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RAMDEOBABA UNIVERSITY, NAGPUR
Formerly Shri Ramdeobaba College of Engineering & Management (RCOEM) Est. 1984

RAMDEOBABA UNIVERSITY, NAGPUR-440013

(Formerly, Shri Ramdeobaba College of Engineering and Management, Nagpur 440013)

School of Electrical and Electronics Engineering

Department of Electrical Engineering

Teaching and Evaluation Scheme and Syllabi (as per National Education Policy-2020)

B. Tech Electrical Engineering **Specialization Artificial Intelligence and Applications**

(With effect from Academic Year 2026-27)

Program Educational Objectives

PEO 1: Our graduates will be able to plan, design and develop AI based solutions and practice in electrical systems.

PEO 2: Our graduates will be able to work in multidisciplinary environments including IT applications and adapt themselves as per the emerging technological needs of Industry.

PEO 3: Our graduates will be able to progress in their career by demonstrating in practice the technical and communication skills effectively with understanding of ethical and social values.

Program Outcomes

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Programme Specific Outcomes

PSO1: Analyze, design, and develop electrical engineering systems by integrating core electrical concepts with Artificial Intelligence techniques for applications in power systems, control, renewable energy, electric vehicle and industrial automation.

PSO2: Apply AI tools, data analytics, machine learning, and computational techniques to solve complex electrical engineering problems in various domains of electrical engineering.

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Semester I

S. No	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	BSC	26HS01TP0103	Engineering Chemistry	2	2	3	50+25	50+25	150	2
2	BSC	26HS03TP0106	Engineering Mathematics I	3	2	4	50+25	50+25	150	3
3	PCC	26EE07TP0101	Fundamentals of Electrical Engineering-I	3	2	4	50+25	50+25	150	3
4	ESC	26EE07TH0102	Digital Circuits	2	0	2	50	50	100	2
5	ESC	26EE07TP0103	Fundamentals of Programming	3	2	4	50+25	50+25	150	3
6	AEC	26HS02TP0101	Foundations of Business English	2	2	3	50+25	50+25	150	2
7	CCA	26HS02PR0102-2 to 26HS02PR0102-25	Liberal /Performing Arts	0	2	1	25	25	50	--
8	VEC	26HS02TH0103-2	Foundational Course in Universal Human Values	1	0	1	25	25	50	--
TOTAL				16	12	22	475	475	950	

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Semester II

S. No	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	BSC	26HS05TP0202	Semiconductor Physics	3	2	4	50+25	50+25	150	3
2	BSC	26HS03TH0216	Engineering Mathematics II	3	0	3	50	50	100	3
3	PCC	26EE07TP0201	Fundamentals of Electrical Engineering-II	3	2	4	50+25	50+25	150	3
4	ESC	26EE07TP0202	Analog Electronics Circuits	3	2	4	50+25	50+25	150	3
5	ESC	26EE07TP0203	Data Structures and Algorithms	2	2	3	50+25	50+25	150	2
6	IKS	26HS02TH0203-1	Foundational Literature of Indian Civilization	1	0	1	25	25	50	-
7	CCA	26HS04PR0201	Health, Fitness & Wellbeing	0	2	1	25	25	50	-
TOTAL				15	10	20	400	400	800	

Exit option: Award of Certificate in Electrical after the completion of 42 credits and an additional 8 credits.					
Sr. No.	Course Code	Course Offline/ Online Any two of following courses:	Lecture	Practical	Credits
1		Electrical Maintenance	3	0	3
		Electrical Appliances	3	0	3
Electrical Measurements and Instrumentation					
Equivalent NSQF/COURSERA/ MOOC courses approved by the Department					
2		Internship	Four Weeks		2
OR					
1		Project/ Internship/On-Job Training (OJT)	Eight weeks		8

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Semester III

S. No	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	BSC	26HS03TH0304	Probability and Transform	3	0	3	50	50	100	3
2	PCC	26EE07TH0301	Signals and Systems	3	0	3	50	50	100	3
3	PCC	26EE07TP0302	Microcontroller Programming and Applications	3	2	4	50+25	50+25	150	3
4	PCC	26EE07TP0303	Electrical Measurements and Instrumentation	3	2	4	50+25	50+25	150	3
5	MDM		MDM Course-I	3	0	3	50	50	100	3
6	OE		Open Elective-I	2	0	2	50	50	100	2
7	VEC	26HS01PR0301	Environmental Science Lab	0	2	1	25	25	50	---
8	HSSM		Innovation and Entrepreneurship	1	2	2	25+25	25+25	100	---
9	FP/CEP	26EE07PR0304	Field Project / Community Engagement Project-I	0	2	1	25	25	50	---
TOTAL				18	10	23	450	450	900	

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Semester IV

S. No	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	PCC	26EE07TP0401	Network Analysis	3	2	4	50+25	50+25	150	3
2	PCC	26EE07TH0402	Power System-I	3	0	3	50	50	100	3
3	PCC	26EE07TP0403	Electrical Machines	4	2	5	50+25	50+25	150	3
4	VSC	26EE07TP0404	Automation with PLC	3	2	4	50+25	50+25	150	3
5	MDM		MDM Course –II	3	0	3	50	50	100	3
6	OE		Open Elective-II	2	0	2	50	50	100	2
7	SEC	26ID27TH0408	Design Thinking	1	0	1	25	25	50	---
8	FP/CEP	26EE07PR0405	Prompt Engineering Lab	0	2	1	25	25	50	---
9	SEC	26EE07PR0406	*Skill Enhancement Course-I	0	2	1	25	25	50	--
10	CCA	26HS04PR0401	Self Defence & Indian Martial Arts	0	2	0				
TOTAL				19	12	24	450	450	900	

*Floating Credit: To be acquired before IV Semester

Exit option: Award of Diploma in Electrical Engineering after the completion of 89 credits and an additional 8 credits.					
Sr. No.	Course Code	Course (Offline/ Online) Any two of following courses:	L	P	C
1		Computer Aided Electrical Engineering Drawing	3	0	3
		Electrical Energy Conservation and Audit Energy Storage Systems Equivalent NSQF/COURSE/ MOOC courses approved by the Department	3	0	3
2		Internship	Four weeks		2
OR					
1		Project/ Internship/On-Job Training(OJT)			8

