. Howard Anton, Irl Bivens, Stephens Davis, Calculus, 10th Edition, Wiley
Reference Books: 1. Shanti Narayan, Differential Calculus, S. Chand & Co.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, New York.
3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi.
4. P. N. Wartikar, J. N. Wartikar, Applied Mathematics (Vol I & II) , Pune Vidyarthi Griha Prakashan, Pune
5. H. K. Das and Rajnish Verma, Higher Engineering Mathematics , S. Chand & CO. Pvt. Ltd., New Delhi
6. K. D Joshi, Calculus for Scientists and Engineers, CRC Press.
7 Prasad and Reena Garg, Advanced Engineering Mathematics, Khanna Publishing Company Private Limited, New Delhi.
Online Resources: 1. NPTEL / SWAYAM lectures.

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Semester-I

Course code: APS21BSL104 Course name: Engineering Chemistry Course category: Basic Science
Credits: 3 Teaching scheme: L-3hrs/week Evaluation scheme: CA-60, ESE-40
Duration of External Examination- 2 Hrs
Pre-requisites: Fundamentals of basic chemistry.
Course Type: - Basic Science Course
Course Objectives:
1. To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.
2. To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.
3. The objectives of the laboratory sessions are to enable the learners to get hands-on experience on the principles discussed in theory sessions and to recognize the applications of these concepts in engineering.
Course Outcomes: At the end of the course, the students will be able to -
CO1: Illustrate the water quality parameters, water softening processes and causes of hard water in industries.
CO2: Analyze Demonstrate a comprehensive understanding of advanced concepts in polymer chemistry
CO3: Apply fundamental concepts of corrosion science to solve problems arising in engineering applications
CO4: Interpret physical, chemical properties and applications of fuels and lubricants.
CO5: Describe the functions of batteries and applications of modern instrumental techniques like conductometry, pH metry, TLC, gas chromatography, UV-Visible and IR spectroscopy.

Contents –

Unit	Content	Teaching hours
1	Water Treatment - Natural sources of water, Impurities in water, Water quality parameters and its BIS standards, Hardness- Definition, Types, Estimation of hardness by EDTA method, Numerical based on hardness calculation, Disadvantages of hard water, Boiler troubles (causes, effect on boiler operation and methods of prevention), Internal and external treatments, Alkalinity and its determination, Water softening: Ion exchange process, Sewage water analysis- Dissolved oxygen (DO) and its determination, Biological oxygen demand (BOD), Chemical oxygen demand (COD) and their significance, Sewage water treatment.	9
2	Polymer Chemistry Introduction, Classification of polymers, Use and disposal of polymers, Polymerization and its types, Plastics and its types- Thermoplastic and thermosetting plastics, Preparation, properties and engineering applications of: PVC, PMMA, Bakelite and Epoxy resin, Molding constituents of plastics, Methods for molding of plastics into articles, Conducting polymers and Biopolymers (Introduction, types, examples and its applications).	8
3	Corrosion and its Control Introduction, Types of corrosion, Mechanism of dry & wet corrosion, Factors influencing on corrosion – Nature of metal & Nature of environment. Methods of corrosion control, Cathodic and anodic protection, Use of Inhibitors, Protective Coatings: a) Metallic coatings: Types of coatings methods of applications, (hot dipping, cladding and electroplating), b) Nonmetallic coatings: Chemical conversion coatings, Powder coatings.	8

4	<p>Fuels and Lubricants Fuels: Introduction, Classification of fuel, Calorific value of a fuel, Characteristics of a good fuel, Solid fuel- Coal, Various types of Coal, Analysis of coal- Proximate and Ultimate analysis, Numerical based on analysis of coals, Liquid fuel- Refining of Petroleum, Gaseous fuels- LPG and CNG.</p> <p>Lubricants: Introduction, Mechanism of lubrication, Classification of lubricants, Solid, Semi-solid and Liquid Lubricants, Properties of lubricants, Physical properties – Viscosity & Viscosity index, Surface tension, Flash and Fire point, Cloud and pour point. Chemical properties – Acid value, Saponification value, Aniline point.</p>	10
5	<p>Electrochemistry and Instrumental Methods of Chemical Analysis</p> <p>Electrochemistry: Introduction - Basic concepts: Conductance, Specific Conductance, Equivalent conductance, Molecular conductance, Effect of dilution on conductance, Cell constant. Battery: Primary & secondary batteries, Ni-Cd cell, Lithium-air battery, Fuel cell- H₂-O₂ Cell.</p> <p>Instrumental Methods of Chemical Analysis: Basic principle, instrumentation and applications of pH metry, Conductometry, Thin layer chromatography, Gas Chromatography, Ultraviolet-Visible spectroscopy and Infra-Red Spectroscopy.</p>	10

<p>Text Books: 1. Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi</p>	
<p>2. O. G. Palanna, Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.</p>	
<p>3. S. S. Dara, A textbook of Engineering Chemistry, McGraw-Hill Publication, New Delhi.</p>	
<p>4. Shashi Chawla, Engineering Chemistry, Dhanpat Rai and Co Education and Technical Publishers.</p>	
<p>5. Shikha Agrawal, Engineering Chemistry- Fundamentals and Applications, Cambridge Publishers</p>	
<p>Reference Books: 1. Barrow G.M., Physical Chemistry, McGraw-Hill Publication, New Delhi</p>	
<p>2. Atkins, Physical Chemistry, OUP Oxford</p>	
<p>3. Bhal & Tuli, Text book of Physical Chemistry, S. Chand & Company, New Delhi..</p>	
<p>4. V. R Gowarikar, Polymer Science, New Age International Ltd</p>	
<p>5. B. K. Sharma, Instrumental Methods of Chemical Analysis, Krishna Prakashan Medi</p>	
<p>E-Resources: Name of the website/ E-Journals/ Online Videos</p>	
<p>4. NPTEL Basic Courses Engineering Chemistry (https://nptel.ac.in/courses/122/101/122101001/)</p>	
<p>5. https://www.ncertbooks.guru/engineering-chemistry/</p>	
<p>6. Coursera Chemistry Courses (https://www.coursera.org/browse/physical-science-and-engineering/chemistry?languages=en&page=2)</p>	

7. "Introduction to Polymer Physics" NPTEL Course
(<https://www.youtube.com/playlist?list=PLwdnzlV3ogoXe67WsgE8f1fOIWcc5GKKS>)
8. "Introduction to Corrosion" NPTEL Course
(<https://www.youtube.com/playlist?list=PL8lylDWRkaW8BXestE4baRnN0699S11Lq>)
9. "Tribology & Lubrication" NPTEL Course (<https://www.youtube.com/playlist?list=PLLwnvFq-JAltJvWafEVU4gcUK27hEA7FD>)
10. "Electrochemistry" NPTEL Course
(https://www.youtube.com/playlist?list=PLVFqK_9GOGXnnriQpsn0z1Rss96Rh0vsm)
11. "Modern Instrumental Methods of Analysis" NPTEL Course
(<https://www.youtube.com/playlist?list=PL400CAFBA72E94CF8>)

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Semester-I

Course code: APS21ESL103	Course name: Engineering Mechanics	Course category: ESC
Credits: 2	Teaching scheme: L-2 hrs/week	Evaluation scheme: CA-60, ESE-40
Duration of External Examination-2 Hrs		
Pre-requisites:		
Coordinate Geometry, Trigonometry, Sine & Cosine Rule, Unit Conversions.		
Fundamentals of Physics		
Course Type:- Basic Science Course		
Course Objectives:		
1.This course aims to make the students become familiar with the basic concepts of linear algebra with a thorough understanding of vector spaces, linear transformations and matrix operations enhancing the students' ability to reason mathematically and able to apply this knowledge to many fields in engineering, statistics and computer science.		
2. To create and analyze mathematical models using differential equations		
Course Outcomes: At the end of the course, the students will be able to -		
CO1: Identify the force system for given conditions by applying the basics of mechanics.		
CO2: Determine the unknown forces of different engineering systems by applying equilibrium conditions.		
CO3: Apply the principles of friction and to locate Center of Gravity and find Moment of Inertia of plane lamina		
CO4: Establish the relations between kinematic parameters for different types of motion.		
CO5: Formulate the relevant equations for types of motion in kinetics.		

Contents –

Unit	Content	Teaching hours
1	Force System Introduction to Mechanics, Laws of mechanics, Newton's Laws, Law of Parallelogram, Law of transmissibility, Characteristics of force, System of Forces, Method of resolution and composition moment of a force, Law of Moments, Varignon's Theorem, Problems on moment, Resultant, Equivalent force& couple, properties of couple.	8
2	Equilibrium Introduction to Equilibrium and its types, Equilibrant, Concept of FBD, Analytical conditions of equilibrium, Equilibrium of different force system, Lami's Theorem, Types of loads, beams and supports..	7
3	Friction, Centre of Gravity and Moment of Inertia Friction: Introduction to friction, types and application, Laws of friction, Angle of friction, Angle of repose, Cone of friction, Problems on horizontal & inclined plane, block, and ladder. CG & MI: Centroid of regular and composite plane lamina, MI and its application, Perpendicular axis Theorem, Parallel Axis Theorem, Radius of Gyration, Problems on plane and composite lamina.	8

4	Kinematics Introduction and classification of dynamics motion and its classification, Rectilinear Motion Equation of Motion, Motion curves, Curvilinear Motion, rectangular and tangential components of acceleration, Projectile Motion: General Equation of Projectile Motion.	4
5	Kinetics Applications Basic concepts and laws of motion, D'Alemberts Principle, Problems on rectilinear motion Curvilinear motion, Work, Energy Principle, Work Done by force, Work Done by weight force, Work Done by frictional force, Work Done by spring force, Kinetic and Potential energy of the particle Problems on all cases of Work Done, Principle of Impulse and Momentum, Principle of Conservation Momentum, Impact and its types, Coefficient of restitution, Problems on impact Problems on impulse and momentum, Kinetics of rigid body problems	3

Text Books: 1 Beer, F.P and Johnston Jr. E.R., “Vector Mechanics for Engineers (In SI Units): Statics and Dynamics”, 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).	
2 Vela Murali, “Engineering Mechanics”, Oxford University Press (2010).	
3. S. Timoshenko, D. H. Young, “Engineering Mechanics”, McGraw Hill, 1995.	
4. Tayal A. K., “Engineering Mechanics”, Umesh Publications, 2010	
5. Singer F. L., “Engineering Mechanics - Statics & Dynamics”, Harper and Row Pub. York.	
6. Khurmi R. S., “Engineering Mechanics”, S. Chand Publications, N. Delhi.	
Reference Books:	
1. McLean, Nelson, "Engineering Mechanics", Schaum's outline Series, McGraw Hill Book Company, N. Delhi, Publication.	
2. Hibbeler, R.C and Ashok Gupta, “Engineering Mechanics: Statics and Dynamics”, 11th Edition, Pearson Education (2010).	
3. Bhavikatti, S.S and Rajashekarappa, K.G., “Engineering Mechanics”, New Age International (P) Limited Publishers, (1998).	
4. Irving H. Shames and Krishna Mohana Rao. G., “Engineering Mechanics – Statics and Dynamics”, 4th Edition, Pearson Education (2006).	
5. Rajasekaran Sand Sankarasubramanian G., “Engineering Mechanics Statics and Dynamics”, 3rd Edition, Vikas Publishing House Pvt. Ltd., (2005).	
6. Meriam J.L. and Kraige L.G., “ Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2”, Third Edition, John Wiley & Sons, (1993).	
7. Kumar, K.L., “Engineering Mechanics”, 3rd Revised Edition, Tata McGraw-Hill Publishing Company, New Delhi (2008).	
E-Resources :	
1. www.nptel.ac.in (Learning platform from IIT professors)	
2. http://www.asnu.com.au (For Engineering applications)	
3. www.discoveryforengineers.com (Investigating Discoveries)	

Semester-I

Course code: MGM54AEL101 Course name: Communicative English Course category: AEC
Credits: 1 Teaching scheme: L-1hr/week Evaluation scheme: CA–30, ESE–20
Pre-requisites: Basic knowledge of English.
Duration of External Examination- 2 Hrs
Course Objectives:
1. The course aims at grooming the professional ethics of the students through various personality traits and behavioral patterns focusing on communication skills.
Course Outcomes: At the end of the course, the students will be able to -
CO1: Communicate formally with enhanced communication Competency.
CO2: Adapt professional nonverbal communication.
CO3: Construct English formal syntax and apply corporate vocabulary in written and verbal communication
CO4: Acquire listening and drafting skills with professional competency.

Contents –

Unit	Content	Teaching hours
1	Communication and Communication Process: Introduction to Communication, Forms and functions of Communication, Barriers to Communication and overcoming them, Ways of Effective Communication.	5
2	Non-verbal Communication And its types: Kinesics Occulesics Appearance roxemics Chronemics Paralanguage Qualities of effective speech.	3
3	English Grammar Overview of basic Mid-level grammar Tenses & concept of time, Sentence construction, Corporate vocabulary Difference between formal and informal sentences, phrases and words.	3
4	Listening Skills and Writing Skills Listening : Active and Passive Listening writing styles –layouts Business Letters- job application, resignation, resume .	4

Text Books: 1. Ashraf Rizvi, Communication Skills for Engineers, Tata McGraw Hill.
2. Sanjay Kumar, Pushp Lata, Communication Skills, Oxford University Press, 2016..
3. Meenakshi Raman, Sangeeta Sharma, Communication Skills, Oxford University Press, 2017
4. Teri Kwal Gamble, Michael Gamble, Communication Works, Tata McGraw Hill Education, 2010.
5. Anderson, Kenneth. Joan Maclean and Tossny Lynch. Study Speaking: A Course in Spoken English for Academic Purposes. Cambridge: CUP, 2004.
6. Bellare, Nirmala. Reading Strategies. Vols. 1 and 2. New Delhi. Oxford University Press, 1998

7. Bhasker, W. W. S & Prabhu, N. S.: English through Reading, Vols. 1 and 2. Macmillan, 1975
8. Bovee Courtland, L and Thrill, John V. Business Communication, Today McGraw Hill, New York Taxman Publication (1989).
9. Murphy, Raymond. Essential English Grammar, Cambridge: University Press (2000)
10. Hewings Martin Advanced English Grammar Cambridge: University press (2003)
11. Bansal Harrison. Spoken English

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Semester-I		
Course code: ICS23ESL101	Course name: Applied Python Programming	Course category: AEC
Credits: 3	Teaching scheme: L-3 hr/week	Evaluation scheme: CA-60, ESE-40
Pre-requisites:		
Duration of External Examination-2 Hrs		
Course Objectives:		
1. Introduce students to the Python programming language and its syntax.		
2. Cover essential programming constructs such as variables, data types, operators, and input/output operations.		
3. Explore control flow structures including conditional statements and loops for program execution.		
4. Provide an in-depth understanding of object-oriented programming principles and their application in Python.		
5. Familiarize students with error handling techniques and file input/output operations.		
6. Discuss advanced topics such as regular expressions, modules, libraries, graphical user interfaces (GUI), and web programming		
7. Enable students to apply Python programming skills in networking, data processing, analysis, and database applications		
Course Outcomes: At the end of the course, the students will be able to -		
CO1: Demonstrate proficiency in Python programming fundamentals and syntax.		
CO2: Design and develop object-oriented Python programs using classes, objects, inheritance, and encapsulation.		
CO3: Apply error handling techniques to write robust and reliable Python code.		
CO4: Utilize advanced Python features such as regular expressions, modules, and libraries for efficient programming.		
CO5: Create graphical user interfaces (GUI) and web applications using Python frameworks		
CO6: Employ Python for networking, data processing, analysis, and database-driven applications		

Contents –

Unit	Content	Teaching Hours
1	Introduction to Python Programming: Python Fundamentals, Introduction to Python, What is Python?, Python's Popularity and Use Case, Python Syntax and Structure, Python's Indentation and Block Structure, Writing Your First Python Program, Writing and Executing Python Programs, Using Python Interactive Mode (REPL), Running Python Scripts from Command Line, Python Basics, Variables and Data Types, Understanding Variables and Naming Conventions, Numeric Data Types (int, float), Text Data Type (str), Operators and Expressions, Arithmetic Operators, Comparison Operators, Logical Operators, Input and Output Operations, Using input() for User Input, Printing Output with print()	7

	<p>Control Flow and Loops</p> <p>Control Statements: Conditional Statements (if, elif, else): Simple if Statements, elif for Multiple Conditions, Logical Operators and Conditions: Using Logical AND, OR, NOT, Complex Conditions, Switch-Case (if-elif-else): Implementing Switch-Like Behavior, Loops: While Loops: Using while Loops for Iteration, Controlling Loops with break and continue, For Loops: Iterating Over Sequences (Lists, Strings), Using range() for Controlled Iteration, Loop Control Statements (break, continue): Breaking Out of a Loop, Skipping Iterations with continue</p>	7
	<p>Object-Oriented Programming (OOP) in Python</p> <p>OOP Principles: Classes and Objects: Defining Classes and Objects, Constructors and Instance Variables, Inheritance and Polymorphism: Creating Subclasses, Overriding Methods, Encapsulation and Abstraction: Access Modifiers (public, private, protected), Achieving Abstraction through Interfaces, Advanced OOP Concepts: Constructors and Destructors: Parameterized Constructors, Destructor in Python, Method Overloading and Overriding: Overloading Methods, Overriding Methods with super(), Class Variables and Instance Variables: Understanding Class Variables, Using Instance Variables</p>	6
	<p>Error Handling and Exception Handling</p> <p>Exception Handling: Introduction to Exceptions: Understanding Exceptions in Python, Common Built-in Exceptions, Handling Exceptions with try and except: Using try-except Blocks, Handling Multiple Exceptions, Custom Exceptions: Creating Custom Exception Classes, Raising Exceptions, File Handling (I/O): Reading and Writing Files: Opening and Closing Files, Reading and Writing Text Files, Working with Text and Binary Files: Reading and Writing Binary Files, Text Encoding and Decoding, File Handling Best Practices: Using 'with' Statements, Error Handling in File Operations</p>	6
	<p>Advanced Python Programming</p> <p>Regular Expressions: Introduction to Regular Expressions: What are Regular Expressions?, Use Cases for Regular Expressions, Pattern Matching and Text Processing: Matching Patterns with re Module, Extracting Data from Text, Regex in Python: Using Regular Expressions in Python, Regex Functions and Methods, Modules and Libraries: Creating and Using Modules: Writing Your Own Modules, Importing Modules, Standard Library Modules: Exploring Built-in Modules (math, datetime), Working with OS and sys Modules, Third-party Libraries and Packages: Using pip for Package Installation, Popular Third-party Libraries (requests, pandas)</p>	7
	<p>Graphical User Interfaces (GUI) and Web Programming</p> <p>GUI Development: Introduction to GUI Programming: GUI vs. Command Line Interfaces, GUI Frameworks in Python, Widgets and Event Handling: Creating Widgets (Buttons, Labels), Handling User Events (Clicks, Input), Web Programming with CGI:</p>	6

	Introduction to CGI: What is CGI and Its Purpose, CGI in Web Development, Handling HTTP Requests: Receiving and Processing Requests, Generating HTTP Responses, Building Interactive Web Applications: Form Handling with CGI, Implementing Data Processing	
	<p>Python Applications:</p> <p>Networking and Serialization: Networking Basics in Python: Introduction to Networking Protocols, Creating Client and Server Sockets, Socket Programming: Building Networked Applications, Data Transfer and Communication, Serialization (JSON and Pickle): Serialization Overview, JSON and Pickle for Data Serialization, Data Processing and Analysis: Introduction to NumPy and Pandas: What is NumPy?, Overview of Pandas, Data Manipulation with NumPy: Creating NumPy Arrays, Array Operations and Manipulation, Data Analysis with Pandas: Working with DataFrames, Data Cleaning and Exploration, Database Applications: Database Connectivity in Python: Database Management Systems (DBMS), Connecting to Databases, SQL Queries and Database Operations: Structured Query Language (SQL), Executing SQL Queries from Python, Building Database-driven Applications: Integrating Python with Databases, CRUD Operations in Database Applications</p>	6

Text Books: 1. "Python Crash Course" by Eric Matthes

2. "Automate the Boring Stuff with Python" by Al Sweigart
3. "Learning Python" by Mark Lutz
4. "Fluent Python" by Luciano Ramalho

Reference Books:

1. "Python Cookbook" by David Beazley and Brian K. Jones
2. "Effective Python: 90 Specific Ways to Write Better Python" by Brett Slatkin
3. "Python for Data Analysis" by Wes McKinney

Semester-I

Course code: APS21VSP102 Course name: Workshop Practices Course category: VSEC	
Credits: 2 Teaching scheme: P-4 hrs/week Evaluation scheme: TW-60, PR-40	
Pre-requisites: Pre-university English.	
Course Type: Vocational Skill Enhancement Course.	
Course Objectives:	
1. To know about the different carpentry tools and perform various carpentry operations to complete the job	
2. To understand different welding tools, joints, defects and perform welding operation to complete useful article/job.	
3. To learn various types of pipes, plumbing tools, operations and perform thread cutting on GI pipes.	
4. To know different sheet metal tools, operations, applications and perform various operations to complete job.	
Course Outcomes: On completion of the course, the student should be able to:	
CO1: Perform basic carpentry operation on wood and prepare carpentry article.	
CO2: Perform welding processes and prepare welding article by performing various welding operations.	
CO3: Use plumbing tools, processes and perform threading on GI pipe.	
CO4: Use sheet metal tools, processes and prepare sheet metal article .	
Contents –	
Unit	Contents
1	Carpentry Shop Carpentry shop: Types of woods, tools, joints, operations, applications, safety measures etc. Job: Exercises on wood involving operations marking, sawing, chiselling, planning, grooving etc to make useful wooden article/ job e.g. Wooden Trophies, Showpiece articles, Stools etc
2	Welding Shop Welding Shop: Types of welding, welding joints, tools, welding defects, applications, safety measures etc. Job: Exercise in Arc welding to make useful articles like Grills, Stools, Tree Guards, Flower pot stand, Shoe rack, Bag Stand, Showpiece Articles from Scrap etc.
3	Plumbing Shop Plumbing shop: Study of types of pipe, pipe joints, operations, applications, safety measures etc. Job: Prepare threading on GI pipe to make useful items like Nipple, Pipe joints etc.
4	Sheet Metal Shop: Sheet Metal Shop: Sheet metal tools, operations, applications, safety measures etc. Job: Making a utility item using G I sheet involving development, marking, cutting , bending, spot welding/riveting Parts like i) Tray, ii) Funnel etc..

Text Books: 1 Hazra and Chaudhary, Workshop Technology-I, Media promoters & Publisher private limited.

2. Hazra and Chaudhary, Workshop Technology-II, Media promoters & Publisher private limited.
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Reference Books: 1.K. C. John, Mechanical Workshop Practice, Prentice Hall Publication, New Delhi, 2010.

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Semester-I	
Course code: APS21BSP102 Course name: Engineering Chemistry Lab Course category: Basic Science	
Credits: 1 Teaching scheme: P-2 hrs/week Evaluation scheme: TW-30, PR-20	
Pre-requisites: Pre-university English.	
Course Type: Vocational Skill Enhancement Course.	
Lab Objectives:	
1. To know about the different carpentry tools and perform various carpentry operations to complete the job	
2. To understand different welding tools, joints, defects and perform welding operation to complete useful article/job.	
3. To learn various types of pipes, plumbing tools, operations and perform thread cutting on GI pipes.	
4. To know different sheet metal tools, operations, applications and perform various operations to complete job.	
Lab Outcomes: Upon completion of the Lab Experiments, the students should able to,	
LO1: Perform the experiments as well as accurately record the readings and analyze the results of such experiments	
LO2: Estimate the impurities present in water using titrimetric and instrumental methods.	
LO3: Employ the basic techniques used in chemistry laboratory for analysis such as volumetric titrations, complexometric titrations, Conductometry, pH metry, viscometer, Stalagmometer and TLC.	
Unit	Content
1	Determination of hardness of water sample by EDTA method.
2	Determination of chloride content in water sample by precipitation titration method
3	Determination of dissolved oxygen in water by Iodometric method
4	Determination of percentage purity of bleaching powder
5	Determination of strength of acid / base using pH metric titration
6	Determination of strength of acid / base using conductometric titration.
7	To determine the cell constant of the given conductivity cell.
8	To determine relative surface tension of unknown liquids by using stalagmometer.
9	To determine the viscosity of unknown liquids by using Ostwald / Redwood viscometer.
10	To determine acidity of given water sample.
11	Determination of acid value of an oil sample.
12	Determination of saponification number of an oil sample
13	To determine alkalinity of given water sample.
14	Preparation of phenol- formaldehyde / urea-formaldehyde resin.

15	To find out the Rf value of given sample by thin layer chromatography.
16	To separate the given mixture using thin layer chromatography.
17	Proximate analysis of coal (moisture content, volatile matter, ash content).
18	To study factors influencing on rate of electrochemical corrosion.
19	To determine flash and fire point of given oil by Pensky-Marten flash point apparatus.
20	To determine cloud and pour point of lubricating oil.

Reference Books:

1. A Text book on Experiments and Calculations in Engineering Chemistry by Dr. S. S. Dara, S Chand Publication.
2. Laboratory manual on Engineering Chemistry by S. K. Bhasin & Sudha Rani, Dhanpat Rai Publishing Company.
3. Engineering Chemistry with Laboratory Experiments by M. S. Kaurav, Asia-Pacific the holdings Private Ltd.

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Semester-I

Course code: APS21ESP104 Course name: Engineering Mechanics Lab Course category: ESC
Credits: 1 Teaching scheme: P-2hrs/week Evaluation scheme: TW-30, PR-20
Lab Outcomes:
LO1: Describe the working principle of mechanics and correlate them with day to day engineering applications
LO2: Formulate and solve mechanics problems based on law of moments, conditions of equilibrium.
LO3: Verify theoretical concepts through analytical, experimental and graphical methods.

List of Experiments –

Unit	Content
1	Verification of law of the Machine using Screw jack.
2	Polygon law of coplanar forces.
3	Bell crank lever.
4	Lami's theorem.
5	Support reactions for beam.
6	Problems on beam reaction by graphics statics method.
7	Inclined plane (to determine coefficient of friction).
8	Centroid of irregular shaped bodies.
9	Determine center of gravity for composite sections.
10	Determine moment of inertia for composite sections.
11	Moment of Inertia of fly wheel.
12	Simple / compound pendulum.

Semester-I

Course code: MGM54AEP101 Course name: Communicative English Lab Course category: AEC
Credits: 1 Teaching scheme: P-2 hrs/week Evaluation scheme: TW-30, PR-20
Pre-requisites: Basic knowledge of English.
Lab Objectives: The course aims at grooming the professional ethics of the students through various personality traits and behavioral patterns focusing on communication skills
Lab Outcomes: the students will be able to -
LO1: Introduce themselves formally and informally through practice.
LO2: Pronounce English vowel and Consonant sounds effectively.
LO3: Participate effectively in G.Ds, Presentations, & Interviews.
LO4: Face Interviews competently.
LO5: Draft resume, business letters, reports formally.
LO6: Comprehend the meaning of English text by comprehension techniques.

Contents –

Unit	Content
1	Self Introduction.
2	Pronunciation of Vowel sounds in English
3	Pronunciation of consonant sounds in English.
4	Group discussion.
5	Presentation techniques.
6	Interview techniques.
7	Letter writing.
8	Email writing, Agenda of the meeting and notices.
9	Resume Writing.
10	Report writing.
11	Skimming & Scanning.

Semester-I

Course code: ICS23ESP101 Course name: Applied Python Programming Lab Course category: ESC
Credits: 2 Teaching scheme: P-4 hrs/week Evaluation scheme: TW-30, PR-20
Pre-requisites:
Lab Objectives:
1. Introduce students to the Python programming language and its syntax.
2. Cover essential programming constructs such as variables, data types, operators, and input/output operations.
3. Explore control flow structures including conditional statements and loops for program execution.
4. Provide an in-depth understanding of object-oriented programming principles and their application in Python.
5. Familiarize students with error handling techniques and file input/output operations.
6. Discuss advanced topics such as regular expressions, modules, libraries, graphical user interfaces (GUI), and web programming
7. Enable students to apply Python programming skills in networking, data processing, analysis, and database applications
Lab Outcomes: the students will be able to -
LO1: Demonstrate proficiency in Python programming fundamentals and syntax.
LO2: Design and develop object-oriented Python programs using classes, objects, inheritance, and encapsulation.
LO3: Apply error handling techniques to write robust and reliable Python code.
LO4: Utilize advanced Python features such as regular expressions, modules, and libraries for efficient programming.
LO5: Create graphical user interfaces (GUI) and web applications using Python frameworks
LO6: Employ Python for networking, data processing, analysis, and database-driven applications

Contents –

Unit	Content
1	<p>Hello, World! Program Write a Python program that prints "Hello, World!" to the console.</p> <p>Interactive Mode Basics Use Python's interactive mode to perform basic arithmetic operations like addition, subtraction, multiplication, and division.</p> <p>User Input and Display Create a Python script that takes user input for their name and displays a personalized greeting.</p> <p>Calculate Rectangle Area Write a Python program that calculates and prints the area of a rectangle. Prompt the user for</p>

	<p>the length and width.</p> <p>Temperature Conversion Create a Python script that converts a temperature from Fahrenheit to Celsius. Prompt the user for the temperature in Fahrenheit and display the result in Celsius.</p>
2	<p>Even or Odd Checker Implement a Python program that checks if a given number is even or odd and prints the result.</p> <p>Largest among Three Numbers Write a Python script that finds and prints the largest among three numbers entered by the user.</p> <p>Factorial Calculation with a While Loop Create a Python program that calculates and prints the factorial of a number entered by the user using a while loop.</p> <p>Fibonacci Sequence with For Loop Use a for loop to generate and print the Fibonacci sequence up to a specified number of terms. Prompt the user for the number of terms.</p> <p>Sum of Prime Numbers Write a Python program that calculates and prints the sum of all prime numbers in a given range. Prompt the user for the range.</p>
3	<p>Simple Calculator Class Define a Python class for a simple calculator that has methods for addition and subtraction. Allow the user to perform calculations using objects of this class.</p> <p>Class Inheritance Hierarchy Create a class hierarchy with a base class and two derived classes. Demonstrate inheritance by accessing attributes and methods of each class.</p> <p>Method Overriding Implement method overriding in a Python class. Create a base class with a method and override it in a derived class.</p> <p>Encapsulation Demonstration Use encapsulation to restrict access to class attributes. Create a class with private attributes and demonstrate encapsulation principles.</p> <p>Abstract Geometric Shape Class Create an abstract class representing a geometric shape with abstract methods like area and perimeter. Define derived classes (e.g., Circle, Rectangle) to implement these methods.</p>
4	<p>Custom Exception Handling Write a Python program that raises and handles a custom exception. Define a custom exception class and demonstrate its usage.</p> <p>File Exception Handling Implement a function that reads data from a file and handles file-related exceptions such as</p>

	<p>FileNotFoundError and PermissionError.</p> <p>Division by Zero Handling</p> <p>Create a Python program that simulates division by zero and handles the ZeroDivisionError exception gracefully.</p> <p>File Handling with Multiple Exceptions</p> <p>Modify a file reading program to handle both FileNotFoundError and PermissionError exceptions.</p> <p>Finally Block Usage</p> <p>Develop a program that demonstrates the use of the finally block in exception handling. Open a file and ensure it is properly closed even if exceptions occur.</p>
5	<p>Email Validation with Regular Expressions</p> <p>Write a Python program that validates email addresses using regular expressions. Prompt the user for an email address and validate it.</p> <p>Phone Number Extraction</p> <p>Create a Python script that extracts phone numbers from a given text using regular expressions.</p> <p>Custom Python Module</p> <p>Develop a Python module with functions to perform basic arithmetic operations. Import this module into another script and use its functions.</p> <p>Exploring Built-in Modules</p> <p>Explore Python's built-in modules like math and datetime. Use them to perform mathematical operations and work with date and time.</p> <p>Third-Party Library Usage</p> <p>Install and use a third-party library (e.g., requests) to fetch data from a web API. Retrieve data and display it in your Python script.</p>
6	<p>Simple tkinter GUI</p> <p>Design a simple tkinter GUI application with buttons and labels. Implement functionality to update labels when buttons are clicked.</p> <p>GUI Button Actions</p> <p>Create a Python program that responds to user button clicks in a tkinter GUI. Perform actions like displaying messages when buttons are clicked.</p> <p>HTML Form Handling</p> <p>Build an HTML web form with input fields and a submit button. Create a Python CGI script to handle form submissions and display the entered data.</p> <p>Form Data Validation</p> <p>Extend the previous exercise to validate form data in the Python CGI script. Check for required fields and display validation messages.</p>

	<p>Dynamic Web Content with CGI</p> <p>Implement a Python CGI script that generates dynamic web content based on user requests. Create a simple web application that displays different content based on URL parameters.</p>
7	<p>Pickle Serialization</p> <p>Use Pickle to serialize and deserialize Python objects. Save Python objects to a file using Pickle and then load them back.</p> <p>Networked Data Exchange</p> <p>Develop a Python script that simulates data exchange over a network using sockets and serialization. Send and receive data between client and server.</p> <p>Basic NumPy Operations</p> <p>Create a NumPy array and perform basic operations like addition, subtraction, multiplication, and division.</p> <p>Data Filtering and Selection</p> <p>Implement data filtering and selection using NumPy arrays. Filter data based on specific conditions and criteria.</p> <p>Data Analysis with Pandas</p> <p>Client-Server Communication</p> <p>Create a simple client-server program using socket programming in Python. Implement basic communication between the client and server.</p> <p>Enhanced Client-Server Communication</p> <p>Extend the client-server program to support data transfer between the client and server. Implement sending and receiving data between the two.</p> <p>JSON Serialization and Deserialization</p> <p>Serialize Python objects into JSON format and then deserialize them back into Python objects. Demonstrate data interchange between JSON and Python.</p> <p>Use Pandas to read data from a CSV file and perform data analysis. Calculate statistics like mean, median, and standard deviation on the dataset.</p> <p>DataFrame Manipulation</p> <p>Explore DataFrame manipulation in Pandas. Sort, filter, and perform various operations on a dataset loaded into a DataFrame.</p> <p>Database CRUD Operations</p> <p>Connect to a SQLite database in Python and perform CRUD (Create, Read, Update, Delete) operations using SQL queries. Create a Python script that interacts with a database.</p>

MGMUNIVERSITY

Semester-I

Course code: MGM82CCP101 Course name: National Cadet Corps Course category: CCA
Credits: 2 Teaching scheme: P-4 hrs/week Evaluation scheme: TW-30, PR-20
Pre-requisites: Nil

Contents –

Unit	Content	Teaching hours
1	NCC General, National Integration and Awareness, Social Service and Community Development, Drill: Aims, Objectives and Organization of NCC, Duties of NCC Cadet, National Integration Importance and Necessity, Factors Affecting National Integration, Foot Drill, Drill With Arms, Ceremonial Drill with Arms, Social Service and Community Development Activities- Pollution, Mission Indradhanush, Beti Bachao Beti Padhao, Tree Plantation, Digital Awareness.	12
2	Personality Development, Disaster Management, Weapon Training, Map Reading : Critical and Creative Thinking, Decision Making, Self Awareness, Public Speaking, Interview Skills, Types, Org, Capability and Role of NCC cadets, Initiative Trg, Organizing Skills, Do's & Don't, Introduction and Characteristics of .22 rifles, Handling of .22 rifle, Introduction to Map Reading, Conduct of MR-Google and Tourist Maps and Apps.	10
3	Health and Hygiene, Environmental Awareness and Conservation, Adventure, Obstacle Training: Hygiene & Sanitation (Personal & Camp Hygiene) Soch Vichar, First Aid in Common Medical Emergencies, Treatment & Care of Wounds, Introduction Yoga & Exercises, Water Conservation, Energy Conservation, Introduction Adventure Activities. Obstacle Course	10
4	Leadership, Introduction to Infantry Weapons and Equipments: Traits, Indicators, Motivation, Ethics, Case Studies- Chhatrapati Shivaji Maharaj, Maharana Pratap, Jhansi ki Rani, Ratan Tata, Narayan Murty, Rabindra Nath Tagor, Organization of Infantry Battalion and its weapons.	8
5	Armed Forces, Field Craft and Battle Craft, : Armed Forces, Army, CAPF, Police, Modes of Entry to Army, CAPF, Police, Introduction to Field Craft, Indication of Landmark, Observation, Camouflage and Concealment, Fire and Move Capsule.	8

Text Books: 1. James Stewart, Calculus Early Transcendental, 7 th edition, Cengage.
2. George B. Thomas, Ross L. Finney, Calculus and Analytical Geometry, 9th edition, Pearson
3. Howard Anton, Irl Bivens, Stephens Davis, Calculus, 10th Edition, Wiley
References:
1. Cadet's Handbook- Common Subject, all wings by DG NCC, New Delhi.

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| 2. Cadet's Handbook- Common Subject by NCC Directorate- Bhubaneshwar. |
| 3. Cadet's Handbook- Specialised Subjects, Army, Navy, Air-Force by DG NCC, New Delhi. |
| 4. NCC OTA Precise by DG NCC, New Delhi. |
| 5. Chanakya's 7 Secrets of Leadership by Radhakrishanan Pillai and D. Shivnandhan. |
| 6. National Cadets Corps (India) by Lambert M. Suvarkar. |

E-Resources:

1. National Cadet Corps, Youth in Action (Google eBook).
2. <https://indiancc.nic.in/dg-ncc-lt-gen-gurbirpal-singh/>
www.youtube.com

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Semester-I

Course code: APS21BSL102	Course name: Yoga	Course category: CCA
Credits: 2	Teaching scheme: P-4 hrs/week	Evaluation scheme: TW-30, PR-20
Pre-requisites: Students should know Basic.		