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Semester V

S. No	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal evaluation	Total	Duration of End Semester (Hrs)
1	PCC	26EE07TP0501	Power Electronics	3	2	4	50+25	50+25	150	3
2	PCC	26EE07TP0502	Control Systems	4	2	5	50+25	50+25	150	3
3	ESC	26EE07TP0503	Artificial Intelligence	3	2	4	50+25	50+25	150	3
4	PEC	26EE07TH0504	Program Elective-I	3	0	3	50	50	100	3
5	MDM		MDM Course-III	3	0	3	50	50	100	3
6	OE		Open Elective-III	2	0	2	50	50	100	2
7	AEC	26HS02TP0501	Business Communication	1	2	2	25+25	25+25	100	---
TOTAL				19	08	23	425	425	850	

Program Elective-I

Sem	Program Elective	Track I	Track II	Track III	Track IV
5	I	Optimization Techniques 26EE07TH0504-1	Electrical Energy Conservation and Audit 26EE07TH0504-2	Utilization of Electrical Energy 26EE07TH0504-3	Renewable Energy Sources 26EE07TH0504-4

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Semester VI

S. No	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	PCC	26EE07TH0601	Power System-II	3	0	3	50	50	100	3
2	PCC	26EE07TH0602	Electrical Installation Design	3	0	3	50	50	100	3
3	ESC	26EE07TP0603	Machine Learning	3	2	4	50+25	50+25	150	3
4	MDM		MDM Course-IV	3	0	3	50	50	100	3
5	PEC	26EE07TH0604	Program Elective-II	3	0	3	50	50	100	3
6	PEC	26EE07TH0605	Program Elective-III	3	0	3	50	50	100	3
7	Project	26EE07PR0606	Capstone Project -I	0	4	2	50	50	100	---
8	SEC	26EE07PR0607	*Skill Enhancement Course-II	0	2	1	25	25	50	--
TOTAL				18	08	22	400	400	800	

*Floating Credit: To be acquired before VI Semester.

Exit option: Award of B.VoC in Electrical Engineering after the completion of 134 credits and an additional 8 credits.					
Sr. No.	Course Code	Course (Offline/Online) Any two of following:	Lecture	Practical	Credits
1		Industrial Electrical Systems	3	0	3
		Power Quality Flexible AC Transmission Equivalent NSQF/COURSERA/ MOOC courses approved by the Department	3	0	3
2		Internship	Four weeks		2
OR					
1		Project/Internship/On-Job Training(OJT)			8

Program Elective – II and III

Sem	Program Elective	Track I	Track II	Track III	Track IV
6	II	# Data Visualization 26EE07TH0604-1	Power Plant Engineering 26EE07TH0604-2	Electric Drives and Control 26EE07TH0604-3	Introduction to Nuclear Engineering 26EE07TH0604-4
	III	Robotics and Automation 26EE07TH0605-1	Smart grid and Cyber Security 26EE07TH0605-2	Solar Photovoltaic Engineering 26EE07TH0605-3	Nuclear Safety and Regulations 26EE07TH0605-4

Credit transfer through equivalent global certification with prior approval by the Department

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Semester VII

S. No	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	PCC	26EE07TP0701	Digital Protection and Switchgears	3	2	4	50+25	50+25	150	3
2	PCC	26EE07TH0702	AIML Applications in Electrical Engineering	2	0	2	50	50	100	2
3	PEC	26EE07TP0703	Program Elective-IV	3	2	4	50+25	50+25	150	3
4	HSSM	26HS02TH0701	Principles of Economics and Management	2	0	2	50	50	100	2
5	SEC	26EE07PR0704	*Participative Learning	0	2	1	25	25	50	--
6	Project	26EE07PR0705	Capstone Project -II	0	6	3	50	50	100	---
TOTAL				10	12	16	325	325	650	
OR										
1	Intern ship	26EE07PR0706	Full Semester internship	0	0	16	325	325	650	--

***Floating Credit: To be acquired before VII Semester**

Program Elective – IV

Sem	Program Elective	Track I	Track II	Track III	Track IV
7	IV	Digital Signal Processing 26EE07TP0703-1	High Voltage Engineering 26EE07TP0703-2	Electric Vehicle 26EE07TP0703-3	Nuclear Instrumentation 26EE07TP0703-4

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Semester VIII

S. No	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	PEC	26EE07TH0801	Program Elective-V	3	0	3	50	50	100	3
2	PEC	26EE07TH0802	Program Elective-VI	3	0	3	50	50	100	3
3	Project	26EE07PR0803	Capstone Project -III	0	12	6	100	100	200	---
TOTAL				6	12	12	200	200	400	
OR										
1	Internship / OJT	26EE07PR0804	Full Semester Industry Internship /TBI	0	0	12	200	200	400	---
OR										
1	RM	26EE07PR0805	Research Methodology	4	0	4	50	50	100	3
2	Internship	26EE07PR0806	Research Internship	0	0	8	150	150	300	---
TOTAL				4	0	12	200	200	400	

Program Elective – V and VI

Sem	Program Elective	Track I	Track II	Track III	Track IV
8	V	Industry 4.0 26EE07TH0801-1	Power Quality 26EE07TH0801-2	Power Semiconductor Based Drives 26EE07TH0801-3	Industrial Applications of Nuclear Energy 26EE07TH0801-4
	VI	# Deep Learning 26EE07TH0802-1	Power Management in Data Centres 26EE07TH0802-2	Energy Storage Systems 26EE07TH0802-3	Electrical Systems in Nuclear Power Plants 26EE07TH0802-4

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Basket of Program Elective Courses

Program Elective					
Sem	PEC No.	Track I	Track II	Track III	Track IV
5	I	Optimization Techniques 26EE07TH0504-1	Electrical Energy Conservation and Audit 26EE07TH0504-2	Utilization of Electrical Energy 26EE07TH0504-3	Renewable Energy Sources 26EE07TH0504-4
6	II	# Data Visualization 26EE07TH0604-1	Power Plant Engineering 26EE07TH0604-2	Electric Drives and Control 26EE07TH0604-3	Introduction to Nuclear Engineering 26EE07TH0604-4
	III	Robotics and Automation 26EE07TH0605-1	Smart grid and Cyber Security 26EE07TH0605-2	Solar Photovoltaic Engineering 26EE07TH0605-3	Nuclear Safety and Regulations 26EE07TH0605-4
7	IV	Digital Signal Processing 26EE07TP0703-1	High Voltage Engineering 26EE07TP0703-2	Electric Vehicle 26EE07TP0703-3	Nuclear Instrumentation 26EE07TP0703-4
8	V	Industry 4.0 26EE07TH0801-1	Power Quality 26EE07TH0801-2	Power Semiconductor Based Drives 26EE07TH0801-3	Industrial Applications of Nuclear Energy 26EE07TH0801-4
	VI	# Deep Learning 26EE07TH0802-1	Power Management in Data Centres 26EE07TH0802-2	Energy Storage Systems 26EE07TH0802-3	Electrical Systems in Nuclear Power Plants 26EE07TH0802-4

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Honors in “Electrical Engineering by Research”
VII and VIII Semester

S. No	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	RM	26EE07HT0702	Research Methodology /SWAYAM –NPTEL approved by the Department	3	0	3	50	50	100	3
2	Project	26EE07HP0703	Research Project Phase-I	0	06	3	50	50	100	---
3	Project	26EE07HP0801	Research Project Phase-II	0	18	12	200	200	400	---
TOTAL				3	24	18	300	300	600	

Honors in “Electric Vehicles”

Sem	Course Type	Course code	Course Name	L	P	C	Continuous Assessment	End Semester / Internal Evaluation	Total	Duration of End Semester (Hrs)
III	Honors	26EE07HT0301	Electric Vehicle Fundamentals	3	0	3	50	50	100	3
IV	Honors	26EE07HT0401	Electric Vehicle: Components and Systems	3	0	3	50	50	100	3
V	Honors	26EE07HT0501	Battery Storage and Charging System	4	0	4	50	50	100	3
VI	Honors	26EE07HT0601	Electric Vehicle Drives and Control OR Equivalent SWAYAM NPTEL course approved by the Department	4	0	4	50	50	100	3
VII	Honors	26EE07HP0701	Project	0	8	4	50	50	100	
TOTAL				14	08	18	250	250	500	

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Multidisciplinary Minor (MDM) Courses offered by the Computer Science Department for Electrical Students

S. No	Sem	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	III	26CS01TH0305-2	Object Oriented Programming	3	0	3	50	50	100	3
2	IV	26CS01TH0407-2	Programming for Machine Learning	3	0	3	50	50	100	3
3	V	26CS01TH0507-2	Database Management System	3	0	3	50	50	100	3
4	VI	26CS01TH0605-2	Internet of Things	3	0	3	50	50	100	3
TOTAL				12	0	12	200	200	400	

Multidisciplinary Minor (MDM) Courses offered by the Electrical Department

“Renewable Energy and E-mobility”

S. No	Sem	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal Evaluation	Total	Duration of End Semester (Hrs)
1	III	26EE07TH0309	Introduction to Renewable Energy Sources	3	0	3	50	50	100	3
2	IV	26EE07TH0409	EV Architecture and Components	3	0	3	50	50	100	3
3	V	26EE07TH0509	Energy Storage Systems in E- Mobility	3	0	3	50	50	100	3
4	VI	26EE07TH0609	Autonomous Vehicle	3	0	3	50	50	100	3
TOTAL				12	00	12	200	200	400	

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Multidisciplinary Minor track in Basics of Nuclear Systems

Sem	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal evaluation	Total	Duration of End Semester (Hrs)
III	26EE07TH0310	Nuclear Concepts-I	3	0	3	50	50	100	3
IV	26EE07TH0410	Nuclear Concepts-II	3	0	3	50	50	100	3
V	26EE07TH0510	Basics of Nuclear Measurements	3	0	3	50	50	100	3
VI	26EE07TH0610	Nuclear Security and Safeguards	3	0	3	50	50	100	3
TOTAL			12	00	12	200	200	400	

Minors in “E-Mobility” offered by the Electrical Department

Sem	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal evaluation	Total	Duration of End Semester (Hrs)
III	Minor	26EE07MT0301	Basics of Electrical Engineering and E-Mobility	3	0	3	50	50	100	3
IV	Minor	26EE07MT0401	Energy Storage Systems for EV Applications	3	0	3	50	50	100	3
V	Minor	26EE07MT0501	Introduction to EV Drives	4	0	4	50	50	100	3
VI	Minor	26EE07MT0601	EV Communication and Instrumentation	4	0	4	50	50	100	3
VII	Minor	26EE07MP0701	Project	0	8	4	50	50	100	--
TOTAL				14	08	18	250	250	500	

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Minor track in” Nuclear Energy Systems”

Sem	Course Code	Course Name	L	P	C	Continuous Assessment	End Semester/ Internal evaluation	Total	Duration of End Semester (Hrs)
III	26EE07MT0302	Nuclear Fundamentals -I	3	0	3	50	50	100	3
IV	26EE07MT0402	Nuclear Fundamentals -II	3	0	3	50	50	100	3
V	26EE07MT0502	Nuclear Measurements and Instrumentations	4	0	4	50	50	100	3
VI	26EE07MT0602-1	Nuclear Power Plant Engineering	4	0	4	50	50	100	3
	26EE07MT0602-2	Industrial Applications of Nuclear Energy							
VII	26EE07MP0702	Project	-	8	4	50	50	100	--
TOTAL			18	00	18	250	250	500	

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Semester I	
Course Code: 26HS01TP0103	Course: Engineering Chemistry
L: 2Hrs, P: 2Hrs per Week	Total Credits: 03
Compulsory/Elective: Compulsory	Course Type: BSC

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Analyze boiler water chemistry and apply treatment methods to prevent scaling and corrosion.
CO 2:	Interpret spectroscopic data, including electronic and X-ray diffraction techniques, for material characterization.
CO 3:	Evaluate the working principles, materials, and applications of lithium-ion batteries, fuel cells, and supercapacitors.
CO 4:	Differentiate between renewable and non-renewable energy resources and assess their environmental and economic impacts.
CO 5:	Develop practical skills in chemical handling, water and fuel analysis, e-waste resource recovery, and industrial characterization techniques, fostering sustainable chemistry and innovation.

Course Content:
Module I: Boiler chemistry (7Hrs) Introduction to Boiler Chemistry Importance of boilers in power generation, Types of boilers (fire-tube, water-tube). Role of chemistry in boiler performance. Sources of impurities in feed water. Hardness, alkalinity, dissolved oxygen, silica and TDS. Numerical on Lime Soda process, Effects of impurities: scaling, corrosion, foaming, priming and chemical reactions involved in scale formation and corrosion.
Module II: Material Characterization & Spectroscopic Techniques (7Hours) Spectroscopy: Fundamentals of spectroscopy, Interaction of light with matter, Beer-Lambert's Laws of absorption. Electronic Spectroscopy: Types of transitions, Chromophores, auxochrome, different type of absorption shifts, Woodward-Fieser Rule. X-ray Spectroscopy: Principles of X-ray diffraction (XRD) for crystal structure determination. Applications in materials science and semiconductor industry.
Module III: Energy Storage and conversion devices (08 Hours) Battery: Fundamentals of electrochemistry, Introduction to battery, types, characteristics, components/materials, working and applications of Lead acid battery and Lithium-ion. Battery Waste management. Energy conversion devices: Introduction, characteristics, materials, working and applications of H ₂ -O ₂ fuel cells, Supercapacitors.