Unit	Content	Teaching hours
1	<p>Yoga History of Yoga Yoga is a mind and body practice with a 5,000-year history in ancient Indian philosophy.</p> <p>The word "yoga" comes from the Sanskrit word "yuj," which means "to yoke" or "to unite."</p> <p>Yoga is a system of physical postures, breathing exercises, and meditation designed to help practitioners achieve physical, mental, and spiritual well-being. The earliest written records of yoga date back to the 2nd century BCE, and the practice has been evolving ever since.</p> <p>Yoga has spread to all corners of the world, and there are now many different styles of yoga practiced today.</p> <p>Fundamental Skills of Yoga Postures: The postures, or asanas, are the physical component of yoga. There are many different postures, and they can be practiced in a variety of ways.</p> <p>Breathing: Breathing, or pranayama, is an important part of yoga. There are many different breathing techniques, and they can be used to help relax the body and mind.</p> <p>Meditation: Meditation is the mental component of yoga. There are many different meditation techniques, and they can be used to help focus the mind and achieve a state of peace.</p>	20
2	<p>Swimming History of Swimming Swimming is one of the oldest sports in the world, with evidence of swimming dating back to 2500 BC. The earliest recorded swimming competitions were held in ancient Greece and Rome. Swimming became an Olympic sport in 1896, and it has been a part of every Game since then.</p> <p>Swimming is now a popular sport all over the world, and there are many different types of swimming, including freestyle, backstroke, breaststroke, butterfly, and individual medley.</p> <p>Fundamental Skills of Swimming Breathing: Breathing is one of the most important skills in swimming. It is important to be able to breathe efficiently while swimming in order to avoid getting tired.</p> <p>Body Position: Body position is another important skill in swimming. It is important to maintain a good body position in order to be hydrodynamic and to swim efficiently.</p> <p>Stroke Technique: Stroke technique is the way that the arms and legs are used to</p>	20

propel the body through the water. There are many different stroke techniques, and it is important to develop a good stroke technique in order to swim efficiently.

Drills: Drills are exercises that can be used to improve swimming skills. There are many different drills, and they can be used to improve different aspects of swimming, such as breathing, body position, and stroke technique.

Mental Toughness: Mental toughness is also an important skill in swimming. It is important to be able to stay focused and motivated during long swims, especially in competitions.

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Semester-I

Course code: MGM82CCP103 Course name: Sports Course category: CCA
Credits: 02 Teaching scheme: P-4hrs/week Evaluation scheme: TW-30, PR-20
Pre-requisites: Student should know Basic Physics and basic Mathematics.
Course Objectives: The Objective of this course is
1. To understand the importance of sports in physical and mental development.
2. To learn about the different types of sports
3. To learn about the different types of indoor games .
4. To participate in indoor games.
5. To learn about the different types of outdoor games.
6. To participate in outdoor games
Course Outcomes:
Upon completion of this course, students will be able to
1. Demonstrate knowledge of the history, benefits, types, equipment, and safety of sports.
2. Demonstrate proficiency in the basic skills of indoor and outdoor games
3. Understand the rules and regulations of selected sports
4. Participate in sports competitions.

Contents –

Unit	Content	Teaching hours
	<p>Football</p> <p>The earliest forms of football can be traced back to ancient China, Greece, and Rome.</p> <p>In England, the game of football developed in the 19th century, with different rules being used by different schools and organizations.</p> <p>In 1863, the Football Association (FA) was founded, and it standardized the rules of the game.</p> <p>The first international match was played between England and Scotland in 1872.</p> <p>Football became an Olympic sport in 1900, and the first World Cup was held in 1930.</p> <p>Today, football is the most popular sport in the world, with billions of fans around the globe.</p> <p>Fundamental Skills of Football</p> <p>Dribbling: Dribbling is the ability to move the ball with your feet while keeping control of it. It is an essential skill for all footballers, as it allows you to move past defenders and create scoring opportunities.</p> <p>Passing: Passing is the ability to accurately and effectively throw the ball to your teammates. It is another essential skill, as it allows you to move the ball up the field and create scoring opportunities.</p> <p>Shooting: Shooting is the ability to kick the ball with power and accuracy. It is the most important skill for scoring goals, and it is essential for all footballers to develop a good shot.</p> <p>Heading: Heading is the ability to use your head to control and direct the ball. It is a</p>	10

	<p>valuable skill for both attacking and defending, and it is important for all footballers to learn how to head the ball effectively.</p> <p>Tackling: Tackling is the ability to take the ball away from an opponent. It is an important skill for defenders, but it is also valuable for midfielders and attackers.</p>	
1	<p>Basket Ball</p> <p>Basketball was invented by James Naismith in 1891 at the International YMCA Training School in Springfield, Massachusetts.</p> <p>Naismith was a physical education instructor who was looking for a game that would be less injury-prone than football.</p> <p>He nailed two peach baskets to the lower rail of a balcony and used a soccer ball to play the game.</p> <p>The first game of basketball was played on December 21, 1891, with nine players on each team.</p> <p>The rules of basketball have evolved over time, but the basic premise of the game has remained the same.</p> <p>Today, basketball is one of the most popular sports in the world, with millions of players and fans around the globe.</p> <p>Fundamental Skills of Basketball</p> <p>Dribble: Dribbling is the ability to move the ball with your hands while keeping control of it. It is an essential skill for all basketball players, as it allows you to move past defenders and create scoring opportunities.</p> <p>Passing: Passing is the ability to accurately and effectively throw the ball to your teammates. It is another essential skill, as it allows you to move the ball up the court and create scoring opportunities.</p> <p>Shooting: Shooting is the ability to throw the ball through the hoop with power and accuracy. It is the most important skill for scoring points, and it is essential for all basketball players to develop a good shot.</p> <p>Rebounding: Rebounding is the ability to catch the ball after it has been missed by a shooter. It is an important skill for both offense and defense, as it allows teams to get second chances at scoring.</p> <p>Defense: Defense is the ability to prevent the other team from scoring points. It is an essential skill for all basketball players, as it is impossible to win a game without playing good defense.</p>	10

	<p>Volleyball</p> <ol style="list-style-type: none"> 1. Volleyball was invented in 1895 by William G. Morgan, a physical education instructor at the Young Men's Christian Association (YMCA) in Holyoke, Massachusetts. 2. Morgan was looking for a game that would be less vigorous than basketball and he created volleyball as a way to keep his students active during the winter months. 3. The original name of the game was "mintonette," but it was renamed "volleyball" in 1896. <ol style="list-style-type: none"> 1. Volleyball quickly spread throughout the United States and around the world, and it became an official Olympic sport in 1964. <p>Fundamental Skills of Volleyball</p> <p>Passing: Passing is the ability to receive the ball from the opponent and direct it to a teammate. It is an essential skill for all volleyball players, as it allows the team to keep possession of the ball and start an attack.</p> <p>Setting: Setting is the ability to control the height and direction of the ball so that a teammate can spike it. It is a critical skill for setters, as they are responsible for setting up the team's offense.</p> <p>Spiking: Spiking is the ability to hit the ball over the net with power and accuracy. It is the most important skill for scoring points in volleyball, and it is essential for all attackers to develop a good spike.</p> <p>Blocking: Blocking is the ability to prevent the opponent from spiking the ball over the net. It is an important skill for blockers, as they can prevent the other team from scoring points.</p> <p>Digging: Digging is the ability to prevent the opponent from scoring a point by returning the ball over the net. It is an important skill for all defenders, as they are responsible for preventing the other team from scoring points</p>	10
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2	<p>4 Kabaddi History of Kabaddi Kabaddi is a contact team sport that originated in India.</p> <p>It is believed to have originated in the Indian subcontinent over 4,000 years ago.</p> <p>The game is mentioned in the Sangam literature of Tamil Nadu, which dates back to the 3rd century BC.</p> <p>Kabaddi was first played as a competitive sport in the Indian Olympic Games in 1938.</p> <p>It was included as a demonstration sport at the 1982 Asian Games in Delhi, and it became a full medal sport in the 1990 Asian Games in Beijing.</p> <p>Kabaddi is now played in over 100 countries around the world.</p> <p>Fundamental Skills of Kabaddi</p> <p>Dabki: Dabki is the act of entering the opponent's half of the court while chanting "kabaddi, kabaddi." It is a fundamental skill for all raiders, as it allows them to enter the opponent's half of the court without being tackled.</p> <p>Touch: Touching an opponent is the most important skill in kabaddi. It is how raiders score points for their team. There are many different ways to touch an opponent, such as touching their arm, leg, or torso.</p> <p>Tackling: Tackling is the act of preventing a raider from touching an opponent. It is a fundamental skill for all defenders, as it allows them to prevent the other team from scoring points. There are many different ways to tackle a raider, such as grabbing them, pushing them, or tripping them.</p> <p>Stamina: Stamina is essential for all kabaddi players, as the game is very physically demanding. Players need to be able to run, jump, and tackle for long periods of time.</p> <p>Agility: Agility is also important for kabaddi players, as they need to be able to change direction quickly and avoid being tackled.</p>	10
4	<p>Unit-2</p> <p>Badminton</p> <p>History of Badminton The game of badminton originated in ancient Greece, China, and India.</p> <p>It was brought to England in the 1870s by British army officers stationed in India.</p> <p>The first badminton club was founded in 1873 at Badminton House, the country estate of the Duke of Beaufort.</p> <p>The first official all-England badminton championships for men were held in 1899, and the first badminton tournament for women was arranged the next year.</p> <p>Badminton became an Olympic sport in 1992.</p> <p>Today, badminton is a popular sport played by millions of people around the world.</p> <p>Fundamental Skills of Badminton</p>	10

Grip: The grip is the most important fundamental skill in badminton. It allows you to control the racket and hit the shuttlecock with power and accuracy. There are many different grips, but the most common are the forehand grip and the backhand grip.

Footwork: Footwork is essential for moving around the court and positioning yourself to hit the shuttlecock. There are many different footwork drills that you can practice to improve your footwork.

Racket control: Racket control is the ability to hit the shuttlecock with power and accuracy. It is important to practice hitting the shuttlecock in different directions and with different levels of power.

Timing: Timing is the ability to hit the shuttlecock at the right time. It is important to practice hitting the shuttlecock at the peak of its flight.

Stamina: Stamina is essential for badminton, as it is a physically demanding sport. You need to be able to run, jump, and hit the shuttlecock for long periods of time.

Soft Tennis

History of Soft Tennis

Soft tennis is a racquet sport that originated in Japan in the early 20th century. It was created as a less dangerous alternative to lawn tennis, as the ball used in soft tennis is made of foam rubber and does not travel as fast as a regular tennis ball.

The first soft tennis tournament was held in Japan in 1921, and the sport quickly spread to other countries in Asia.

Soft tennis was first introduced to the United States in the 1950s, and it has since become a popular recreational sport in the country.

Fundamental Skills of Soft Tennis

Grip: The grip is the most important fundamental skill in soft tennis. It allows you to control the racquet and hit the ball with power and accuracy. There are many different grips, but the most common are the forehand grip and the backhand grip.

Footwork: Footwork is essential for moving around the court and positioning yourself to hit the ball. There are many different footwork drills that you can practice to improve your footwork.

Racket control: Racket control is the ability to hit the ball with power and accuracy. It is important to practice hitting the ball in different directions and with different levels of power.

Timing: Timing is the ability to hit the ball at the right time. It is important to practice hitting the ball at the peak of its flight.

Stamina: Stamina is essential for soft tennis, as it is a physically demanding sport. You need to be able to run, jump, and hit the ball for long periods of time.

Here are some additional fundamental skills of soft tennis:

Ball control: The ability to control the direction and speed of the ball.

Serve: The ability to serve the ball accurately and with power.

Volley: The ability to hit the ball before it bounces.

Overhead smash: The ability to hit the ball forcefully and accurately overhand.

Drop shot: The ability to hit the ball softly and precisely so that it bounces low and close to the net.

Tennis

History of Tennis

The origins of tennis can be traced back to a 12th–13th-century French handball game called jeu de paume (“game of the palm”), from which was derived a complex indoor racket-and-ball game: real tennis.

The modern game of lawn tennis was invented in England in the 1870s by Major Walter Winfield.

Wing field created a set of rules and equipment for the game, and he called it "Sphairistike". The game quickly became popular, and it was renamed "lawn tennis" in 1874.

The first lawn tennis tournament was held in 1877 at the All England Club in Wimbledon, England.

Tennis became an Olympic sport in 1896.

Today, tennis is a popular sport played by millions of people around the world.

Fundamental Skills of Tennis **Grip:** The grip is the most important fundamental skill in tennis. It allows you to control the racket and hit the ball with power and accuracy. There are many different grips, but the most common are the forehand grip and the

5	<p>backhand grip.</p> <p>Footwork: Footwork is essential for moving around the court and positioning yourself to hit the ball. There are many different footwork drills that you can practice to improve your footwork.</p> <p>Racket control: Racket control is the ability to hit the ball with power and accuracy. It is important to practice hitting the ball in different directions and with different levels of power.</p> <p>Timing: Timing is the ability to hit the ball at the right time. It is important to practice hitting the ball at the peak of its flight.</p> <p>Stamina: Stamina is essential for tennis, as it is a physically demanding sport. You need to be able to run, jump, and hit the ball for long periods of time.</p>	10
	<p>Fencing</p> <p>History of Fencing The earliest evidence of fencing dates back to ancient Egypt, Greece, and Rome. Fencing was used as a form of training for warfare and as a way to settle disputes. The modern sport of fencing developed in Italy in the 15th century.</p> <p>The first fencing competition was held in 1550 in Paris.</p> <p>Fencing became an Olympic sport in 1896, and it has been a part of every Games since then.</p> <p>Fencing is now a popular sport all over the world, and there are three main disciplines: foil, épée, and sabre.</p> <p>Fundamental Skills of Fencing</p> <p>Footwork: Footwork is essential in fencing, as it allows you to move quickly and efficiently around the piste. There are many different footwork drills that you can practice to improve your footwork.</p> <p>Blade work: Blade work is the ability to use the sword effectively. There are many different blade work techniques, and you need to practice them in order to become proficient.</p> <p>Parrying: Parrying is the ability to deflect an opponent's attack. There are many different parrying techniques, and you need to practice them in order to become proficient.</p> <p>Riposte: The riposte is the counterattack that follows a parry. It is an important skill in fencing, as it allows you to score points.</p> <p>Mental Focus: Mental focus is also an important skill in fencing, as it allows you to stay focused on the opponent and to avoid making mistakes.</p> <p>5 Athletics</p> <p>History of Athletics The history of athletics can be traced back to the ancient Olympic Games, which were held in Greece from 776 BC to 393 AD. The original events included running, jumping, throwing, and wrestling.</p>	10

	<p>The modern Olympic Games were revived in 1896, and athletics has been a part of every Game since then.</p> <p>Athletics is now a global sport, with competitions held at all levels, from local to international.</p> <p>Fundamental Skills of Athletics Running: Running is the most basic skill in athletics. It is the ability to move forward quickly and efficiently. There are many different types of running, including sprinting, distance running, and middle- distance running.</p>	
	<p>Jumping: Jumping is the ability to move upwards from the ground. There are many different types of jumping, including high jump, long jump, and triple jump.</p> <p>Throwing: Throwing is the ability to propel an object through the air. There are many different types of throwing, including shot put, discus throw, javelin throw, and hammer throw.</p> <p>Sprinting: Sprinting is a type of running that involves short bursts of speed. Sprinters need to be able to accelerate quickly and maintain their speed for a short period of time.</p> <p>Distance Running: Distance running is a type of running that involves running for long distances. Distance runners need to be able to pace themselves and maintain their energy levels for long periods of time.</p> <p>Middle-Distance Running: Middle-distance running is a type of running that involves running for distances between 800 meters and 1500 meters. Middle- distance runners need to be able to combine speed and endurance.</p> <p>High Jump: High jumping is a type of jumping that involves clearing a bar that is raised progressively higher. High jumpers need to be able to generate a lot of power in their legs and have good timing.</p> <p>Long Jump: Long jumping is a type of jumping that involves jumping as far as possible. Long jumpers need to have good speed and coordination.</p> <p>Triple Jump: Triple jumping is a type of jumping that involves jumping three times in a row. Triple jumpers need to have good speed, coordination, and power.</p> <p>Shot Put: Shot put is a type of throwing that involves throwing a heavy ball as far as possible. Shot putters need to have good upper body strength and technique.</p> <p>Discus Throw: Discus throw is a type of throwing that involves throwing a disc as far as possible. Discus throwers need to have good upper body strength and technique.</p> <p>Javelin Throw: Javelin throw is a type of throwing that involves throwing a spear as far as possible. Javelin throwers need to have good upper body strength and technique.</p> <p>Hammer Throw: Hammer throw is a type of throwing that involves throwing a heavy ball on a chain as far as possible. Hammer throwers need to have good upper body strength and technique.</p>	10

	<p>Kho-Kho</p> <p>History of Kho-Kho Kho-Kho is a tag game that originated in India.</p> <p>It is believed to have originated in the Indian subcontinent over 4,000 years ago.</p> <p>The game is mentioned in the Sangam literature of Tamil Nadu, which dates back to the 3rd century BC.</p> <p>Kho-Kho was first played as a competitive sport in the Indian Olympic Games in 1938.</p> <p>It was included as a demonstration sport at the 1982 Asian Games in Delhi, and it became a full medal sport in the 1990 Asian Games in Beijing.</p> <p>Kho-Kho is now played in over 100 countries around the world.</p> <p>Fundamental Skills of Kho-Kho</p> <p>Touch: Touching an opponent is the most important skill in Kho-Kho. It is how raiders score points for their team. There are many different ways to touch an opponent, such as touching their arm, leg, or torso.</p> <p>Dive: Diving is a fundamental skill for all Kho-Kho players. It allows players to avoid being touched by the opponents. There are many different types of dives, such as front dive, side dive, and back dive.</p> <p>Stamina: Stamina is essential for all Kho-Kho players, as the game is very physically demanding. Players need to be able to run, jump, and dive for long periods of time.</p> <p>Agility: Agility is also important for Kho-Kho players, as they need to be able to change direction quickly and avoid being touched by the opponents.</p> <p>Teamwork: Teamwork is essential for Kho-Kho, as it is a team sport. Players need to be able to work together to score points and defend their territory</p>	10
	<p>Cricket</p> <p>History of Cricket The history of cricket can be traced back to the 16th century in England.</p> <p>The game is believed to have originated from a game called "stoolball", which was played by children in the 15th century.</p> <p>The first recorded cricket match was played in 1611 between two teams of Kentish cricketers.</p> <p>Cricket became a popular sport in England during the 18th century, and it was first played in Australia in 1826.</p> <p>Cricket became an international sport in the 19th century, and the first Test match was played between England and Australia in 1877.</p> <p>Cricket is now played in over 100 countries around the world.</p> <p>Fundamental Skills of Cricket</p> <p>Batting: Batting is the act of hitting the ball with a bat. It is the most important skill in cricket, as it is how runs are scored. There are many different batting techniques, such as the defensive technique and the attacking</p>	10