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Module IV: Chemical Thermodynamics and Corrosion Science (07 Hours) Thermodynamic functions: Energy, work, entropy, enthalpy and free energy Corrosion: Introduction, mechanisms of corrosion, types of corrosion and its prevention.
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<u>Text Books</u>	
1	Energy storage and conversion devices: Super capacitors, batteries and hydroelectric cells, Anurag Gaur, A. L. Sharma, Anil Arya. 2021, CRC press, 1st edition, ISBN: 978-1 003-14176. 3. 4. 5.
2	A Textbook of Engineering Chemistry, S. S. Dara & S. S. Umare, S. Chand Publishing, ISBN 9355018576, 9789355018571.
3	Elementary Organic Spectroscopy, Y. R. Sharma, Revised Edition, S. Chand Publishing, ISBN 9789358702385.
4	Engineering Chemistry. Jain & Jain, 17th Edition 2025. ISBN : 978-93-5216-213-0
5	A Textbook of Engineering Chemistry, Dr. Rajshree Khare, published by S. K. Katariya and Sons, New Delhi

<u>Reference Books</u>	
1	Practical Guide to Thermal Power Station Chemistry, Soumitra Banerjee, 2022, CRC Press, 1st Edition, ISBN: 978-1-032-18237-4.
2	Spectroscopy for Materials Characterization, Simonpietro Agnello (Editor), 2021, Springer, 1st Edition, ISBN: 978-3-030-73264-0.
3	Electrochemical Energy Storage for Renewable Sources and Grid Balancing, Patrick T. Moseley, Jürgen Garche, 2015, Elsevier, 1st Edition, ISBN: 978-0-444-62616-5.
4	Energy Storage and Conversion Devices: Supercapacitors, Batteries and Hydroelectric Cells, Anurag Gaur, A. L. Sharma, Anil Arya, 2021, CRC Press, 1st Edition, ISBN: 978-1-003-14176-0.

Engineering Chemistry Lab

List of Experiments for Chemistry Lab (Any eight experiments from the given list)	
1	Safe Handling of Hazardous Chemicals for Sustainable Communities. (SDGs: 3, 12, 13)
2	To estimate the type and extent of alkalinity present in the water sample to supply for high pressure boilers.(SDGs: 6, 12)
3	To estimate the amount of temporary, permanent and total hardness present in the water sample to supply for high pressure boilers. (SDGs: 6,9,10)
4	Chromium Estimation from E-Waste for Water and Health Safety (SDGs: 3, 6, 12)
5	Computational Prediction of NMR Spectra for Sustainable Chemistry. (SDGs: 9, 12)
6	Conductometric Determination of Acid–Base Titration End points using conductivity meter (SDG 12)
7	Study of Temperature-Dependent Viscosity and fluid flow behavior using Redwood Viscometer (SDG 9)
8	To determine the composition of coal by proximate analysis (moisture, volatile matter, ash, fixed carbon, elemental composition).(SDGs: 7, 12, 13)
9	Estimation of Fe (II) Ions from E-Waste Rust for Sustainable Resource Management

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	and verification of Lambert's Beers Law (SDGs: 12, 15, 3, 9)
10	Determination of Saponification Value of oils (SDG 12)
11	Determine acid value of oils. (To assess quality, degradation, and safe consumption. (SDG 3)

Text Books:

1. Experiments and Calculation in Engineering Chemistry by S. S. Dara, S. Chand Publications.
2. Advanced Practical Physical Chemistry by J.B.Yadav, Krishna's Prakashan Media (P) Limited.

Reference Books:

College Practical Chemistry by V. K. Ahluwalia, S. Dhingra and A. Gulati, Universities Press Publications.

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Semester I	
Course Code: 26HS03TP0106	Course: Engineering Mathematics I
L: 3Hrs, P: 2 Hrs per Week	Total Credits: 04
Compulsory/Elective: Compulsory	Course Type: BSC

Course Outcomes:	
After completion of the course, students will be able to	
CO 1	Solve and analyze first-order ordinary differential equations and apply them to model real-life engineering problems using computational tools.
CO 2	Formulate and solve higher-order differential equations using analytical techniques and interpret their applications through graphical models.
CO 3	Analyze and interpret engineering data using curve fitting, regression, and correlation techniques to identify patterns and relationships.
CO 4	Apply differential calculus methods to solve engineering problems and use computational tools to model and optimize systems involving several variables.
CO 5	Construct and solve partial differential equations related to engineering boundary value problems and simulate their behavior using computational visualization techniques.
CO 6	Implement fundamental matrix operations to simulate and interpret applications in fields such as image processing, computer graphics.

<u>Syllabus</u>
Module I: First order ordinary differential equations (07 hours) Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Applications of First order Differential Equations.
Module II: Ordinary differential equations of higher orders (08 hours) Second order linear differential equations with constant and variable coefficients, method of variation of parameters, Cauchy-Euler equation. Applications of Higher order Differential Equations.
Module III: Statistics: (07 hours) Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves, correlation and regression – Rank correlation, Multiple regression and correlation and its application in Engineering.
Module IV: Differential Calculus (10 hours) Taylor's and Maclaurin's series expansions, radius of curvature (Cartesian form), evolutes and involutes, Limit and continuity of functions of several variables and their partial derivatives, Euler's Theorem, chain rule, total derivative, Jacobians, Maxima, minima and saddle points; Method of Lagrange multipliers.
Module V: Partial differential equations (8 hours) Partial differential equations with separation of variables, boundary value problems: vibrations of a string, heat equation, potential equation, vibrations of circular membranes.

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Text Books/ References	
1	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
2	Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3	W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
4	A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).
5	Paul Zimmermann, Computational Mathematics with Sagemath, siam publisher.

Expt No	List of Experiments:	Mapped COs
1	To use mathematical software as an advance calculator	CO1
2	Graphical Representation of 2D Functions Relevant to Engineering Models	CO1, CO2, CO3
3	3D Plotting Techniques for Visualizing ODE-related Engineering Models	CO1, CO2, CO3
4	Analyzing Data Trends through Curve Fitting Techniques	CO3
5	Visualization and Interpretation of Differential Equation Solutions	CO1, CO2, CO5
6	Differential Calculus Techniques for Modelling Engineering behavior.	CO4
7	Applied optimization (Maxima, minima and Gradient descent method)	CO4
8	Matrix Computations with various Applications	CO6

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Semester I	
Course Code: 26EE07TP0101	Course: Fundamentals of Electrical Engineering I
L: 3Hrs, T: 0Hrs, P: 2 Hrs per Week	Total Credits: 04
Compulsory/Elective: Compulsory	Course Type: PCC

Course Outcomes: After completion of the course, students will be able to	
CO 1	Apply the basic electrical laws for solving DC and magnetic circuits
CO2	Explain the fundamentals of single phase and three-phase AC circuits and determine various phasor quantities
CO 3	Discuss the structure of power generation ,transmission and distribution systems
CO 4	Explain LT switchgear , protection devices, and earthing systems used in electrical installations
CO5	Perform precise measurements and analyse experimental results
CO6	Explain the principles, procedures, and outcomes of experiment performed

<u>Syllabus</u>
Module I: DC Circuits (08 Hours) Circuit elements resistor, inductor and capacitor, Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel circuits excited by independent voltage sources; energy sources, source transformation, star- delta transformation.
Module II: Magnetic Circuits (04 Hours) Magnetic circuits: Basic terminologies of magnetic circuits, Analogy between magnetic and Electric circuits, Kirchhoff's Laws for magnetic circuits, Types of magnetic circuits : series and parallel, B-H characteristics, leakage flux and fringing.
Module III: Fundamentals of A.C. Circuits (10 Hours) Generation of sinusoidal voltage, basic terminologies associated with AC quantity, phasor representation of alternating quantities, Analysis of basic series and parallel AC circuit, Resonance in series and parallel circuits, Real power, reactive power, apparent power, Power factor, nature of power factor and it's improvement techniques,
Module VI: Three Phase A.C. Circuits (05 Hours) Basic concepts; Generation of three phase sinusoidal voltages, basic terminologies associated with three phase circuit, Relationship between line and phase values of balanced star and delta connections; Real power, reactive power, apparent power in balanced three phase circuits.
Module V: Basics of Electrical Power Systems (4 Hours) Sources of Electrical Energy: conventional and non-conventional, Block schematic of :

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Hydro-electric, Thermal, Nuclear, Wind and Solar Power Plant with their advantages and disadvantages. Single line diagram for generation, transmission and distribution through different voltage levels.
Module VI: : Introduction to Electrical Installations (5 Hours) Components of LT Switchgear: Fuses: AC and DC types of fuses, Switch Fuse Unit (SFU), MCB, MCCB, Leakage current, Electrocution Current Formula, ELCB /RCCB, earthing and it's types.

Text Books:	
1	Basic Electrical Engineering, D. C. Kulshreshtha, McGraw Hill, 2009.
2	Basic Electrical and Electronics Engineering by D.P. Kothari and I J Nagrath, TMH.
3	A Textbook of Electrical Technology, Volume I, B. L. Thereja, S. Chand Publications, 2005
4	Basic Electrical Engineering: S. B. Bodkhe, N. M. Deshkar, P. P. H. Pvt. Ltd. Second Edition, 2008.

Reference Books:	
1	Basic Electrical Engineering by Fitzgerald and Higginbotham, TMH.
2	Basic Electrical and Electronics Engineering by S.K.Bhattacharya, Pearson Publications

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Semester I	
Course Code: 26EE07TH0102	Course: Digital Circuits
L: 2Hrs, T: 0Hrs, P: 0Hrs per Week	Total Credits: 02
Compulsory/Elective: Compulsory	Course Type: ESC

Course Outcomes: After completion of the course, students will be able to
CO 1: Analyze and simplify digital systems using number systems and Boolean logic.
CO 2: Design combinational logic circuits to meet given specifications.
CO 3: Analyze sequential circuits using flip-flops.
CO 4: Explain and implement synchronous/asynchronous counters and shift registers.

<u>Syllabus</u>
Module I: Basics of Digital Electronics Motivation for digital systems, Number Systems and Digital Codes (conversion and arithmetic), representation of signed numbers, Boolean algebra, SOP, POS forms, Karnaugh-maps, Introduction to Logic family. Timing Issues in Digital Circuit, Fan-In, Fan-Out, Propagation Delay, Power dissipation, Noise Margin, Timing issues
Module II: Combinational Circuit Design Multiplexers, De-multiplexers, Encoders, Decoders, Code Converters, Adders, Subtractor, BCD Adder/Subtractor, comparator.
Module III: Sequential Circuit Latches, Flip Flops – RS, D, JK, Master Slave JK, T flip flop, their excitation and truth table, Conversion of one Flip Flop to another, Timing and Clocking issues.
Module IV: Sequential circuits Design Design of asynchronous and synchronous counters, Shift Registers, Application of shift register.

Text Books:
1 D.V. Hall, “Digital Circuits and Systems”, Tata McGraw Hill, 1989.
2 Modern Digital Electronics: R. P Jain, Tata McGraw Hill, 3rd Edition.

Reference Books:
1 Digital Logic and Computer Design: Morris Mano, PHI, 3rd Edition.

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Semester I	
Course Code: 26EE07TP0103	Course: Fundamentals of Programming
L: 3Hrs, P: 2Hrs per Week	Total Credits: 04
Compulsory/Elective: Compulsory	Course Type: ESC

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Implement C programs using algorithms and different control structures.
CO 2:	Apply concepts of function, recursion, arrays, and strings for modular programming in C
CO 3:	Develop C program using pointers and structures for efficient data handling.
CO 4:	Implement file input/output operations using file handling concepts in C.
CO 5:	Apply object-oriented concepts using classes and objects to develop basic C++ programs.
CO6	Execute, debug, and validate C and C++ programs to ensure correct functionality.

<u>Syllabus</u>
Module I: Introduction to Programming (10 Hours) Algorithm building, Representation of Algorithm: Flowchart/Pseudo code with examples. Introduction to C language: Structure of C Program, Keywords, Data Types and Variables, Operators and Expressions, Control Structures: Decision making, switch case statement, Looping statements and Nested loop. break, continue, and goto statements.
Module II: Functions and Arrays : (10 Hours) Introduction to functions and modular programming: Function declaration, definition, and calling, Function arguments and return values, Call by value and call by reference, Function prototypes, Library functions vs. user-defined functions. Concept of Recursion. Introduction to storage classes. Concepts of array, one- and two-dimensional arrays, declaration and initialization of arrays for algorithm building. Passing arrays to functions. String declaration and initialization String input/output functions, String manipulation functions, Array of strings.
Module III: Pointers and Structures (08 Hours) Introduction to Pointers and memory addressing, Pointer declaration and initialization, Pointer operators, Pointer arithmetic, Pointers and arrays, Pointers and functions, Pointer to Pointer. Introduction to Structures: Structure declaration and initialization, Accessing structure members, Array of structures, Structures and functions, Nested structures, Pointers to structures.
Module IV: File Handling (Teaching Hours : 04 Hours)

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Streams in C, Types of Files, File Input/output Operations: Modes of file opening, Reading and writing the file, Closing the files.