	<p>technique.</p> <p>Bowling: Bowling is the act of delivering the ball to the batsman. There are many different bowling techniques, such as the fast bowling technique and the spin bowling technique.</p> <p>Fielding: Fielding is the act of catching the ball and preventing the batsman from scoring runs. It is an important skill for all cricketers, as it helps to prevent the other team from scoring runs.</p> <p>Running: Running is essential for scoring runs in cricket. Players need to be able to run quickly between the wickets to score runs.</p> <p>Stamina: Stamina is essential for all cricketers, as the game is very physically demanding. Players need to be able to run, jump, and field for long periods of time.</p> <p>Agility: Agility is also important for cricketers, as they need to be able to change direction quickly and avoid being run out.</p> <p>Teamwork: Teamwork is essential for cricket, as it is a team sport. Players need to be able to work together to score runs and prevent the other team from scoring runs.</p>	
	<p>Rifle Shooting</p> <p>History of Rifle Shooting The history of rifle shooting can be traced back to the 16th century in Europe. The first recorded rifle shooting competition was held in 1533 in Zurich, Switzerland. Rifle shooting became a popular sport in Europe during the 18th century, and it was first introduced to the United States in the 1770s. Rifle shooting became an Olympic sport in 1896, and it has been a part of every Games since then. Rifle shooting is now a popular sport all over the world.</p> <p>Fundamental Skills of Rifle Shooting</p> <p>Accuracy: Accuracy is the most important skill in rifle shooting. It is the ability to hit the target with the bullet. There are many different factors that affect accuracy, such as the stance, the grip, the breathing, and the trigger control.</p> <p>Consistency: Consistency is also important in rifle shooting. It is the ability to hit the target with the same accuracy shot after shot. There are many different factors that affect consistency, such as the mental focus and the physical preparation.</p> <p>Stance: The stance is the position of the body when shooting. It is important to have a stable stance in order to be accurate. There are many different stances that can be used, such as the standing stance, the kneeling stance, and the prone stance.</p> <p>Grip: The grip is the way that the rifle is held. It is important to have a firm grip in order to be accurate. There are many different grips that can be used, such as the weaver grip and the isosceles grip.</p> <p>Breathing: Breathing is important in rifle shooting because it can affect the accuracy</p>	10

	<p>of the shot. It is important to breathe slowly and evenly before and after the shot. Trigger Control: Trigger control is the ability to pull the trigger smoothly and evenly. It is important to avoid jerking the trigger, as this can cause the shot to go off target.</p>	
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Semester-II

Course code: APS21BSL103 Course name: Linear Algebra and Differential Equations Course category: Basic Science
Credits: 4 Teaching scheme: L-4 hrs/week Evaluation scheme: CA-60, ESE-40
Duration of External Examination- 2 Hrs
Pre-requisites: Pre-university mathematics.
Course Type: Basic Science Course
Course Objectives:
1. This course aims to make the students become familiar with the basic concepts of linear algebra with a thorough understanding of vector spaces, linear transformations and matrix operations enhancing the students' ability to reason mathematically and able to apply this knowledge to many fields in engineering, statistics and computer science.
2. To create and analyze mathematical models using differential equations
Course Outcomes: At the end of the course, the students will be able to -
CO1: Understand basic concepts such as vector spaces, linear dependence / independence of vectors, basis and linear maps.
CO2: Analyze and calculate eigen values, eigen vectors, rank nullity of a matrix / linear map.
CO3: Prove theorems; apply Gram-Schmidt process on inner product spaces, diagonalizable special matrices.
CO4: Solve ordinary differential equations analytically and numerically and apply these methods to solve engineering problems.
CO5: Find the solution of linear differential equations having their applications in mechanical and electrical systems.

Contents –

Unit	Content	Teaching hours
1	Matrices and Vector Spaces - Basic property of matrices, row operations and Gauss elimination, Inverse of a matrix. Basic concepts in linear algebra: vector spaces, subspaces, linear independence and dependence of vectors, bases, dimensions. Row and Column spaces, rank. Applications to systems of linear equations, Inverse transformation..	10
2	Linear mappings and Diagonalization Linear mappings, representation by matrices, rank-nullity theorem, Diagonalization, Eigen values, Eigen vectors and their basic properties, Cayley Hamilton Theorem.	10
3	Inner Product Spaces and Quadratic Inner Product Spaces , Orthogonality, Gram-Schmidt process, Geometric Applications of Linear Transformation, Quadratic Forms: Positive Definiteness and applications	10
4	First order ordinary differential equations and Applications Exact , Linear ,Bernoulli and separable differential equations, Applications to Population growth/decay, Mixing problems, Draining tank/Torricelli's Law problems, Newton's Law of Cooling, Electric circuits, Falling bodies	10

5	Ordinary differential equations of higher orders and Applications Linear differential equations with constant and variable coefficients, method of variation of parameters, Applications to mass spring systems and electrical circuits and Bending of beam and columns	10
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Text Books: 1. Introduction to Linear Algebra (2nd edition) by Serge Lang, Springer.	
2. Elementary Linear Algebra (10th edition) by Howard Anton and Chris Rorres, John Wiley and sons.	
3. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005	
4. S. L. Ross, Differential Equations, 3rd Edition, Wiley India, 1984	

Reference Books: 1. Shanti Narayan, Differential Calculus, S. Chand & Co	
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, New York.	
3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi.	
4. P. N. Wartikar, J. N. Wartikar, Applied Mathematics (Vol I & II), Pune Vidyarthi Griha Prakashan, Pune.	
5. Differential Equations with Applications and Historical notes by George Simmons, Tata McGraw Hill publishing company Ltd, New Delhi	
6. K.D Joshi, Calculus for Scientists and Engineers, CRC Press	
7. Prasad and Reena Garg, Advanced Engineering Mathematics, Khanna Publishing Company Private Limited, New Delhi	
8. Schaum's outlines of Linear Algebra (5th edition) by Seymour Lipschutz, Marc Lipson, McGraw-Hill Education (India) Private Limited, New Delhi	

Semester-II

Course code: APS21BSL102 Course name: Engineering Physics Course category: Basic Science
Credits: 3 Teaching scheme: L-3 hrs/week Evaluation scheme: CA-60, ESE-40
Duration of External Examination- 2 Hrs
Pre-requisites: Students should know Basic Physics and basic Mathematics.

Course Objectives: The Objective of this course is

1. To impart knowledge in basic concepts of physics relevant to engineering applications.
3. To introduce advances in technology for engineering applications.
2. To introduce advances in technology for engineering applications
Course Outcomes:
CO1: Summarize fundamentals of electron optics, modern physics and ultrasonic waves related to the engineering fields.
CO2: Identify the importance of the optical phenomenon i.e interference, diffraction and polarization in relevance with its engineering applications.
CO3: Classify the material on the basis of electric conductivity as semiconductor and superconductors and dielectric materials this leads to their fascinating applications
CO4 Recognize the use of laser and optical fibers in various fields.

Contents –

Unit	Contents	Teaching Hours
1	Modern Physics Electron Optics: e/m by Thomson's method , Positive ray, Bainbridge mass spectrograph Quantum Mechanics: Role and concepts, De-Broglie's hypothesis, Uncertainty Principle, Fundamentals of quantum computing, Quantum Fundamentals of quantum computing, Quantum features Ultrasonic Waves: Production of ultrasonic waves (Magnetostriction & Piezoelectric method), Applications Numericals..	10
2	Wave Optics Interference- Interference in thin films (reflected light), Newton's Rings, Engineering applications of Interference. Diffraction- Fresnel's and Fraunhofer Diffraction, Theory of plane transmission Grating Polarization- Polarization by reflection and double refraction, Optical activity, Specific rotation, Construction and working of Laurent's half shade polarimeter, Engineering applications of Polarization. Numerical.	10
3	Materials of Technological Importance Dielectric Materials: Introduction, Types of polarizations: Electronic and Ionic, Orientation Polarizations - Applications of Dielectrics Semiconducting Materials: Introduction, Fermi energy in Intrinsic semiconductors and extrinsic semiconductors, Hall effect, Applications of Semiconductors. Numericals Superconducting Materials: Introduction, Type I and Type – II superconductors, Meissner effect, BCS Theory, Application..	10

4	Optoelectronic Materials and Devices LASER : Absorption, spontaneous and stimulated emission, population inversion pumping mechanism, Construction and working of Ruby laser, Construction and working of He-Ne laser. Lasers in various technological applications. Introduction to Optical Fibers -Introduction Acceptance Angle-Numerical Aperture Applications of optical fibers. Numerical	10
5	Physics of Materials Crystal structure : Unit cell, Coordination number, atomic radius, packing density of cubic system. X-rays : Bragg's law, X-Ray Diffraction (XRD), Industrial Applications of X-Rays. Numerical . Particle detector : G.M. Counter Nano-Materials : Basic principles of nano- science and technology, properties, applications of nanotechnology.	10

Text Books: 1.Engineering Physics- H.K. Malik & A.K. Singh, McGraw Hill publication.		
2.Engineering Physics - R.K. Gaur and S. L. Gupta. Dhanpat Rai Publications Pvt. Ltd.-New Delhi.		
3 M. N. Avadhanulu, P.G. Kshirsagar "A Text book of Engineering Physics"- S. Chand Publications.		
4.B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012		
Reference Books: 1. Fundamental of Physics - Halliday and Resnik. Willey Eastern Limited.		
2. Introduction to Electrodynamics –David R. Griffiths.		
3 Concepts of Modern Physics – Arthur Beizer. Tata McGraw-Hill Publishing Company Limited.		
4. Optics – Ajoy Ghatak .Mac Graw Hill Education (India) Pvt. Ltd.		
Online Resources: 1. NPTEL / SWAYAM lectures. https://nptel.ac.in/courses/122107035/ Engineering Physics https://youtu.be/98xoZknQjI8 Polarization https://youtu.be/yINtw63Knc Maxwell's Equations and EM theory https://youtu.be/bwreHReBH2A Maxwell's Equations and EM theory https://www.youtube.com/playlist?list=PLuv3GM6-gsE3-hVNaw-YEb7EeY5XVPZdz Maxwell's Equations and EM theory(nptel) https://nptel.ac.in/courses/115105120/ Experimental Physics https://youtu.be/2CsMpEBI5QY Crystal Structure and X- rays https://youtu.be/z_8aJPLr21E Crystal Structure and X- rays https://youtu.be/_Ckh-60B6LY Condensed matter Physics https://youtu.be/QQZ6EGf0Ju8 Magnetic Properties https://youtu.be/DDLjK1ODeg Magnetic Materials https://youtu.be/etjZmdmrjSU Dielectrics https://youtu.be/k6ZxP9Yr02E Semiconductor https://youtu.be/D-9M3GWoBrw Superconductivity https://youtu.be/GglT1RoBPzg Superconductivity https://youtu.be/VHp2Ff5N_bs Superconductivity https://youtu.be/FNp81kkxj5c LASER https://youtu.be/YvrwVK9ZqQY LASER https://nptel.ac.in/courses/115107095/ Optic Fiber https://youtu.be/cjBPnIXK60U Quantum Mechanics (Prof.H.C. Verma) https://youtu.be/BDuqChhUhM0 Divergence and Curl (Prof.H.C. Verma) https://youtu.be/sCviGSMaYfi Divergence and Curl (Prof.H.C. Verma) https://youtu.be/SZCsFS9izfQ Divergence and Curl		

And other related videos from following resources
www.nptel.ac.in ;www.swayam.gov.in;<https://inflibnet.ac.in/>

www.sciencedirect.com

<http://vlabs.iitb.ac.in/vlab/> www.youtube.com

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Semester-II

Course code: APS21ESL102 Course name: Engineering Graphics Course category: ESC
Credits: 2 Teaching scheme: L-2 hrs/week Evaluation scheme: CA-60, ESE-40
Duration of External Examination- 2 Hrs
Pre-requisites: NIL
Course Objectives:
1. Understand the basic principles of engineering graphics and improve the visualization skills.
2. To gain knowledge on projection of points, straight lines, planes, solids.
3. To understand the real life objects through Drawings
4. To know the principles of orthographic and isometric projections.
Course Outcomes: At the end of the course, the students will be able to -
CO1: Identify basic concepts in drawing and its application
CO2: Plan and prepare neat orthographic drawings of points, straight lines, planes and solids.
CO3: To visualize and draw orthographic and isometric projection of solids.
CO4: Acquire skill to draw real life engineering objects by using the engineering drawing.

Contents –

Unit	Content	Teaching hours
1	Projections of Straight Lines Introduction to Engineering Graphics, Need of Engineering Drawing, Drawing Instruments, BIS code of practice for general engineering drawing, Projections of Points in Four Quadrants, Projections of Points in Reference Plane, Line Parallel to both the Plane, Line Parallel to One Plane and Perpendicular to the other, Line Inclined to One Plane and Parallel to The Other, Line Inclined to Both the Reference Planes, Traces of Line (Only first quadrant to be considered).	10
2	Engineering Curves Curves used in Engineering Practice, Conic sections, Construction of conics by different methods, Rectangular-hyperbola, Cycloidal curves, Epi and hypo-cycloids, Involute and Archimedean spiral.	10
3	Projections of Planes Plane with Surface Parallel to One Plane and Perpendicular to other, Plane Inclined to One Plane and Perpendicular to other, Projections of Planes Inclined to both the Planes .	10
4	Projections of Solids Introduction to Solids: Prisms, Pyramid, Cylinder, Cone, Cube, Tetrahedron, Sphere, Projections of above Solids with Axis inclined to one plane, Projections of above solids with Axis inclined to both the Planes, Projection of composite solids (different arrangement of Spheres with above Solids).	10
5	Orthographic Projections Orthographic projections of different Machine Parts (First Angle Projection method only) .	10

6	Isometric Projections ,Introduction to CAD Introduction to Pictorial views, Converting Orthographic Projections into Isometric Projections and Isometric views. Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.	10
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Text Books: 1. N. D. Bhatt and Panchal V. M., “Engineering Drawing”, Charotar Publishing House, Anand
2. P. J. Shah , “ A Text Book of Engineering Drawing”, S.Chand, New Delhi
3. Shah M.B. & Rana B.C, “Engineering Drawing & Computer Graphics”, Pearson Publications,
4. Agrawal B.& Agrawal C.M, “Engineering Graphics”, TMH Publications
5. Narayana K.L. & P. Kannaiyah, “Engineering Drawing”, Scitech Publications
6. P.I Vargese, “Engineering Graphics”, Mcgraw Hill Publications
7. D.A.Hindoliya,” Engineering Graphics”, B. S. Publications
Reference Books: 1 Dabhade M. L., “Engineering Graphics”, Vol.-I and Vol.-II, Vision Publications, Pune
2. K.Venugopal, "Engineering Drawing and Graphics" ,New Age International Publishers.

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Semester-II

Course code: APS21IKL101	Course name: Indian Knowledge Systems	Course category: IKS
Credits: 2 Teaching scheme: L-2 hrs/week Evaluation scheme: CA-60, ESE-40		
Duration of External Examination- 2 Hrs		
Pre-requisites: NIL		
Course Objectives:		
The objective of this course is		
1. To make students understand foundational concepts in IKS for science, engineering and technology.		
2. To explore ancient Indian pursuits and accomplishments in the various domains of engineering		
Course Outcomes: At the end of the course, the students will be able to -		
CO1: Familiarise with key components of the IKS & develop appreciation for Indian philosophical systems		
CO2: Understand key features of the Indian Numeral System, units of measurement and the framework for establishing the right knowledge.		
CO3: Appreciate the unique & specific contributions of ancient Indian mathematicians in Arithmetic, Geometry & Trigonometry.		
CO4: Develop awareness about engineering & technology heritage of India and understand ancient Indian contributions in various engineering domains.		

Unit	Content	Teaching Hours
1	Introduction to IKS: Importance of ancient knowledge, defining IKS, Classification framework for IKS, Historicity of IKS, Indian philosophical systems, Vedic schools of philosophy(Sankhy and yoga, Nyaya and Vaisesika, Purva- Mimamsa and Vedanta), Non- Vedic philosophical systems (Jain, Bauddha and Carvaka) , Wisdom through the ages: Issues of interest in the Puranas, Itihasa as a source of wisdom (Uniqueness of the two epics), Nitisastras.	08
2	Foundational Concepts for Science and Technology: Number system in India, salient features of the Indian numeral system. Measurements for Time, Distance and weight. The knowledge triangle, Prameya- a Vaisesikan approach to Physical Reality, Pramana - The means of valid knowledge, Framework for establishing valid knowledge.	07
3	Science in IKS: Mathematics: Great mathematicians and their contributions. Arithmetic (square of a number, square root, series and progressions). Geometry (Property of right angled triangle in Sulba- sutras, value of tt). Trigonometry, Algebra, Binary Mathematics and combinatorial problems in Chandah- Sastra of Pingala.	08

4	Engineering and Technology in IKS: The Indian Science and Technology Heritage, Mining and ore extraction. Metals and metal working technology. Iron and Steel in India, Lost wax casting of idols and artefacts, apparatuses used for extraction of metallic components. Literary sources for Science and Technology, Physical Structures in India, Irrigation & Water Management, Dyes and Painting Technology, Shipbuilding.	08
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Text Books:

1. Mahadevan B., Bhat Vinayak Rajat & Nagendra Pavana R.N. "Introduction to Indian Knowledge System Concepts and Applications" PHI, 2023.
2. Jha Amit "Traditional Knowledge System in India" Atlantic Publishers and Distributors (P) Ltd, 2023
3. Chauhan Bhag Chand "IKS: The Knowledge system of Bharata" Garuda Prakashan, 2023
4. Bag A.K., "Mathematics in Ancient and Medieval India" Chaukhambha Orientalia, 1979
5. Sengupta Nirmal, "Traditional Knowledge in Modern India" Springer, 2019

Reference Books:

1. Bag A.K., "History of Technology in India, Vol. I" Indian National Science Academy, 1997
2. Kumar Alok, "Ancient Hindu Science" Jaico Publishing House, 2019
3. Datta B and Singh A.N. "History of Hindu Mathematics: Parts I and II" Asia Publishing House, 1962
4. Kapoor Kapil, Singh Awdhesh Kumar "Indian Knowledge Systems Vol.-I & II" D.K. Print World Ltd, 2005

E-Resources:

https://www.youtube.com/watch?v=-cBd6JYPWtY&list=PLRfu94TCePTtWtu0xl45H_63WgoeYickE

https://www.youtube.com/watch?v=yvj5ROYbP2E&list=PLRfu94TCePTtLuEYSzmJXNYK_EnDSvY3N

<https://iksindia.org/book-list.php>

Semester-II

Course code: APS21ESL104 Course name: Building Programming logic in C Course category: ESC
Credits: 1 Teaching scheme: L-1 hr/week Evaluation scheme: CA–30, ESE–20
Duration of Theory Exam: 1 Hr
Pre-requisites: Basic Knowledge of computers.
Course Objectives:
1. To introduce the basic concepts of programming and the C language, including algorithms, program structure, data types, variables, constants, and tokens.
2. To learn various operators, expressions, type casting, and input/output functions in C
3. To understand decision-making statements, loops, and jump statements for controlling program flow.
4. To learn arrays, strings, and functions, including user-defined and library functions, recursion, and variable scope.
5. To understand structures, unions, and enums for creating user-defined data types in C
Course Outcomes:
After the completion of this course, students will be able to:
CO1: Write a simple C program.
CO2: Apply operators, expressions, and I/O functions to develop simple C programs.
CO3: Design and implement programs using control structures and loops for decision-making and iteration
CO4: Write C programs using arrays, strings, and functions to solve problems efficiently.
CO5: Write C programs using structures, unions, and enums to organize and manage complex data efficiently.