Module V: Introduction to C++ and Object-Oriented Programming:(07 Hours) Basics of C++, Object-oriented programming concepts: encapsulation, abstraction, polymorphism, inheritance, Structure of a C++ program, Classes and Objects: Class declaration and definition, Access specifiers, Creating and accessing objects, Concept of Operator Overloading and Inheritance.
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Text Books:	
1	Programming in ANSIC: E.Balguruswami Mc-GrawHill
2	Mastering C: K. R. Venugopal and S. R. Prasad, Tata Mc-GrawHill
3	Balagurusamy, E. (2017). Object-Oriented Programming with C++ (7th ed.). McGraw Hill Education.

Reference Books:	
1	Programming with C: Byron Gottfried, Schaums Outline Series.
2	Let Us C: Yashwant Kanetkar, B P B Publication
3	Lippman, S. B., Lajoie, J., & Moo, B. E. (2012). C++ Primer (5th ed.). Addison-Wesley.

Fundamentals of Programming Lab

Experiments based on:
Control statements, Looping statements and Nesting of control structures
Functions, Arrays and String
Pointers and Structures
File Handling
Object Oriented Programming

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Semester I	
Course Code: 26HS02TP0101	Course: Foundations of Business English
L: 2Hrs, P:2Hrs per Week	Total Credits: 03
Compulsory/Elective: Compulsory	Course Type: AEC

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Apply and demonstrate active listening techniques and grammatical rules to construct accurate, coherent, and contextually appropriate communication.
CO 2:	Analyse and apply verbal aptitude strategies, business vocabulary, and reading comprehension techniques to interpret written communication effectively.
CO 3:	Demonstrate and adapt public speaking techniques and professional etiquette to deliver structured and audience-centric oral communication in workplace scenarios.
CO 4:	Evaluate and apply employability communication strategies by actively participating in group discussions, mock interviews, and résumé-building exercises to meet professional standards.
CO 5:	Create and justify professional documents using appropriate formats and ethically integrate AI-assisted tools to enhance clarity, accuracy, and effectiveness in communication.

Syllabus
Module I: Listening Comprehension and Remedial Grammar (05 Hours) Listening Comprehension: Active listening, Reasons for poor listening, Barriers to effective listening, Traits of a good listener, Note-making Remedial Grammar: Common Errors in Indian English, Subject-verb agreement, Tenses
Module II: Structural Communication and Reading Comprehension (05 Hours) Verbal Aptitude: Para-jumbles, Analogies, Sentence completion, Syllogisms Business Vocabulary: Use of power verbs, power adjectives and power adverbs, Common technical affixes, Avoiding corporate jargons Reading Comprehension: Types and Strategies
Module III: Speaking Skills (05 Hours) Public Speaking: Mechanics of Public Speaking, Five-C model of storytelling (audience-centric), principles of effective introductions and welcome addresses, and questioning techniques. <u>Professional Oral Communication:</u> Meetings, Seeking and giving feedback, <u>Professional Etiquette:</u> greetings, introductions, politeness strategies, telephone and virtual communication
Module IV: Communication for Employment (05 Hours) Group Discussions: concepts, types, roles, and evaluation parameters Résumé Building: structure, content, and formatting techniques

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Introduction to Interview Skills: types of interviews, commonly asked questions, and response strategies

Module V: Professional Communication (06 Hours) Principles of professional document design Academic and professional email writing (format, tone, etiquette) Instruction writing (clarity, sequencing, audience awareness) Statement of Purpose (SOP): structure and content Introduction to AI-assisted communication (AI prompts and applications) and Ethical considerations in the use of AI in professional communication
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Text Books:

- | |
|---|
| 1. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011 |
| 2. Practical English Usage. Michael Swan. OUP. 1995. |
| 3. Remedial English Grammar. F.T. Wood. Macmillan.2007 |
| 4. On Writing Well. William Zinsser. Harper Resource Book. 2001 |
| 5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006 |
| 6. The AI Prompt Handbook for Business Writing: 50+ Prompts for Professionals, Managers & Entrepreneurs (The AI Prompt Handbook Series), Maxwell Striling |
| 7. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011 |

Foundation of Business English Lab

List of Practical

Computer Assisted + Activity Based Language Learning

Practical 1: Everyday Situations: Conversations and Dialogues – Listening Skills
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Practical 2: Reading Skills

Practical 3: Everyday Situations: Conversations and Dialogues- Speaking Skills
--

Practical 4: Pronunciation, Intonation, Stress, and Rhythm
--

Activity Based Language Learning

Practical 5: Public Speaking

Practical 6: Presentation Skills: Orientation

Practical 7: Presentation Skills: Mock
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Practical 8: Group Discussions: Practice
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Practical 9: Group Discussions: Mock

Reference Books:

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1. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011
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2. <i>Practical English Usage</i> . Michael Swan. OUP. 1995.
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Liberal Arts/Performing arts									
Course Code	Course Title	Lecture	Tutorial	Practical	Credits	Continuous Evaluation	End Sem Exam/Internal Evaluation	Total	ESE Duration
26HS02PR0102-2	Fundamentals of Indian Classical Dance: Bharatnatayam	0	0	2	1	25	25	50	N/A
26HS02PR0102-3	Fundamentals of Indian Classical Dance: Kathak	0	0	2	1	25	25	50	N/A
26HS02PR0102-4	Introduction to Digital Photography	0	0	2	1	25	25	50	N/A
26HS02PR0102-5	Introduction to Basic Japanese Language	0	0	2	1	25	25	50	N/A
26HS02PR0102-6	Art of Theatre	0	0	2	1	25	25	50	N/A
26HS02PR0102-7	Introduction to French Language	0	0	2	1	25	25	50	N/A
26HS02PR0102-8	Introduction to Spanish Language	0	0	2	1	25	25	50	N/A
26HS02PR0102-9	Art of Painting	0	0	2	1	25	25	50	N/A
26HS02PR0102-10	Art of Drawing	0	0	2	1	25	25	50	N/A
26HS02PR0102-11	Nature Camp	0	0	2	1	25	25	50	N/A
26HS02PR0102-12	Developing Self-awareness	0	0	2	1	25	25	50	N/A
26HS02PR0102-13	Art of Poetry	0	0	2	1	25	25	50	N/A
26HS02PR0102-14	Creative and Content Writing	0	0	2	1	25	25	50	N/A
26HS02PR0102-15	Science of life through Bhagwad Gita	0	0	2	1	25	25	50	N/A
26HS02PR0102-16	Sanskrit Sambhashan-Spoken Sanskrit	0	0	2	1	25	25	50	N/A
26HS02PR0102-17	Kirtan Kala	0	0	2	1	25	25	50	N/A
26HS02PR0102-18	Introduction to German Language and culture	0	0	2	1	25	25	50	N/A
26HS02PR0102-19	Adventure Sports	0	0	2	1	25	25	50	N/A
26HS02PR0102-20	Introduction to Défense Forces & Obstacle Training	0	0	2	1	25	25	50	N/A

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26HS02PR0102-21	First Aid & Disaster Management	0	0	2	1	25	25	50	N/A
26HS02PR0102-22	Basic Nutritional Course	0	0	2	1	25	25	50	N/A
26HS02PR0102-23	Stress Management Through Yoga & Meditation	0	0	2	1	25	25	50	N/A
26HS02PR0102-24	Audio Recording & Dubbing	0	0	2	1	25	25	50	N/A
26HS02PR0102-25	Art of Basic Film Making	0	0	2	1	25	25	50	N/A

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Semester I	
Course Code: 26HS02PR0102-2	Course: Fundamentals of Indian Classical Dance: Bharatnatayam
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Understand the importance of dance and Bharatnataym as an Indian dance form
CO 2:	Develop skills to perform the dance form at its basic level.
CO 3:	Evaluate their strengths and interest to take bridge course to give <i>Pratham</i> (1 st level formal exam of Bharatnatayam).

<u>Syllabus</u>
Practical -1: Orientation in Bharatnatayam
Practical-2: Tattu Adavu till 8, Naatta Adavu 4 Steps, Pakka Adavu 1 step, Metta Adavu 1 Step, Kuditta Metta Adavu 4 Steps,
Practical -3: Practice sessions
Practical-4: Tatta Kuditta Adavu (Metta), Tatta Kuditta Adavu (Metta) 2 Steps, Tirmanam Adavu 3 Steps, Kattu Adav - 3 Steps, Kattu Adav - 3 Steps
Practical-5: Practice sessions
Practical-6: Tiramanam (front) 3 Steps, Repeat of Tiramanam (Overhead) 3 Steps,
Practical-7: practice sessions
Practical-8: final practice sessions and performances.

Recommended reading:	
1	Introduction to Bharata's Natyasastra, Adya Rangacharya, 2011
2	The Natyasastra and the Body in Performance: Essays on the Ancient Text, edited by Sreenath Nair, 2015
3	Bharatanatyam How to ... : A Step-by-step Approach to Learn the Classical Form, Eshwar Jayalakshmi, 2011

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Semester I	
Course Code: 26HS02PR0102-3	Course: Fundamentals of Indian Classical Dance: Kathak
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Understand the importance of dance and Kathak as an Indian dance form
CO 2:	Develop skills to perform the dance form at its basic level.
CO 3:	Evaluate their strengths and interest to take bridge course to give <i>Prarambhik</i> (1 st level formal exam of Kathak).

<u>Syllabus</u>
Practical -1: Orientation in Kathak. Correct posture of kathak, Basic Movements and exercise Stepping, Chakkar of 5 count (Bhramari),
Practical -2: practice sessions of practical 1
Practical -3: Hastaks, Hastaks and Steppings, Reciting asamyukta Mudra shloka, Hastak and steppings
Practical -4: practice sessions of practical 3
Practical -5: Todas and Asamyukta hasta mudra shlok, Vandana of Shlok, 2 Todas and Vandana, Ghante Ki Tihai,
Practical -6: practice sessions of practical 5
Practical -7: 2 1 Chakkardar Toda and Ginnti Ki Tihai, 2 Todas and 1 Chakkardar Toda, practice sessions
Practical -8: Final performances.

Recommended reading:	
1	Kathak Volume1 A "Theoretical & Practical Guide" (Kathak Dance Book), Marami Medhi & Debasish Talukdar, 2022, Anshika Publication (13 September 2022)

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Semester I	
Course Code: 26HS02PR0102-4	Course: Introduction to Digital Photography
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Develop an understanding of the technical aspects and aesthetics of Photography.
CO 2:	Apply the rules of digital photography for creating photographs.
CO 3:	Develop skills to enhance photographs through post processing.
CO 4:	Create a portfolio of their photographs in selected genre.

<u>Syllabus</u>
Practical 1: Orientation in digital photography: Genres, camera handling and settings
Practical 2: Rules of Composition
Practical 3: Rules of Composition: practice sessions
Practical 4: Understanding Exposure and Art of Pre-Visualization
Practical 5: Rules of Composition and Art of Pre-Visualization: practice sessions
Practical 6: Post Processing Photographs and Portfolio creation
Practical 7: Post Processing Photographs: practice sessions
Practical 8: Portfolio finalization and presentation in selected genre.

Reference material:	
1	Scott Kelby (2020) <i>The Digital Photography Book: The Step-by-Step Secrets for how to Make Your Photos Look Like the Pros</i> , Rocky Nook, USA
2	Larry Hall (2014) <i>Digital Photography Guide: From Beginner to Intermediate: A Compilation of Important Information in Digital Photography</i> , Speedy Publishing LLC, Newark
3	J Miotke (2010) <i>Better Photo Basics: The Absolute Beginner's Guide to Taking Photos Like a Pro</i> , AMPHOTO Books, Crown Publishing Group, USA

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Semester I	
Course Code: 26HS02PR0102-5	Course: Introduction to Japanese Language and Culture
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Gain a brief understanding about Japan as a country and Japanese culture.
CO 2:	Develop ability to use vocabulary required for basic level communication in Japanese language.
CO 3:	Able to write and read the first script in Japanese language.
CO 4:	Able to frame simple sentences in Japanese in order to handle everyday conversations
CO 5:	Able to write in basic Japanese about the topics closely related to the learner.