Contents –

Unit	Contents	Teaching Hours
1	Introduction To C Programming: Overview of C: History of C, Algorithm and Structure of C program. Keywords, Tokens, Data types, Constants, Literals and Variables. Operators and Expressions: Arithmetic operators, Relational operators, Logical operators, Expressions. Operator precedence and associativity, Type casting Console I/O Formatting: Formatted I/O, Unformatted I/O functions: getch(), getchar(), getche(), getc(), putc(), putchar()	3
2	Control Statements and Loops: Control statements: if , if-else, Nested if-else, conditional operators, switch and break, nested conditional branching statements, Looping Statements : while, do while, for, Nested loops, Jump Statements: break and continue, goto and label, exit function.	3
3	Array and String: Array: Array declaration, One and Two dimensional numeric and character arrays, Multidimensional arrays, operations on array. String: String declaration, initialization, string manipulation with library function, Without library functions.	3

4	<p>Functions: Functions: Definition, function components: Function arguments, return value, function prototype, function call statement, Types of function: Library Functions(math and character),User-defined Functions, Scope and lifetime of variable, Call by value and call by reference. Function using arrays, function with command line argument. Recursive function.</p>	3
5	<p>Structure and Union: Structure: Basics, declaring structure and structure variable, typedef statement, array of structure, array within structure, Nested structure; passing structure to function, function returning structure. Union: basics, declaring union and union variable, Difference between Structure and Union Enum: declaring enum and enum variable.</p>	3

Text Books:

1. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill, Third Edition.
2. Let Us C, Yashwant Kanetkar, Infinity Science Press, Eighth Edition.
3. Mastering C, K. R. Venugopal, Tata McGraw-Hill.

Reference Books

- The C Programming Language, Brian W. Kernighan & Dennis M. Ritchie, Prentice Hall, 2nd Edition.
- Applications Programming in ANSI C, R. Johnsonbaugh & Martin Kalin, Macmillan, 2nd Edition.
- The Spirit of C, Mullish Cooper, Jaico Publishing House.
- How to Solve It by Computer, R. G. Dromey, Pearson Education

Semester-II

Course code: ICS23VSL101 Course name: Design Thinking and Innovation Course category: VSEC
Credits: Teaching scheme: L- Evaluation scheme: CA–60, ESE–40
Duration of External Examination- 2 Hrs
Pre-requisites: Nil
Course Objectives:
1. To introduce students to the fundamental concepts and principles of design thinking and strategic innovation.
2. To develop students' ability to identify, define, and analyze complex problems from a user-centric perspective.
3. To cultivate creative thinking and ideation skills through various techniques and methodologies.
4. To provide students with practical experience in prototyping and testing ideas to gather feedback and iterate on solutions.
5. To equip students with effective communication and presentation skills to pitch their ideas convincingly.
6. To explore the role of strategic thinking and innovation in organizational contexts and industry trends.
7. To encourage collaboration and interdisciplinary approaches to problem-solving and innovation
Course Outcomes: At the end of the course, the students will be able to -
CO1: Apply design thinking principles and methodologies to identify and redefine problems effectively.
CO2: Generate innovative solutions through divergent and convergent thinking techniques
CO3: Develop prototypes and minimum viable products (MVPs) to test and validate ideas.
CO4: Utilize various ideation and prioritization techniques to evaluate and refine solutions
CO5: Present ideas and concepts persuasively using storytelling and effective communication strategies.
CO6: Analyze industry trends and organizational challenges to identify opportunities for strategic innovation.
CO7: Collaborate effectively in interdisciplinary teams to tackle complex problems and drive innovation forward

Contents –

Unit	Contents	Teaching Hours
1	<p>Introduction and Background of Design Thinking:-</p> <p>Introduction, Knowing the team and course, The strategy of Innovation in design thinking. Why is Design Thinking required? Industries in Design Thinking, what is Design Thinking? Design thinking is a way of thinking. Design Thinking Tips and Anecdotes, Design Thinking Mindset Design thinking vs Scientific approach, Analysis vs. Synthesis in design thinking, Divergent Thinking vs. Convergent Thinking in design thinking, key phases of the design thinking process, Case Studies on Design thinking, Fundamentals of Design Thinking, Stages of Design Thinking, Design Thinking Skills, The process of Design Thinking, Design thinking framework, Why Design Thinking Works, Incorporating design thinking into your work, Limitations of a design thinking process, Advantages of the design thinking approach, Examples of design thinking success, Planning a Design Thinking Project, Benefits of the design thinking approach, Applications of design thinking</p>	6
2	<p>Getting started with Problem Statement:-</p> <p>Introduction What is a Problem Statement? Initial questions, Case Studies, Problem Clarification, Role of the Stakeholders, Activities for Problem Clarification, Point-Of-View (POV) in Design Thinking, Empathy Map, Understand and Define Problem Statement, Problem Analysis, Root Cause analysis tools, Defining Metrics, Persona Identification, User Personas, Stakeholder Map, who are Stakeholders? What is their role? Stakeholders of Few Companies, Creating a Stakeholder Map, Example Scenarios, Dos and Don'ts During Problem statement identification, Reformulation of the Problem.</p>	6
3	<p>Identifying real problem:-</p> <p>Introduction, what is a Design Thinking Problem Statement? steps to create a design thinking problem statement, Learn Why and How to Focus on User Problem, Observation Phase, The Power to Observe, Useful Instrument for Observation Sessions, Tips for Observing, Practice problem Identification using Empathetic Design, Methods for Empathetic Design, Inquiry Vs. Observation, Learn As -is-state, Practice problem Identification using As-is-state long answer, Point-of-View phase for defining a problem, Characterizing the target group, Top of Form, Description of customer needs.</p>	6
4	<p>Deliver on Big Idea: Ideation and Prioritization:-</p> <p>Introduction, Ideation Phase, The Ideation Funnel, Divergent and Convergent Thinking, Techniques for Clearing the Mind, The creative process and creative principles, Understanding Creativity, Creative Principles, Creativity Techniques, Brainstorming, Example of a Brainstorming Session, Mind Mapping, SCAMPER, Random Word Association, Rapid Prototyping / Design Sprint, Learn various Idea Generation Techniques, Creativity and Idea Generation, Common Techniques, Reverse Brainstorming, Role Playing, Analogies, Real-life Examples, Forced Connection, Visual Thinking, Storytelling, Practice Ideation, Overcoming Creative Blocks, Unrealistic Expectations, The Right Way to Take Risks, Examples of Creative Thinking, Evaluation of Ideas, Criteria /</p>	6

	<p>Metrics for Evaluation, Testing the Ideas, Refining and Selecting the Best Ideas, Transparency in the Evaluation Process, Pass/Fail Method, Idea Evaluation Matrix, SWOT Analysis, Criteria for Prioritization, Idea Prioritization Techniques -</p> <ol style="list-style-type: none"> Dot Voting Impact vs. feasibility matrix Weighted Scoring Affinity Mapping Cost-Benefit Analysis (CBA) MoSCoW Method Kano Model Eisenhower Matrix <p>Implementing Prioritization, Re-Prioritization, Learn To-be Scenario, To-Be Scenario Map, use a to-do list to plan, How to Write an effective to-do List, Using Technology for to-do lists, Strategies for practicing prioritization, Urgent vs. Important Matrix, ABC Analysis, Value-based prioritization, Time-based prioritization, The Pomodoro Technique, Time-Value Prioritization Funnel, Pareto Analysis, Time-blocking, Tips for maintaining focus and staying motivated when prioritizing tasks, How to adjust priorities as circumstances change.</p>	
5	<p>Model creation and Idea pitching:- Introduction, Prototyping Phase, Learn Wireframe and Model creation, Introduction to Minimum Viable Product, Benefits Of MVP Development, What is expected from Minimum Viable Product, Practice Wireframe creation, End to end connecting from Problem to MVP, Testing Phase, Types of Testing, White and Black Box Testing, Unit Testing, Integration testing, Unit Testing Vs Integration Testing, System Testing, System Testing Vs Functional Testing, Acceptance Testing, User Acceptance Testing (UAT), Operational Acceptance Testing (OAT), Contract Acceptance Testing, Alpha/Beta Testing, Performance Testing, Security Testing, Usability Testing, Testing Techniques, Test Cases and Test Scripts, Bug Tracking and Reporting, User Feedback and Testing, Continuous Testing, Challenges and Best Practices, Tips for Interviews and Surveys, Kano Model, Desirability testing, Storytelling and Idea Presentation.</p>	6

<p>Text Books: 1. "Design Thinking: Integrating Innovation, Customer Experience, and Brand Value" by Thomas Lockwood</p> <ol style="list-style-type: none"> "The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems" by Michael Lewrick, Patrick Link, Larry Leifer "Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days" by Jake Knapp, John Zeratsky, Braden Kowitz "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation" by Tim Brown "Creative Confidence: Unleashing the Creative Potential Within Us All" by Tom Kelley, David Kelley "The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm" by Tom Kelley "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries
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Semester-II

Course code: ICS23VSP101 Course name: Design Thinking and Innovation Lab Course category: VESC
Credits: 1 Teaching scheme: P-2 Hrs/week Evaluation scheme: TW–30, PR–20
Pre-requisites: Nil
Lab Objectives:
1.Understand the core concepts and mindset of Design Thinking.
2.Practice divergent and convergent thinking techniques within a problem-solving context
3.Develop a deep understanding and empathy for a target user by creaŌng an Empathy Map.
4. Learn to synthesize user insights into a clear, acŌnable, and user-centric Point-Of-View (POV) statement.
5.Create a detailed user persona to represent a segment of the target user base.
6.Identify and map all key stakeholders relevant to a problem and understand their relationships.
7. Practice identifying the fundamental root cause of a recurring problem using the 5 Whys technique.
8.Learn to reframe an initial problem statement into a more precise, acŌnable, and inspiring challenge.
9.Develop keen observaŌn skills to gather insights from user behavior in real-world contexts.
10.Understand and visually document the current "as-is" state of a specific process or user journey.
11.Generate a wide range of innovaŌve ideas using the structured SCAMPER brainstorming technique.
12.Systematically evaluate and compare multiple ideas using predefined criteria.
13.Create a basic visual representation of a solution's user interface and flow using low- fidelity wireframes.
14.Prioritize ideas based on their potential impact and feasibility of implementation
15.Utilize mind mapping as a visual and non-linear technique for expanding upon initial ideas.
16.Understand the purpose of testing and develop simple test cases for a specific functionality.
17.Define the essential features required for a Minimum Viable Product to test a core hypothesis.
18.Practice presenting an innovative idea persuasively and memorably using storytelling techniques.
19. Formulate insighŌul initial questions to clarify a given ambiguous problem.
Lab Outcomes:
LO1: A foundational understanding of Design Thinking principles, its advantages, and its contrast with other approaches.
LO2: Practical experience in applying both thinking styles and initial promising ideas for a given problem.
LO3: A comprehensive list of clarifying questions for a complex problem.
LO4: A completed Empathy Map that visually represents user insights and pain points.
LO5: A comprehensive user persona that aids in user-centric design decisions.
LO6: A visual stakeholder map providing a holistic view of the ecosystem surrounding a problem.
LO7: Identification of a core root cause and a deeper understanding of problem origins.
LO8: A refined and impacŌul "How Might We" problem statement.
LO9: Sharpened observation skills and documented behavioral insights for a given scenario.
LO10: A visual representation of the current user journey or process flow, highlighting areas for improvement.
LO11: A diverse set of ideas, demonstraŌng the application of the SCAMPER technique.
LO12: A comprehensive and visually organized mind map, showcasing a broad exploration of ideas.

LO13: A data-driven prioritization of ideas with clear justification for selection.
LO14: A visually prioritized set of ideas, guiding strategic decision-making.
LO15: A set of clear, actionable low-fidelity wireframes demonstrating the solution's structure.
LO16: A clear definition of the MVP scope, outlining its core functionalities and testable hypotheses.
LO17: An understanding of test case structure and initial practical experience in defining test scenarios.
LO18: Improved public speaking and storytelling skills for effectively communicating ideas to stakeholders.

List of Practicals -

Sr. No.	Name of Practical	Teaching Hours
1	Lab 1: Design Thinking Introduction & Mindset Task: In small groups, select a common societal problem (e.g., plastic waste, urban commute challenges). Discuss how a Design Thinking mindset (focusing on empathy, iteration, and experimentation) would approach this problem differently compared to a traditional, linear problem-solving method. Share brief examples of how Design Thinking has led to successful solutions in similar areas.	1
2	Divergent vs. Convergent Thinking Exercise Task: Given a broad problem statement (e.g., "How might we improve the student experience on campus?"), individually generate at least 15 diverse ideas in 20 minutes (Divergent Thinking). Then, as a group, spend 30 minutes discussing, clustering similar ideas, and narrowing down to the top 3-5 most promising ideas for further exploration (Convergent Thinking).	1
3	Initial Problem Statement Generation Task: Provide a high-level, somewhat vague problem scenario (e.g., "Customer satisfaction is declining"). In groups, generate 10-15 initial questions that aim to uncover underlying issues, different perspectives, and potential root causes. Focus on "who, what, where, when, why, and how" questions.	1
4	Empathy Map Creation Task: Choose a specific user group related to a given problem (e.g., commuters facing traffic, online shoppers experiencing delivery issues). In groups, create an Empathy Map by detailing what the user "Says, Thinks, Does, and Feels" in relation to the problem.	1
5	Point-Of-View (POV) Statement Definition Task: Based on the insights gathered from the Empathy Map created in Lab 4, formulate a "User + Need + Insight" POV statement. For example: "[Specific User] needs to [User's Need] because [Surprising Insight]".	1
6	User Persona Development Task: Based on a problem scenario and insights from empathy mapping, develop a fictional but realistic user persona. Include demographics, goals, frustrations, behaviors, motivations, and a brief narrative.	1

7	Stakeholder Mapping Task: Given a specific problem (e.g., "improving healthcare access in rural areas"), identify all direct and indirect stakeholders. Create a stakeholder map, categorizing them by influence and interest, and illustrate their connections and potential impact on the problem.	1
8	Root Cause Analysis (5 Whys) Task: Take a simple, observable recurring problem (e.g., "why is the team of ten late for morning meetings?"). Iteratively ask "Why?" at least five times (or until a clear root cause is identified) to delve beyond surface-level symptoms.	1
9	Problem Reformulation Task: Take a broad or vaguely defined problem statement (e.g., "Our product is not selling well"). In groups, reformulate it into a more specific, user-centric "How Might We...?" question that encourages innovative solutions (e.g., "How might we make our product more appealing to young professionals?").	1
10	Observation Practice Task: Observe a simple activity or interaction (e.g., how people choose items in a cafeteria, how users navigate a public website, or a simple classroom activity) for 20-30 minutes without interaction. Document your observations in detail, focusing on "what people do," "how they do it," and "why they might be doing it" (inferred).	1
11	"As-Is" State Analysis and Mapping Task: Choose a common process (e.g., filling out a university application, booking an appointment online). Individually or in pairs, map out the "as-is" steps of this process, identifying user actions, touchpoints, pain points, and emotional highs/lows at each stage.	1
12	Brainstorming Session using SCAMPER Task: Choose an existing everyday product or service (e.g., a smartphone, a coffee shop experience). Apply the SCAMPER framework (Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, Reverse) to brainstorm new features, uses, or improvements for it.	1
13	Mind Mapping for Idea Generation Task: Start with a central problem or initial idea from a previous lab. Individually or in small groups, create a mind map, branching out with related concepts, keywords, questions, and solutions to explore different dimensions of the problem space.	1
14	Idea Evaluation Matrix Task: Take 3-5 ideas generated from a previous ideation lab. Define 3-4 clear evaluation criteria (e.g., Feasibility, Impact, Novelty, User Value). Create a simple matrix and score each idea against these criteria (e.g., on a scale of 1-5). Discuss the results and identify the top idea(s).	1
15	Idea Prioritization (Impact vs. Feasibility Matrix) Task: From a list of 10-15 brainstormed ideas, plot each one on an Impact vs. Feasibility Matrix. Discuss where each idea falls and decide which quadrant (e.g., high impact/high feasibility) represents the "quick wins" or strategic priorities.	1
16	Low-Fidelity Wireframe Creation	1

	Task: For a selected idea (e.g., a mobile app feature, a website page layout), sketch out a series of low-fidelity wireframes on paper or a simple digital tool. Focus on the core layout, key elements, and user flow, rather than detailed aesthetics.	
17	Minimum Viable Product (MVP) Definition Task: Based on a chosen idea and its wireframes, identify the absolute minimum set of features that would make the product usable and allow for testing its core value proposition. Distinguish these "must-have" MVP features from "nice-to-have" future enhancements.	1
18	Basic Test Case Development Task: For a simple feature of an imagined product or service (e.g., "user registration," "password reset," "adding an item to a cart"), write 3-5 basic test cases. Each test case should include a test ID, a description, steps to reproduce, and the expected result.	1
19	Storytelling for Idea Pitching Task: Prepare a short (3-5 minute) pitch for an idea developed in previous labs. Structure your pitch as a compelling story that clearly outlines the problem, introduces your solution, highlights its unique benefits, and calls to attention. Focus on engaging your audience emotionally and logically.	1

Reference Books:

1. "Design Thinking: Integrating Innovation, Customer Experience, and Brand Value" by Thomas Lockwood
2. "The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems" by Michael Lewrick, Patrick Link, Larry Leifer
3. "Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days" by Jake Knapp, John Zeratsky, Braden Kowitz
4. "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation" by Tim Brown
5. "Creative Confidence: Unleashing the Creative Potential Within Us All" by Tom Kelley, David Kelley
6. "The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm" by Tom Kelley
7. "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries

Semester-II

Course code: APS21BSP101 Course name: Engineering Physics Lab Course category: Basic Science
Credits: 1 Teaching scheme: P-2 hrs/week Evaluation scheme: TW-30, PR-20
Pre-requisites: Student should know the basic aspects of measurements like least count and range of instrument, scale identification, accuracy, error etc..
Lab Objectives: The Objectives of this course is
1. To make the students gain practical knowledge to co-relate with the theoretical studies
2. To achieve perfectness in experimental skills.
3. To study practical applications will bring more confidence
Lab Outcomes: At the end of the course, the students will be able to -
LO1: Plot the I-V characteristics of pn junction diode and determine the value of band gap energy which can be used for core engineering Courses..
LO2: Perform optical experiments; using light properties like interference, polarization, diffraction and their applications
LO3: Interpret the results and analyze the data and use the experimental data to plot the graph for a best fit.
LO4: Discuss the characteristics of plateau region and determine operating voltage of G.M counter.
LO4: Determine the numerical aperture and bending loss of optical fiber cable.

List of Practicals –

Unit	Content
1	Thomson's Bar Magnetic method -Determination of e/m of electron .
2	Newton's rings -Determination of radius of curvature of Plano convex lens.
3	Polarization - Half shade Polarimeter -Determination of specific rotation of optically active material.
4	Diffraction - Determination of wavelength of light by plane transmission grating.
5	Wedge Shaped film -Determination of thickness of thin wire.
6	Semiconductors – To study of forward and reverse bias characteristic of Semiconductors diode.
7	Fibre Optics – Determination of Bending losses in optical fibre
8	Fibre Optics – Determination of Numerical Aperture of given optical fibre
9	Determination of operating voltage of G.M tube and characteristics of plateau region
10	Determination of wavelength of laser source.

Semester-II

Course code: APS21ESP102 Course name: Engineering Graphics Studio Course category: ESC
Credits: 2 Teaching scheme: P-4 hrs/week Evaluation scheme: TW-30, PR-20
Pre-requisites: Nil
Course Objectives: The Objectives of this course is to develop the skills required for Engineering drawing.
Course Outcomes: At the end of the course, the students will be able to -
CO1: Develop competence in correct expression of the visualized objects
CO2: Dimension and annotate two-dimensional engineering drawings
CO3: .Plan and prepare neat orthographic drawings of points, straight lines, planes and solids
CO4: Develop the ability to visualize and draw orthographic and isometric projection of solids

Lab Contents

Lab	Content
1	Drawing three problems based on projections of lines on half imperial size drawing sheet.
2	Drawing three problems based on engineering curves on half imperial size drawing sheet.
3	Drawing three problems based on projections of planes on a half imperial size drawing sheet.
4	Drawing three problems based on projections of solids on a half imperial size drawing sheet.
5	Drawing three problems based on orthographic projection on a half imperial size drawing sheet.
6	Drawing three problems based on isometric projections on half imperial size drawing sheet
7	Demonstration of CAD software in CAD lab, drawing simple objects using various commands

Semester-II

Course code: APS21ESP105 Course name: Building Programming Logic in C Lab Course category: ESC
Credits: 1 Teaching scheme: P-2 hrs/week Evaluation scheme: TW–30, PR–20
Pre-requisites: Nil
Course Objectives: The Objectives of this course is
1. Design solutions to simple engineering problem by applying the basic programming principles of C language and basic mathematical knowledge.
2. Choose a suitable C-construct to develop C code for a given problem.
3. Apply the C-language syntax rules to correct the bugs in the C program.
4. Develop simple C programs to illustrate the applications of different data types such as arrays, pointers, functions.
Course Outcomes: At the end of the course, the students will be able to -
CO1: Illustrate and explain the basic computer concepts and programming principles of C language.
CO2: Develop C programs to solve simple mathematical and decision making problems.
CO3: Develop C programs to solve simple engineering problems using looping constructs.
CO4: Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings and functions.

Lab Contents

Lab	Content
1	a) Write a C program to find sum and average of three numbers. b) Write a C program to find the sum of individual digits of a given positive integer.
2	a) Write a C program to generate the first n terms of the Fibonacci sequence b) Write a C program to generate prime numbers between 1 to n. c) Write a C program to check if the given number is Armstrong or not
3	a) Write a C program to check whether the given number is perfect or not b) Write a C program to check whether the given number is strong or not
4	a) Write a C program to find the roots of a quadratic equation. b) Write a C program perform arithmetic operations using switch statement
5	a) Write a C program to perform addition of two matrices. b) Write a C program using function to perform multiplication of two matrices.

6	<p>a) Write a C program to find the largest and smallest number in a list of integers.</p> <p>b) Write a C program to Sort the Array in an Ascending Order.</p> <p>c) Write a C program to find whether the given matrix is symmetric or not.</p>
7	<p>a) Write a C program to use function to insert a sub-string in to given main string from a given position.</p> <p>b) Write a C program to swap the values of two variables using</p> <p>c) (i) Call by value (ii) Call by reference</p>
8	<p>e) Write a C program to find factorial of a given integer using non-recursive function</p> <p>f) Write a C program to find factorial of a given integer using recursive function</p>
9	<p>a) Write C program to find GCD of two integers by using recursive function.</p> <p>b) Write C program to find GCD of two integers by using non-recursive function.</p>
10	<p>a) Write a C program using user-defined functions to determine whether the given string is palindrome or not.</p> <p>b) Write a C program that displays the position or index in the main string S where the sub string T begins, or - 1 if S doesnt contain T.</p>
11	<p>a) Write C program to count the number of lines, words and characters in a given text.</p> <p>b) Write a C program to find the sum of integer array elements using pointers.</p>
12	<p>a) Write a C Program to Calculate Total and Percentage marks of a student using structure</p>

Semester-II

Course code: APS21ESP103 Course name: Recent Trends In Integrated Technologies Course category: ESC
Credits: 1 Teaching scheme: P-2 hrs/week Evaluation scheme: TW–30, PR–20
Pre-requisites: Pre-university mathematics.
Lab Objectives:
1. To introduce students the basics of additive manufacturing/rapid prototyping and its applications in various fields, reverse engineering techniques.
2.To recognize industrial control problems suitable for Industrial Robotics.
3. To acquire basic skills in exploring the potential of the drone technology in professional activities
4. Ability to recognize industrial automation problems suitable for PLC control
Lab Outcomes: , the students will be able to -
LO1: Prepare 3D Model (slice & print) in either Stratasys or Zortrax & generate scan data through Hexagon portable scanning arm
LO2: Describe basic industrial robotics & it's applications.
LO3: Operate a small drone in a controlled environment.
LO4: Explain principles of sensor, PLC & applications.

Contents –

Unit	Content	Teaching hours
1	Scan to CAD, CAD to STL conversion& patching, machine setup & processes for printing	7
2	Programming the TATA Robot(pendant) for pick & place, programming the Yaskawa Robot(pendant) for motion planning, Demonstrate welding exercise by the instructor.	8
3	Introduction to components of drone, Demonstration of assembly of drone, Demonstration of mission planning & flying the drone.	7
4	Controller & sensor & their interfacing, basic ladder logic instructions, pneumatic& hydraulic actuator	8

Text Books:

1. A Step-by-Step Guide For Beginners: Aircraft Design & Construction Design Guide by :Merlin Debrie
2. Industrial Automation & Robotics By A.K. Gupta & S.K.Arora
3. Additive Manufacturing Principles, Technologies & Applications By C.P.Paul (TMH)
4. Basics of unmanned aerial vehicle By Garvit Pandya (Motion press)

Semester-II

Course code: MGM82CCP104 Course name: National Service Scheme (NSS) Course category: CCA		
Credits: 2 Teaching scheme: P-4 hrs/week Evaluation scheme: TW-30, PR-20		
Pre-requisites: Pre-university English.		
Course Type:- CCA		
Course Objectives:		
Contents –		
Unit	Content	Teaching hours
1	Introduction to National Service Scheme (NSS) Emergence of NSS in India (Historical Background) and its development. Organizational Structure of National Service Scheme from National Level to College Level.Objectives of National Service Scheme (NSS) National Service Scheme (NSS) – Symbol and its meaning Symbol of NSS and its meaning Motto of National Service Scheme (NSS) Various prayers, inspirational songs to be used in NSS Programme.	8
2	National Service Scheme (NSS) Regular Activities Guidelines of Distribution of working hours or academic year. Classification of Regular Activities in the Society <ol style="list-style-type: none"> 1. Rural 2. Urban 3. Campus Need base with association Associations in NSS Activities <ol style="list-style-type: none"> 4. Govt. Organization 5. NGO Scope for Innovation (Self-Generated)	8
3	Social Issues in India Concept of Society, Community (Steps involved in evaluation of society) <ul style="list-style-type: none"> ● Features of Indian Society ● Communities in India Basic Social Issues in India Family System, Division of labor, Cast System in India, Gender Issues, Regional Imbalance.	7
4	Indian Constitution and Social Justice Indian Constitution <ol style="list-style-type: none"> 1. Preamble 2. Structure 3. Features 4. Fundamental Rights & Duties Social Justice	7

	<p>5. Social Justice – the Concept and its features Contribution for Social Justice – Mahatma Jyotiba Phule, Dr. Babasaheb Ambedkar, Shahu Maharaj.</p>	
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References:

1. National Service Scheme Manual (Revised) 2006, Government of India, Ministry of Youth Affairs and Sports, New Delhi.
2. University of Mumbai National Service Scheme Manual 2009.
3. Avhan Chancellor's Brigade-NSS Wing, Training camp on Disaster Preparedness Guidelines, March 2012.
4. Rashtriya Seva Yojana Sankalpana- Prof. Dr. Sankay Chakane, Dr. Pramod Pabrekar, Diamond Publication, Pune.
5. National Service Scheme Manual for NSS District Coordinators, National Service Scheme Cell, Dept. of Higher and Technical Education, Mantralaya,
6. Annual report of National Service Scheme (NSS) published by Dept. of Higher and Technical Education, Mantralaya,
7. NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA- Socio and cultural guidelines.

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Semester-II

Course code: MGM73CCP204 Course name: Fine Art Course category: CCA		
Credits: 2	Teaching scheme: P-4 hrs/week	Evaluation scheme: CA-30, ESE-20
Prerequisites: Nil		
Course Objectives:		
<ol style="list-style-type: none"> 1. Students will be able to draw clean lines. 2. Students will be able to explore shading from light to dark. 3. Students will be able to draw perspective drawing. 4. Students will be able to sketch landscape and portrait drawing. 		
Course Outcomes: After completion of this course, students will be able to:		
CO1: Pay attention to core details in visualization. CO2: Represent on paper what they have observed in terms of 3 and 2 dimensional objects and light and dark play of perspective. CO3: Draw clean lines and neat figures which will gradually help the in fashion illustrations.		

List of Practicals:

Sr. No.	Contents	Lab Hours
1	Explore pencil as medium for drawing and exploration of different types of grades of pencils. Lines - Freeing hand movement by practicing various ways to draw lines (wavy/zigzag/diagonal/vertical/horizontal)	8
2	3D objects with Shading: <ul style="list-style-type: none"> • Exploring and sketching 3D objects with Shading/Hatching - Light to Dark (HB/2B/3B/4B/5B/6B) • Space Division - Studying of proportion. Perspectives- Coin / Box / Landscape. 	7
3	Sill Drawing: <ul style="list-style-type: none"> • Introduction to landscape and portrait drawing. • Still drawing (perspective drawing of man- made object) 	7
4	Exploration of color mediums: <ul style="list-style-type: none"> • Exploration of color mediums (chalk/ink/poster/pastels/water) • Landscape perspective of natural and man- made, charcoal rendering. • Still drawing of man- made and natural object by rendering and defining perspective. Ambedkar, Shahu Maharaj. 	8

Reference Books:

1. Mellem, Jeff; Sketching people & Live drawing basics.
2. Belleville- Van Stone, France; Sketch: The Non-Artist's guide to inspiration technique drawing life

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Semester-II

Course code: MGM73CCP204 Course name: Visual Art Course category: CCA		
Credits: 2	Teaching scheme: P-4 hrs/week	Evaluation scheme: CA-30, ESE-20
Course Type:- Professional Core Course		
Course Objectives:		
1.To understand the actual work process in the advertising market. 2. To understand the growth and necessity of advertising in the market.		
Course Outcomes: After completion of this course, students will be able to:		
CO1 :Able to choose a topic for campaign design. CO2: Understand that how campaign design is necessary CO3: Understand the actual work process in advertising market. CO4: Understand the process of designing.		

List of Practicals:

Sr. No	Name of Practical	Lab Hours
1	Topic for campaign design • It should be either product, service or social topic. • Mind mapping	8
2	Different types of media • New digital medias • Use of elective subject in campaign • Software use in designing	11
3	Sill Drawing Final layout • Printing in actual size media • Presentation on ppt of the topic includes artwork with rough work	11

Suggested Tutorial / Practical:

Assignment I: Students will be required to submit a mind map.

Assignment II: Students will be required to submit a list of media selection.

Assignment III: Students will be required to submit different medias in digital form

Assignment IV: Students will be required to submit different medias in print form. Teaching Methods and learning activities-

- Lecture with power point projections
- Demonstration with practical
- Documentaries and Presentation
- Use of different medium and art form to make a new concept of work

Assessment Strategies

Classroom lecture

Power point presentations

Group discussion
digital form

Reference Books:

- Advertising Campaign Design Just the Essentials - By Robyn Blakeman
- Campaign Strategies and Message Design: A Practitioner's Guide from Start to Finish - by Mary Moffitt (Author)
- Student should refer the previous knowledge about media and refer the internet for help.

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Semester-III

Course code: ICS23PCL201	Course name: AI and ML Essentials	Course category: PCC
Credits: 3	Teaching scheme: L-3 Hrs/Week	Evaluation scheme: CA-40, MSE-20, ESE-40
Duration of Theory Exam: 2 Hrs		
Pre-requisites: Basic Concepts of Statistics		
Course Objectives:		
1. To introduce fundamental concepts and historical evolution of Artificial Intelligence.		
2. To explain logical reasoning, knowledge representation, and inference mechanisms in AI.		
3. To develop understanding of probabilistic reasoning and Bayesian methods.		
4. To familiarize students with evolutionary algorithms and optimization techniques.		
5. To present essential machine learning models and learning paradigms.		
Course Outcomes: At the end of the course, the students will be able to -		
CO1: Explain the fundamental principles and evolution of Artificial Intelligence.		
CO2: Apply logical and probabilistic reasoning techniques to AI problems.		
CO3: Analyze evolutionary algorithms for optimization tasks.		
CO4: Distinguish between different machine learning paradigms and models.		
CO4: Explain the working of neural networks and deep learning architectures		

Contents –

Unit	Content	Teaching hours
1	Introduction to Artificial Intelligence (AI) Introduction to Artificial Intelligence, Early AI Concepts, Key Milestones in AI Development, Influential AI Contributors, Logical Approach to AI, Propositional Logic and First-Order Logic, Knowledge Representation, Rule-Based Systems, Knowledge-Based Systems, Inference Engines, Case-Based Reasoning, Applications of Artificial Intelligence, Self-Evaluation Exercise 1, Checkpoints and Question Bank, and Unit Summary.	7
2	Probabilistic Approaches to Artificial Intelligence Probability Concepts in AI includes Discrete and Continuous Probability Distributions, Bayes' Theorem, Bayesian Inference, Bayesian Inference using Markov Chain Monte Carlo (MCMC), Bayesian Networks, Structure and Representation, Directed Acyclic Graphs (DAGs), Conditional Probability Tables (CPTs), Inference in Bayesian Networks (Exact and Approximate), Learning in Bayesian Networks (Parameter Learning, Structure Learning), Self-Evaluation Exercises 2 and 3, Checkpoints and Question Bank, and Unit Summary.	7

3	<p>Evolutionary Intelligence</p> <p>Evolutionary Algorithms includes Genetic Algorithms, Selection Operators, Crossover and Mutation, Evolutionary Strategies, Self-Adaptation in Evolutionary Strategies, Types of Evolutionary Strategies, Applications of Evolutionary Intelligence, Optimization Problems, Genetic Programming (GP), Tree-Based Representation in Genetic Programming, Evolution of Computer Programs, Checkpoints and Question Bank, and Unit Summary.</p>	7
4	<p>Introduction to Machine Learning</p> <p>Basics of Machine Learning includes Types of Learning—Supervised Learning, Unsupervised Learning, Semi-Supervised Learning, and Reinforcement Learning—Model Evaluation Metrics, Data Visualization in Machine Learning, Linear Regression and Gradient Descent, Logistic Regression, Decision Trees and Random Forests, Clustering Algorithms (K-Means, Hierarchical), Principal Component Analysis (PCA), Markov Decision Process (MDP), Challenges in Machine Learning including Model Selection and Overfitting and Underfitting, Self-Evaluation Exercise 4, Checkpoints and Question Bank, and Unit Summary.</p>	7
5	<p>Neural Networks and Deep Learning</p> <p>Neural Networks and Deep Learning Overview includes Neural Network Fundamentals, McCulloch-Pitts Neuron, Activation Functions, Feedforward Neural Networks, Deep Learning Concepts, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Transfer Learning and Fine-Tuning, Self-Evaluation Exercise 5, Checkpoints and Question Bank, and Unit Summary.</p>	7
6	<p>Natural Language Processing (NLP)</p> <p>Natural Language Processing Basics includes Text Pre-Processing, Tokenization, Stopword Removal, Word Embeddings (Word2Vec, GloVe), Vector Similarity, NLP Applications including Sentiment Analysis, Text Classification, Named Entity Recognition (NER), Text Generation, Transformer-Based Models, Self-Evaluation Exercise 6, and Checkpoints and Question Bank, Unit Summary.</p> <p>Generative Intelligence</p> <p>Introduction to Generative Intelligence includes Generative Models, Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), Applications of Generative Models, Ethical Implications of Generative AI, Self-Evaluation Exercises 7 and 8, Checkpoints and Question Bank, and Unit Summary.</p>	10

Text Books:

1. Stuart Russell & Peter Norvig Artificial Intelligence: A Modern Approach, Pearson India
2. Christopher M. Bishop Pattern Recognition and Machine Learning, Springer India
3. Ian Goodfellow, Yoshua Bengio, Aaron Courville Deep Learning, Pearson / MIT Press (India Edition)
4. Daphne Koller & Nir Friedman, “Probabilistic Graphical Models: Principles and Techniques”, MIT Press (India)

Reference Books:

1. Richard S. Sutton & Andrew G. Barto, “Reinforcement Learning: An Introduction”, MIT Press (Indian Edition) Lane, Howard & Hapke
2. Natural Language Processing in Action, Manning / Dreamtech India, David Foster
3. Generative Deep Learning, O’Reilly Media (India)

Semester –III

Course Code: ITY23PCL202 Course Name: Data Structures Course Category: PCC
Credits: 2 Teaching Scheme: L- 2 Hrs/week Evaluation Scheme: CA–40, MSE–20, ESE–40
Duration of Theory Exam: 2 Hrs
Pre-requisites: Fundamentals of programming logic
Course Objectives: This course will enable students to
1.Build foundation in computer programming
2.Develop programming skills
3.Apply programming constructs to implement different data structures.
Course Outcomes: At the end of the course, the students will be able to -
CO1 Apply knowledge of basic programming constructs to design algorithms and programs.
CO2. Demonstrate functioning of linear data structures (stack, queue and linked list) and apply them in required applications.
CO3. Write neat code by selecting appropriate data structure and demonstrate a working solution for a given problem.
CO4 Analyze performance of algorithms by determining time and space complexity.
CO5. Distinguish between linear and non-linear data structures and determine their applicability.
CO6. Analyze possible solutions for solving a given problem and select the most efficient one. (for eg, Sorting and Searching)

Contents–

Unit	Content	Teaching Hours
1	Introduction to Data Structures Data, Data Structure, operations on data structures, Types of data structures: linear and non-linear Algorithm, characteristics of an algorithm, Pseudo-Code. Performance measurement of an algorithm, time and space complexity. Asymptotic notations. Iterative and Recursive algorithms.	7
2	Linear Data Structures: Stack and Queue Stack, Operations on a stack, Mathematical expressions: Infix, Prefix and Postfix, Conversion of expression from one form to other. Applications of a stack: Evaluation of	7

	postfix expression.Queue, Operations on a queue, Circular queue, Double ended queue Priority queue, Application of queue.	
3	Linear Data Structures: Linked List Static and dynamic memory allocation, Linked list, Types of linked-list: Singly, doubly and circular. Operations on linked list: Create, Insert, Search, Delete etc. Stack and queue implementation using linked list. Application of linked list: Addition of polynomials.	8
4	Non-Linear Data Structures Trees: Binary tree, Binary search tree, Binary tree representation, Operations on binary search trees. Tree traversals, Balanced search tree: AVL Graphs: Graphs, Graph representation, Graph Traversals, Minimum spanning tree, Minimum spanning tree algorithms: Kruskal, Prim's	8

Text Books:

1. E. Horowitz, D. Mehta, S. Sahni, "Fundamentals of Data Structures in C++", Silicon Press, 2nd Edition, 2008.
2. Goodrich, Tamassia, "Data Structures and Algorithms in Java", Wiley publication, 6th Edition, 2014.
3. Seymour Lipschutz, "Data Structures", Schaum's Outlines, McGraw Hill Education, 1 February 2014.
4. E. Balagurusamy. "C Programming and Data Structures", Publisher Tata McGraw - Hill Education, Edition: 4th, 2008

Reference Books:

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein, "Introduction to Algorithms", MIT Press, 3rd Edition, 2009.
2. Y. Langsam, M. J. Augenstein and A. M. Tanenbaum, "Data structures using Java", Pearson Education, 2003.
3. Thomas Cormen, Introduction to Algorithms, PHI Publication, 2nd Edition, 2002.

Semester –III

Course Code: ITY23PCL203 Course Name: Object Oriented Programming Course Category: PCC
Credits: 2 Teaching Scheme: L- 2 Hrs/week Evaluation Scheme: CA–40, MSE–20, ESE–40
Duration of Theory Exam: 2 Hrs
Pre-requisites: Logic Building ability
Course Objectives: This course will enable students to
1.To understand Object oriented concepts like data abstraction, encapsulation, etc.
2.To solve real world scenarios using a top down approach.
3.To understand various c++ programming constructs.
Course Outcomes: At the end of the course, the students will be able to -
CO1. Explain Object-Oriented Programming Paradigm
CO2. Understand the storage concepts in a simple program
CO3. Develop programs using basic concepts of object oriented languages i.e. objects, encapsulation, data hiding etc.
CO4. Construct programs using advanced concepts of object oriented languages i.e. associations, packages, interfaces, exception handling etc.
CO5. Apply knowledge behind exception handling in c++

Contents–

Unit	Content	Teaching Hours
1	Fundamentals of Object Oriented Programming- Object-Oriented Programming Paradigm: Benefits, Applications, Object-Oriented Systems Development, Object-Oriented Design: Class design and algorithm. Tokens, Data types, Operators, Expressions, and Control structures, Array, Functions, Structures and Unions, Class and Objects, specifying a class, Defining member functions, Private member functions, Static data and member functions, Arrays of objects, Friend functions.	6
2	Constructors and Destructors - Constructor, Parameterized constructors, Multiple constructors in a class, Copy constructors, Dynamic constructors, Destructor. Programming for class diagrams and relationships.	6

3	Inheritance - Single inheritance, Multilevel inheritance, Multiple inheritance, Hierarchical inheritance, Hybrid inheritance, Virtual base classes, Abstract classes.	6
4	Polymorphism and Exception handling - Operator overloading, Function overloading, Virtual functions, pure virtual functions, Types of exceptions, Catching 10 exceptions, Multiple catching, Nested try statements, Uncaught exceptions, Throw and throws, Built-in exceptions, Creating exception subclasses, Using exceptions.	6
5	Files and Streams - Working with Files: Classes for file stream operations and I/O stream operation, Opening and closing a file, Detecting end-of-file, More about Open(): File Modes, Sequential input and output operations.	6

Text Books:

1. Robert Lafore, "Object Oriented Programming in C++", Pearson Education, 4th Edition, 2008.
2. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill Publication, 6th Edition, 2013

Reference Books:

1. J. R. Hubbard, "Programming with C++: Schaum's Outlines", Tata McGraw-Hill publication, 2005.
2. P. J. Deitel, H.M. Deitel, "C++ How to Program", Pearson Education, 9th Edition, 2016.

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Semester-III

Course code: ICS23PCL202	Course name: Data Communication and Computer Network	Course category: PCC
Credits: 2	Teaching scheme: L-2 Hrs/Week	Evaluation scheme: CA-40, MSE-20, ESE-40
Pre-requisites: basic knowledge of logic circuits and applications in digital system.		
Course Objectives: This course will enable students to		
1. To introduce the Fundamentals of data communication networks.		
2. To demonstrate the Functions of various protocols of Data link layer.		
3. To demonstrate Functioning of various Routing protocols.		
4. To introduce the Functions of various Transport layer protocols.		
5. To understand the significance of application layer protocols.		
Course Outcomes: At the end of the course, the students will be able to		
CO 1: Explain the Categories and functions of various Data communication Networks		
CO 2: Describe the Functioning of various data link layer Protocols		
CO 3: Demonstrate the mechanism of routing the data in network layer		
CO 4: Explain the significance of various Flow control and Congestion control Mechanisms		
CO 5: Describe the Functioning of various Application layer Protocols		

Contents –

Unit	Content	Teaching hours
1	Introduction to Data Communications: Components, Data Representation, Data Flow, Network, Uses of Networks, Network Topologies, Categories of Networks, Multiplexing: FDM, TDM. Reference Models: TCP/IP Model, The OSI Model, Comparison of the OSI and TCP/IP reference model. Physical Layer: Guided Media, Unguided Media (wireless).	6
2	Data Link Layer: Design issues, Error Detection & Correction, Elementary Data Link Layer Protocols, Sliding window protocols Multiple Access Protocols - ALOHA, CSMA, CSMA/CD, CSMA/CA, Collision free protocols, Ethernet Physical Layer, Ethernet Mac Sub layer	6
3	The Network Layer: Network Layer Design issues, Routing algorithms: optimality principle, shortest path, flooding, Distance Vector Routing, Count to Infinity Problem, Link State Routing, Hierarchical Routing; Congestion control algorithms, IP addresses, CIDR, Sub netting, Super Netting, IPv4, Packet Fragmentation, IPv6 Protocol, Transition from IPv4 to IPv6.	6
4	Transport Layer: Services provided to the upper layer's elements of transport protocol, addressing, connection establishment, Connection release, Error Control & Flow Control. UDP, Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Sliding Window, The TCP Congestion Control Algorithm.	6
5	Application Layer: Introduction, services, Applications layer paradigms: Client-server model, HTTP, E-mail, WWW, TELNET, DNS.	6

Text Books: 1. Kurose James F, Keith W- Computer Networking A Top-Down Approach, 6th Edition, Pearson
2. Behrouz A. Forouzan - Data Communications and Networking, 4th Edition, McGraw-Hill Education

Reference Books: 1. Andrew S Tanenbaum - Computer Networks, 4th Edition, Pearson Education

2. W. A. Shay - Understanding Communications and Networks, 3rd Edition, Cengage Learning.

Online Resources: 1. NPTEL / SWAYAM lectures https://onlinecourses.swayam2.ac.in/ntr26_ed102

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Semester –III

Course Code: ITY23PCP202 Course Name: Data Structure LAB Course Category: PCC
Credits: 1 Teaching Scheme: P- 2 Hrs/Week Evaluation Scheme: TW: 30, PR: 20
Pre-requisites: Fundamentals of programming logic
Lab Objectives: This course will enable students to
1. Build foundation in computer programming
2. Develop programming skills
3. Apply programming constructs to implement different data structures.
Lab Outcomes: At the end of the course, the students will be able to -
LO1. Apply knowledge of basic programming constructs to design algorithms and programs.
LO2. Demonstrate functioning of linear data structures (stack, queue and linked list) and apply them in required applications.
LO3. Write neat code by selecting appropriate data structure and demonstrate a working solution for a given problem.
LO4. Analyze performance of algorithms by determining time and space complexity.
LO5. Distinguish between linear and non-linear data structures and determine their applicability.
LO6. Analyze possible solutions for solving a given problem and select the most efficient one. (for eg, Sorting and Searching)

List of Experiments:

1. Implementation of Arrays <ol style="list-style-type: none"> Write a program to accept N elements in an array and find the sum of it. Write a program to accept N elements in an array and find even/odd numbers from it. Write a program to find the given element present in the array or not. Write a program to accept N elements in two arrays and store sum of them in the third array. Write a program for multiplication of two matrices
2. Implementation of Stack <ol style="list-style-type: none"> Perform operations on stack using array Evaluation of postfix expression using stack Reverse a string using array
3. Implementation of Simple Queue <ol style="list-style-type: none"> Perform operations using array

4. Implementation of Circular Queue
5. Implementation of Singly Linked List <ol style="list-style-type: none">Create a singly linked list and perform insert delete operations on it for all conditionsReverse a singly linked listImplementation of stack using singly linked list
6. Implementation of Singly Linked List <ol style="list-style-type: none">Create a singly linked list and perform insert delete operations on it for all conditionsReverse a singly linked listImplementation of stack using singly linked listImplementation of queue using singly linked list
7. Implementation of Doubly Linked List <ol style="list-style-type: none">Create a doubly linked list and perform insert delete operations on it for all conditionsReverse a singly linked listImplementation of stack using singly linked listImplementation of queue using singly linked list
8. Implementation of Circular Singly Linked List
9. Implementation of Circular Doubly Linked List
10. Implementation of Binary Search Tree and Traversing using linked list

Semester –III

Course Code: ITY23PCP203 Course Name: Object Oriented Programming Lab Course Category: PCC
Credits: 1 Teaching Scheme: P-2 Hrs/week Evaluation Scheme: TW- 30, PR- 20
Pre-requisites: Basic understanding of C programming language
Lab Objectives: This course will enable students to
1. To understand the concept of inheritance in C++ and its various forms.
1. To explore advanced features of C++ such as inline functions, operator overloading, and function overloading.
2. To master file handling techniques in C++ for reading from and writing to files.
Lab Outcomes: At the end of the course, the students will be able to -
LO1. Implement single, multiple, multilevel, and hierarchical inheritance in C++ programs, demonstrating proficiency in object-oriented programming principles.
LO 2. Utilize inline functions, operator overloading, and function overloading effectively in C++ programs to improve code efficiency, readability, and maintainability.
LO3. Students will be proficient in performing file operations in C++ programs, including naming files, opening files, writing data into files, reading data from files, and closing files, ensuring data integrity and security.

List of Experiments

1. To write a C++ program to find the sum of the given variables using a function with default arguments.
2. Write a C++ program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, roll no., and grade. Create an array of class objects. Read and display the contents of the array.
3. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members
4. Write C++ programs that illustrate how the following forms of inheritance are supported: a)Single inheritance b)Multiple inheritance
5. Write C++ programs that illustrate how the following forms of inheritance are supported: a) Multiple inheritance b)Multilevel inheritance d)Hierarchical inheritance
6. To write C++ program to implement an inline function.

- | |
|--|
| 7. Write a Program to Generate Fibonacci Series using Constructor to Initialize the Data Members. |
| 8. Write a Program to Demonstrate the i) Operator Overloading. ii) Function Overloading. |
| 9. Write a Program to Naming a file, Opening a file, Writing data into the file, Reading data from the file, Closing a file. |
| 10. Write a Program to Demonstrate the Catching of All Exceptions. |

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Semester –III

Course Code: ICS23FPJ201 Course Name: Field Project Course Category: FP
Credits: 1 Teaching Scheme: P-2 Hrs/week Evaluation Scheme: TW-30, PR-20
Pre-requisites: Basic Programming
Lab Objectives: This course will enable students to
1. Understand and apply fundamental AI concepts
2. Design and implement basic AI models
3. Explore human-centric and ethical dimensions of AI
Lab Outcomes: At the end of the course, the students will be able to -
LO1. Formulate and solve AI problems using logical and probabilistic reasoning
LO2. Construct and analyze AI models such as semantic networks, Bayesian networks, decision trees, and basic neural networks for real-world problem scenarios
LO3. Apply Natural Language Processing techniques like tokenization, preprocessing, and sentiment analysis to interpret textual data effectively.
LO4. Evaluate ethical implications of AI systems, identifying issues related to bias, fairness, transparency, and societal impact based on experimental outcomes.

List of Experiments:

1. Lab Exercise 1: Logic and Knowledge Representation Solve logic problems using Boolean algebra Construct semantic networks to represent object relationships
2. Probability Concepts in AI Perform probability experiments using a six-sided die Compute probabilities of outcomes Apply Bayes' Theorem to update probabilities
3. Bayesian Networks Construct a simple Bayesian Network Define Conditional Probability Tables (CPTs) Perform inference based on observed evidence
4. Machine Learning – Decision Trees Build and interpret a decision tree model

Classify simple datasets using attributes
5. Neural Networks Design a basic neural network architecture Train a feedforward neural network Evaluate model accuracy
6. Natural Language Processing Perform text tokenization and preprocessing Apply sentiment analysis on sample text Interpret sentiment analysis results
7. Generative Intelligence – Creative Tasks Explore generative concepts through image or pattern creation Experiment with shapes, patterns, and digital creativity
8. Ethics in AI Group discussion on fairness, bias, transparency, and societal impact Case-based exploration of ethical implications in AI systems

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Semester –III

Course Code: ITY23HSL201 Course Name: Business Management and Financial Accounting Course Category: EEMC
Credits: 2 Teaching Scheme: L- 2 Hrs/week Evaluation Scheme: CA-40, MSE-20, ESE-40
Duration of Theory Exam: 2 Hrs
Pre-requisites: Basic Management
Course Objectives: This course will enable students -
1. To enable students to describe the estimated cash flows from a project, including operating, net working capital, and capital spending.
2. To provide the students to understand the related information of business Finance. Students can prepare basic financial statements.
3. To enable students to prepare final financial statements.
Course Outcomes: At the end of the course, the students will be able to -
CO1: Analyze the risk and return of alternative sources of financing.
CO2. Estimate cash flows from a project, including operating, net working capital, and capital spending.
CO3. Define basic terminology used in finance and accounts.
CO4. Prepare Financial Statements.

Contents–

Unit	Content	Teaching Hours
1	Introduction to Business Management - Aims, Objective And Function of Business Management, Principles of Management, Concept of business finance, Goals & objectives of financial management, Sources of financing-Long Term financing and Short Term Financing	7
2	Business Capital Management- Concept of business working Capital, significance, types. Adequacy of working capital, Factors affecting working capital needs, financing approaches for working capital, Methods of forecasting, working capital requirements	8
3	Basics of Financial Accounting - Meaning, Scope and importance of Financial Accounting. Financial Accounting - concepts and conventions, classification of accounts,	7

	Rules and principles governing Double Entry Book-keeping system, Meaning, Preparation of Journal, Ledger, Cash book & Trial balance.	
4	Financial Statement Preparation and analysis- Preparation of financial statements. Profit & Loss Account, Balance Sheet, Ratio Analysis.	8

Text Books:

1. Financial Management by Khan & Jain, Text, Problem & Cases, Tata McGraw Hill Publication 5th Edition.
2. Tulsian Financial Management by Dr.P.C.Tulsian, S Chand Publication 5th Edition.
3. Taxman's Financial Management by Ravi M. Kishore, Taxmann 2017 Edition.

Reference Books:

1. A Textbook of Financial, Cost & Management Accounting by Dr.P.Periasamy, Himalaya Publishing House.
2. Fundamentals of Financial Management by Bhabhtosh Banerjee, PHI publication, 2nd Edition.

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Semester –IV

Course Code: ITY23PCL252 Course Name: Programming in JAVA Course Category: PCC
Credits: 2 Teaching Scheme: L- 2 Hrs/week Evaluation Scheme: CA-40, MSE- 20, ESE-40
Duration of Theory Exam: 2 Hrs
Pre-requisites: Fundamentals of programming logic
Course Objectives: This course will enable students to
1. To enable the students to understand the core principles of the Object-Oriented Language
2. To understand the concept of packages and applet programming
3. To understand the concept of Multi-threading
4. To understand the concept of graphic programming
5. Introduce the students to database connectivity
Course Outcomes: At the end of the course, the students will be able to -
CO1. Apply Object Oriented concepts to develop programs in Java.
CO2. Develop programs using packages and applet programming.
CO3. Develop programs using Inheritance, Interfaces. Multithreading.
CO4. Develop programs using graphic programming
CO5. Develop applications using databases.

Contents–

Unit	Content	Teaching Hours
1	Introduction to JAVA- Fundamentals of Object Oriented Programming, Overview of JAVA, Data types, Operators and expressions, Control Statements and Loops, Arrays, Strings Collection Framework: Array List class, Linked List class, List Iterator interface, Hash Set classes, Vector	8
2	Object Oriented Programming - Classes and Objects, methods, method overloading, method overriding, static methods, visibility controls, Constructors, Inheritance, Interface, Packages	8

3	<p>Multithreading and Exception Handling Thread - MultiThreading: Creating threads, Extending Thread Class, Stopping and Blocking a thread, Life cycle of a thread, using thread method, Thread exceptions, Implementing the Runnable interface, Inter-thread communication.</p> <p>Managing Errors and Exceptions: Types of errors, Exceptions, Syntax of exception handling code, Multiple catch statements, throwing your own exception, Using exceptions for debugging</p>	8
4	<p>SWING and JDBC - Introduction to AWT, Graphics classes, Introduction to swing, difference between awt and swing, Components of swing</p> <p>Introduction to JDBC, connectivity with database (MySQL, SQLServer, etc)</p>	8

Text Books:

1. E. Balagurusamy, "Programming with Java – A Primer", Tata – McGraw-Hill Publication, 1998
2. Steven Holzner et al. "Java 2 Programming", Black Book, Dreamtech Press, 2006
3. Herbert Schildt, "Java 2: The Complete Reference", 2002
4. Ken Arnold, James Gosling, David Holmes, "THE Java™ Programming Language", Addison Wesley Professional, 2000

Reference Books:

1. H.M. Deitel, P.J. Deitel, "Java - How to Program", PHI Publication
2. Bruce Eckel, "Thinking in Java", PHI Publication.
3. Patric Naughton, Michael Morrison, "The Java Handbook", McGraw Hill Publication.
4. Tim Lindholm, Frank Yellin, Bill Joy, Kathi Walrath, "The Java Virtual Machine Specification", Addison Wesley Publication.

Online Resources:

1. https://www.java.com/en/download/help/index_using.xml
2. <https://docs.oracle.com/javaee/6/tutorial/doc/>

Semester-IV

Course code: ICS23PCL251	Course name: Computer Organization and Architecture	Course category: PCC
Credits: 3	Teaching scheme: L-3 Hrs/Week	Evaluation scheme: CA-40, MSE-20, ESE-40
Pre-requisites: Basic Data Structures		
Basic Computer Fundamentals & Computing		
Course Objectives: 1. Understand computer evolution and processor architecture		
2. Analyze computer system organization and memory hierarchy		
3. Apply instruction set concepts and pipelining techniques		
Course Outcomes: At the end of the course, the students will be able to -		
CO1: Understand the evolution, organization and architecture of modern computer systems		
CO2: Analyze the structure and function of computer components, interconnection, bus architectures and memory organization		
CO3: Understand input/output mechanisms, interrupt-driven I/O, DMA, I/O processors and ALU operation		
CO4: Analyze processor architectures and instruction execution with addressing modes, instruction formats, and assembly language		

Contents –

Unit	Content	Teaching hours
1	Computer Evolution & CPU Concepts: Organization and Architecture, Structure and Function, IAS Computer, Gates, Memory Cells, Chips, and Multichip Modules, Evolution of the Intel x86 Architecture, Embedded Systems & ARM Architecture, Designing for Performance, Multicore, MICs, and GPGPUs, Ahmdahl's Law and Little's Law.	9
2	Computer System & Memory Management: Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, PCI, Computer Memory System Overview, Cache Memory Principles, Elements of Cache Design, Semiconductor Main Memory, Error Correction, Magnetic Disk, RAID, Optical Memory, Magnetic Tape.	9
3	Computer Input / Output & Arithmetic: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels and Processors, The Arithmetic and Logic Unit (ALU), Integer Representation, Integer Arithmetic, Floating-Point Representation, Floating-Point Arithmetic.	9
4	Instruction Set and Pipelining: Types of Operands, Data Types, Types of Operations, Addressing, Addressing Modes, Instruction Formats, Assembly Language, Processor Organization, Register Organization, The Instruction Cycle, Instruction Pipelining, x86 Processor Family, ARM Processor, RISC Architecture, RISC Pipelining.	9
5	RISC and Parallel Processing: Instruction Execution Characteristics, RISC Architecture, RISC Pipelining, Processor Organization for Pipelining, Multiple Processors Organization, Symmetric Multiprocessors, Multithreading and Chip Multiprocessors, Clusters, Multicore Organization, Heterogeneous Multicore Organization.	9

Text Books: 1. William Stallings, Computer Organization and Architecture, 11/E ISBN- 9781292420103/ 9781292420080, Pearson Education, Global Edition, 2021-22.

2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, and Naraig Manjikian, Computer Organization, 6th Edition, ISBN- 978-0-07-338065-0/ 0-07-338065-2, McGrawHill, 2011-12.

Reference Books: 1. D. Patterson, J. Hennessy, Computer Organization and Design: The Hardware Software Interface, RISC V Edition, ISBN- 978-0-12-812275-4, Morgan Kauffman, 2018.

2. Liu & Gibson, Microcomputer Systems, Second Edition, ISBN: 978-81-203-0409-3, PHI, 1985.

Online Resources: 1. NPTEL / SWAYAM lectures.

https://onlinecourses.swayam2.ac.in/ntr26_ed96/modules/unsubscribe?email=vkolte%40mgmu.ac.in&s=bRYzbjiWeeE39pJo5e1ByvNNN8N7da2t%2FSgxmYawjSA%3D

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Semester-IV

Course code: ICS23PCL252	Course name: Machine Learning Engineering	Course category: PCC
Credits: 3	Teaching scheme: L-3 Hrs/Week	Evaluation scheme: CA-40, MSE-20, ESE-40
Duration of Theory Exam: 2 Hrs		
Pre-requisites: Python Programming		
Course Objectives:		
1. Understand core concepts and motivation of machine learning.		
2. Apply supervised learning methods for regression and classification.		
3. Analyze unlabeled data using unsupervised learning techniques.		
4. Explore advanced methods including ensembles, neural networks, and reinforcement learning.		
5. Evaluate and optimize models using appropriate metrics and validation techniques.		
6. Apply advanced learning approaches while addressing ethical and societal concerns.		
Course Outcomes: At the end of the course, the students will be able to -		
CO1: Identify machine learning types, applications, and ethical considerations.		
CO2: Apply supervised learning techniques for regression and classification.		
CO3: Analyze unlabeled data using clustering and dimensionality reduction methods.		
CO4: Understand advanced learning paradigms and modern machine learning techniques.		
CO5: Select, evaluate, and optimize machine learning models effectively.		
CO6: Apply advanced machine learning concepts to real-world and ethical scenarios.		

Contents –

Unit	Content	Teaching hours
1	Introduction to machine learning - Introduction and motivation for Machine Learning, definition and core components of Machine Learning including data, models, and evaluation metrics, types of Machine Learning: supervised learning, unsupervised learning, semi-supervised learning, and reinforcement learning, historical evolution of Machine Learning, applications of Machine Learning: marketing, finance, healthcare, transportation, cybersecurity, and smartphones, ethical considerations and social implications including bias, transparency, accountability,	8

	and privacy, foundational concepts: abstraction, knowledge representation, generalization, model complexity, and interpretability, and an overview of the Machine Learning pipeline.	
2	Supervised Learning - Supervised learning concepts and labeled datasets, regression techniques including simple linear regression, multiple linear regression, polynomial, nonlinear, exponential, and logarithmic regression, regression model assumptions and hypothesis testing, classification techniques such as logistic regression, decision trees, and support vector machines (SVM), and performance evaluation methods for supervised learning models.	8
3	Unsupervised Learning - Introduction to unsupervised learning, clustering concepts and applications, clustering techniques including K-Means, hierarchical clustering, density-based clustering (DBSCAN), distribution-based clustering using Gaussian Mixture Models (GMM), and fuzzy C-means, cluster quality evaluation methods, and dimensionality reduction techniques such as Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA).	8
4	Advanced Topics in Machine Learning - Ensemble learning methods including bagging, boosting, and random forest, neural networks such as artificial neural networks (ANN) and deep learning concepts, reinforcement learning fundamentals including agent, environment, state, action, and reward with trial-and-error learning, and model interpretability and explainability.	8
5	Model Evaluation and Selection - Evaluation metrics for classification including accuracy, precision, recall, F1-score, and ROC–AUC, regression evaluation metrics such as MAE, MSE, RMSE, and R^2 , cluster validation measures including Silhouette Score and Davies–Bouldin Index, cross-validation techniques such as hold-out, k-fold, stratified k-fold, and leave-one-out, model selection strategies, and hyperparameter tuning methods including grid search and random search.	8
6	Advanced Concepts and Applications - Transfer learning concepts including feature extraction, fine-tuning, and domain adaptation, meta-learning approaches such as model-agnostic meta-learning (MAML) and prototypical networks, adversarial machine learning including attacks and defenses, fairness, accountability, and transparency in machine learning, and case studies focusing on facial recognition and privacy.	5

Text Books:

1. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, O'Reilly Media.
2. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer.
3. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, Deep Learning, MIT Press.

4. Sebastian Raschka and Vahid Mirjalili, Python Machine Learning, Packt Publishing.

Reference Books:

1. Kevin P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press.
2. Andreas C. Müller and Sarah Guido, Introduction to Machine Learning with Python, O'Reilly Media.
3. Richard S. Sutton and Andrew G. Barto, Reinforcement Learning: An Introduction, MIT Press.

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Semester –IV

Course Code: ITY23PCP252 Course Name: Programming in JAVA LAB Course Category: PCC
Credits: 1 Teaching Scheme: P-2 Hrs/week Evaluation Scheme: TW-30, PR-20
Pre-requisites: Basic Programming
Lab Objectives: This course will enable students to
1. To enable the students to understand the core principles of the Object-Oriented Language
2. To understand the concept of packages and applet programming
3. To understand the concept of Multi-threading
4. To understand the concept of graphic programming
5. Introduce the students to database connectivity
Lab Outcomes: At the end of the course, the students will be able to -
LO1. Apply Object Oriented concepts to develop programs in Java.
LO2. Develop programs using packages and applet programming.
LO3. Develop programs using Inheritance, Interfaces. Multithreading.
LO4. Develop programs using graphic programming
LO5. Develop applications using databases.

List of Experiments**Unit I:****Introduction to Java****Aim: To study the working environment of java.**

1. Wap to print your Biodata?

2. Wap to add, subtract, divide, multiply two numbers using command line arguments? Wap to print your Biodata using command line arguments?

Aim: To study Decision Control structures and loop control structures in java

1. Wap to find out the Factorial of a number using For loop, While loop, Do while loop.

2. Wap to find out the square root of a number without using any library function?

3. Wap to find out whether a number is palindrome or not?

4. Write a program to print the kth digit from last. e.g. input 23617 and k=4 output 3.
5. Write a program to find the sum of all digits. Input 23617 output 2+3+6+1+7=19.
Aim: To study Arrays in java
1. Find the smallest and largest number in an array.
2. Count even numbers in an array.
3. Count occurrence of a given number in an array.

Aim: To study interface in java
1. WAP to find out the factorial of a number using the interface ?
2. WAP to find out the greatest among three numbers using the interface?
3. WAP to find out gcd and lcm using the interface ?
4. WAP to find out area and perimeter of rectangle using interface ?
Aim: To study packages in JAVA
WAP to check whether a number is palindrome or not using a package ?
WAP to find out square root of a number without using sqrt or pow function and use packages
WAP to check whether a number is prime or not using a package ?

Unit II:
Object Oriented Programming
Aim: To study classes and objects in JAVA
1. WAP to find out the area of a triangle having three sides using class?
2. WAP to find out the volume of a box using class ?
3. WAP to find out the area and perimeter of a rectangle ?
4. WAP to insert 10 no into stack using push operation and delete 2 elements using pop and display rest using class ?
Aim: To study methods, method overloading , constructors in java
1. WAP to find out the area of a triangle,rectangle,square and circle using method overloading and constructor overloading.
2. Write a JAVA program which contains a method square() such that square(3) returns 9, square(0.2) returns 0.04.
3. Write a JAVA program which contains a method cube() such that cube(3) returns 27, cube(0.2) returns 0.008.
4. Write a JAVA program which contains a method fun() such that fun(x) returns x and fun(x,y) returns x ² + y ² (where x and y are integers).
5. Write a JAVA program which contains a method fun() such that fun(x) returns x and fun(x,y) returns x + y and fun(x,y,z) returns x*y*z. (where x, y and z are integers).
6. Write a set of overloaded methods min() that returns the smaller of two numbers passed to them as arguments. Make versions for int and float.
Aim: To study Inheritance and types of inheritance in java
1. WAP to find out the volume of a box using simple inheritance ?

2. WAP to find out volume, cost and weight of a box using multilevel inheritance ?

3. WAP to find out volume, cost and weight of a box using multilevel inheritance and use super keyword at appropriate place?

Unit III. Multithreading and Exception Handling Thread:

Aim: To study exception handling in JAVA

1. WAP to create your own Exception to check whether a number is Prime or not, Palindrome or not, even or odd.

2. WAP to illustrate Arithmetic Exception, ArrayIndexOutOfBoundsException using nested Try Block with suitable example?

3. WAP to detect and resolve divide by zero error using Exception with suitable example?

Unit- IV: Multithreading

Aim: To study threads and multithreading in java

1) WAP to perform following using Multithreading i) Sort 10 numbers in ascending order

ii) Find Avg. of 10 numbers

Search a number in an array

2) WAP to detect and resolve deadlock using suitable examples?

3) WAP to illustrate the need of synchronization using suitable examples?

Unit- IV: Graphics Programming

Aim: To study java AWT

Program to set the background color of the panel using the color specified in the constants of the class.

Aim: To study swings in java

Create an applet for arithmetic operations.

Aim: Create a application to connect JDBC application to JDBC

Semester –IV

Course Code: ICS23PCP252 **Course Name:** ML Engineering - LAB **Course Category:** PCC

Credits: 1 **Teaching Scheme:** P- 2 Hrs/Week **Evaluation Scheme:** TW: 30, PR: 20

Pre-requisites: Fundamentals of programming logic

Lab Objectives: This course will enable students

1. To provide hands-on experience in implementing machine learning algorithms using Python.
2. To develop skills in data preprocessing, modeling, and performance evaluation.
3. To familiarize students with supervised, unsupervised, and advanced machine learning techniques.
4. To introduce ethical, fairness, and robustness considerations in machine learning applications.

Lab Outcomes: At the end of the course, the students will be able to -

1. Implement and evaluate machine learning models using appropriate tools and metrics.
2. Analyze data using clustering, dimensionality reduction, and classification techniques.
3. Optimize and compare models through validation and hyperparameter tuning.
4. Apply machine learning techniques responsibly to real-world datasets.

List of Experiments:

- 1:** Perform data preprocessing and cleaning using Python libraries such as Pandas and NumPy.
- 2:** Implement simple linear regression using scikit-learn.
- 3:** Evaluate model performance using basic regression metrics such as MAE and MSE.
- 4:** Implement linear regression from scratch using Python.
- 5:** Implement multiple linear regression using scikit-learn.
- 6:** Perform classification using logistic regression and decision tree algorithms.
- 7:** Evaluate classification and regression models using R^2 , RMSE, accuracy, and confusion matrix.
- 8:** Implement K-means clustering using scikit-learn.

- 9:** Perform hierarchical clustering and visualize results using dendrograms.
- 10:** Apply DBSCAN clustering on noisy datasets.
- 11:** Perform dimensionality reduction using Principal Component Analysis (PCA).
- 12:** Implement ensemble learning models using scikit-learn.
- 13:** Build and evaluate a basic neural network for classification tasks.
- 14:** Implement a simple reinforcement learning simulation.
- 15:** Evaluate models using cross-validation techniques.
- 16:** Perform hyperparameter tuning using GridSearchCV.
- 17:** Conduct comparative model evaluation and selection.
- 18:** Apply transfer learning using pre-trained models.
- 19:** Implement few-shot learning using meta-learning concepts.
- 20:** Simulate adversarial attacks and defense mechanisms.

Semester-IV

Course Code: ITY23HSL252 Course Name: Entrepreneurship Development Course Category: EEMC
Credits: 2 Teaching Scheme: L- 2 Hrs/week Evaluation Scheme: CA-40,MSE:20, ESE-40
Duration of Theory Exam: 2 Hrs
Pre-requisites: Knowledge of Planning
Course Objectives: This course will enable students to
1. To provide an overview of entrepreneurship development, covering its evolution, concepts, role in economic development, and factors affecting it.
2. Types of Entrepreneurship: Introduce various types of entrepreneurship such as techno entrepreneurship, women entrepreneurship, social entrepreneurship, and intrapreneurship, along with the decision-making process and entrepreneurial environments.
3. To equip students with essential skills for successful entrepreneurship, including project planning, business laws, communication, creativity, problem-solving, innovation, negotiation, and risk management, while also exploring different business organizations and legal aspects in India.
Course Outcomes: At the end of the course, the students will be able to -
CO1. Develop skills related to various functional areas of management (Marketing Management, Financial Management, Operations Management, Personnel Management etc.)
CO2. To develop skills related to Project Planning and Business Plan development.
CO3. To determine and compare various skills of successful entrepreneurs, business organizations and business laws.
CO4. To examine essentials to avoid failure in Entrepreneurship.

Contents–

Unit	Content	Teaching Hours
1	Introduction - Entrepreneurship Development, Evolution of Entrepreneurship, Meaning, Definition, and Concept of Enterprise, Concepts of Entrepreneurship, Role of Entrepreneurship in Economic Development, Factors Affecting Entrepreneurship,	8

	Entrepreneurial Development models and Theories, Entrepreneurial Trait Tests; Business Opportunity Identification.	
2	Entrepreneur- Major types of Entrepreneurship – Techno Entrepreneurship, Women Entrepreneurship, Social Entrepreneurship, Intrapreneurship (Corporate entrepreneurship), Rural Entrepreneurship, Family Business etc. The entrepreneurial decision process, Entrepreneurial Environment – Political, Legal, Technological, Natural, Economic, Socio – Cultural etc.	7
3	Project Planning - Project Planning, Skills for Successful Entrepreneurs & Business Organizations and Business Laws: Project report; Project appraisal; Setting up an Industrial unit – procedure and formalities in setting up an Industrial unit; Business Plan Development, Communication Skills, Creativity and Problem-solving, Innovation, Negotiation Skills, Risk management. Types of Business Organizations –Sole, Proprietorship, Joint Hindu Family Business, Partnership, Limited Liability Partnership (LLP), Corporate Governance, Franchising, Business Laws in India to Start Business.	8
4	Concepts of Entrepreneurship Failure - Issues of Entrepreneurial failure, Reasons of Entrepreneurial Failure, Essentials to Avoid Failure in Entrepreneurship. Case Study of Failure in Entrepreneurship.	7

Text Books:

1. Dynamics of Entrepreneurship Development – Vasant Desai.
2. Entrepreneurship Development and small business management – Poornima M. Charantimath
3. Dynamics of Entrepreneurship Development – Vasant Desai.
1. Innovation and Entrepreneurship – Peter F. Drucker
2. Kathleen R Allen, Launching New Ventures, An Entrepreneurial Approach, Cengage Learning, 2016.
3. Vijay Sathe, Corporate Entrepreneurship, Cambridge, 2009.

Semester –IV

Course Code: MGM21VEL101 Course Name: Environmental Studies Course Category: Basic Science
Credits: 2 Teaching Scheme: L- 2 Hrs/week Evaluation Scheme: CA-60, ESE-40
Duration of Theory Exam: 2 Hrs
Pre-requisites: Basic Science
Course Objectives: This course will enable students to
1. To study the environment and ecosystems.
2. To study different types of natural resources
3. To study concept of biodiversity and its conservation
4. To study the concept of causes, effects and control of different types of environmental pollution
5. To study population growth and its impact on environment
Course Outcomes: At the end of the course, the students will be able to -
CO1. Describe environment and ecosystem
CO2. Explain environmental impacts of human activities on natural resource
CO3. Identify the importance of conservation of biodiversity.
CO4. Describe the problems of environmental pollution, its impact on human and ecosystem and control measures
CO5. Identify the impact of increased population on environment

Contents–

Unit	Content	Teaching Hours
1	Ecosystem and the Environment - a. Definition, Scope and importance of Environmental studies, Need for Public awareness. b. Concepts of an Ecosystem, Structure and functions of an Ecosystem. a. Producers, Consumers and Decomposers in an Ecosystem	6

2	Natural Resources - a. Renewable and non-renewable resources, Role of individuals in conservation of natural resources for sustainable lifestyles. a. Use and over exploitation of Forest resources, Deforestation, Timber extraction, Mining, Dams and their effects on forest and tribal people b. Use and over exploitation of surface and ground water resources, Floods, Drought, Conflicts over water, Dams- benefits and problems.	6
3	Biodiversity and its Conservation - a. Definition, Genetic, Species and Ecosystem diversity, Bio-geographical classification of India. b. Value of biodiversity: Consumptive use, Productive use, Social, Ethical, Aesthetic and option values.	6
4	Environmental pollution- a. Definition, Causes, effects and control measures of Air pollution. Water pollution and Soil pollution. b. Causes, effects and control measures of Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards	6
5	Population issues and the Environment - a. Population growth, Variation among nations, Population explosion- Family welfare programmes, Environment and Human health, Human rights, Value education, HIV/AIDS. b. Woman and Child welfare, Role of information technology in environment and human health, Case studies	6

Text Books:

- 1 Bharucha Erach (ed) Text Book of Environmental Studies., University Press (India) Pvt. Ltd
2. Bharucha Erach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmedabad – 380013
3. Kaushik, Anubha & Kaushik, C.P. 2006. Perspectives in Environmental Studies, New Age International (P) Ltd. Publisher, New Delhi
4. Deswal, S. and Deswal, A. 2005. A Basic Course in Environmental Studies. Dhanpat Rai & Co ltd., Delhi.

Reference Books:

1. IndiaSantra S.C, (ed), Environmental Science, New Central Agency Pvt Ltd. Kolkata, India.
2. Botbin, D., and Keller, E.1995. Environmental Science. John Wiley and Sons, USA.
3. Cunningham, W.P. and Saigo, B.W. 1997. Environment Science. McGraw-Hill, USA.
4. Lal, R. and Stewart, B.A. 1992. Advances in Science: Soil Restoration Springer Verlag, New York.