<u>Syllabus</u>
Practical-1: Orientation about Japan, its language, and its culture
Practical-2: Communication Skills 1: Vocabulary for basic Japanese language
Practical-3: Practice sessions
Practical-4: Writing Skills 1: Reading and writing first script in Japanese
Practical-5: Practice sessions
Practical-6: Communication Skills 2: framing sentences
Practical-7: Practice sessions
Practical-8: Writing Skills 2: Write basic Japanese and practice

Recommended reading:	
1	Marugoto Starter (A1) Rikai - Course Book for Communicative Language Competences, by The Japan Foundation, Goyal Publishers & Distributors Pvt. Ltd (ISBN: 9788183078047)
2	Japanese Kana Script Practice Book – Vol. 1 Hiragana, by Ameya Patki, Daiichi Japanese Language Solutions (ISBN: 9788194562900)

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Semester I	
Course Code: 26HS02PR0102-6	Course: Art of Theatre
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Understand and synthesize the working of the prominent genres of theatre across the world.
CO 2:	Apply the skill of voice and speech in theatre and public speaking
CO 3:	Apply the art of acting and also develop generic skills such as confidence, communication skills, self-responsibility, motivation, commitment, interpersonal skills, problem solving, and self-discipline.
CO 4:	Apply skills acquired related to technical/production aspects of theatre and also develop problem solving and interpersonal skills.

<u>Syllabus</u>
Practical 1: Orientation in theatre
Practical 2: Voice and Speech training
Practical 3: Voice and Speech training: practice sessions
Practical 4: Art of acting
Practical 5: Art of acting: practice sessions
Practical 6: Art of script writing
Practical 7: Art of script writing: practice sessions
Practical 8: Final performances

<u>Reference books:</u>	
1	Boleslavsky, R. (2022). <i>Acting: The First Six Lessons</i> (1st ed., pp. 1-92). Delhi Open Books.
2	Shakthi, C. (2017). <i>No Drama Just Theatre</i> (1st ed., pp. 1-171). Partridge.
3	Bruder, M., Cohn, L. M., Olnek, M., Pollack, N., Previto, R., & Zigler, S. (1986). <i>A Practical Handbook for the Actor</i> (1st ed.). Vinatge Books New York.

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Semester I	
Course Code: 26HS02PR0102-7	Course: Introduction to French Language
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Demonstrate basic knowledge about France, the culture and similarities/differences between India and France
CO 2:	Learn to use simple language structures in everyday communication.
CO 3:	Develop ability to write in basic French about themselves and others.
CO 4:	Develop ability to understand beginner level texts in French

<u>Syllabus</u>
List of Practicals
Practical-1: Orientation about France, the language, and culture
Practical-2: Communication Skills 1: Vocabulary building for everyday conversations
Practical -3: Practice sessions
Practical-4: Reading and writing Skills : Reading and writing simple text in French
Practical-5: Practice sessions
Practical-6: Communication Skills 2: listening comprehension
Practical-7: Practice sessions
Practical-8: Writing Skills: Write basic French and practice

<u>Recommended reading:</u>	
1	15-minute French by Caroline Lemoine
2	Cours de Langue et de Civilisation Françaises by G. Mauger Vol. 1.1
3	Cosmopolite I by Natalie Hirschsprung, Tony Tricot

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Semester I	
Course Code: 26HS02PR0102-8	Course: Introduction to Spanish Language
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Demonstrate basic knowledge about Spain, the culture and similarities/differences between India and France
CO 2:	Learn to use simple language structures in everyday communication.
CO 3:	Develop ability to write in basic Spanish about themselves and others.
CO 4:	Develop ability to read and understand beginner level texts in Spanish

<u>Syllabus</u>
List of Practicals
Practical-1: Orientation about Spain, the language, and culture
Practical-2: Communication Skills 1: Vocabulary building for everyday conversations
Practical -3: Practice sessions
Practical-4: Reading and writing Skills : Reading and writing simple text in Spanish
Practical-5: Practice sessions
Practical-6: Communication Skills 2: listening comprehension
Practical-7: Practice sessions
Practical-8: Writing Skills: Write basic Spanish and practice

Recommended reading:	
1	15-Minute Spanish by Ana Bremon
2	Aula Internacional 1 by Jaime Corpas ,Eva Garcia, Agustin Garmendia.
3	Chicos Chicas Libro del Alumno by María Ángeles Palomino

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Semester I	
Course Code: 26HS02PR0102-9	Course: Art of Painting
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Become familiar with the basic methods, techniques & tools of painting.
CO 2:	Train the eye and hand to develop sense of balance, proportion and rhythm.
CO 3:	Develop the ability to observe and render simple natural forms.
CO 4:	Enjoy the challenging and nuanced process of painting.

<u>Syllabus</u>
List of Practicals
Practical 1: Orientation in Painting tools & basics of lines, shapes, light, shadows and textures
Practical 2: The art of observation how to see shapes in drawing
Practical 3: Introduction Water color how to handle water paints
Practical 4: Introduction to acrylic colors how to handle acrylic paints
Practical 5: Explore layering paint and capturing the quality of light with paint.
Practical 6: Create landscape painting
Practical 7: Create Abstract painting
Practical 8: Paint on Canvas (try to recreate any famous painting)

Reference material:	
1	Drawing made easy by Navneet Gala; 2015th edition
2	Alla Prima II Everything I Know about Painting--And More by Richard Schmid with Katie Swatland
3	Daily Painting: Paint Small and Often To Become a More Creative, Productive, and Successful Artist by Carol Marine

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Semester I	
Course Code: 26HS02PR0102-10	Course: Art of Drawing
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Compulsory	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Become familiar with the basic methods, techniques & tools of drawing.
CO 2:	Train the eye and hand to develop sense of balance, proportion and rhythm.
CO 3:	Develop the ability to observe and render simple natural forms.
CO 4:	Enjoy the challenging and nuanced process of drawing.

<u>Syllabus</u>
List of Practicals
Practical 1: Orientation in Drawing tools & basics of lines, shapes, light, shadows and textures
Practical 2: The art of observation how to see shapes in drawing
Practical 3: One/two-point basic linear perspective
Practical 4: Nature drawing and landscapes
Practical 5: Gestalt principles of visual composition
Practical 6: Figure drawing: structure and proportions of human body
Practical 7: Gesture drawing: expression and compositions of human figures
Practical 8: Memory drawing: an exercise to combine the techniques learnt

Reference material:	
1	Drawing made easy by Navneet Gala; 2015th edition
2	Perspective Made Easy (Dover Art Instruction) by Ernest R. Norling

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Semester I	
Course Code: 26HS02PR0102-11	Course: Nature Camp
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Develop an affinity with nature by observing and understanding it marvels with guidance from experts
CO 2:	Develop an understanding of the challenges and solutions associated with nature and its conservation

<u>Course content</u>
In collaboration with the Forest Department and/or a local NGO working in the field of environment conservation, this course would be conducted in 24 hours. Students will be taken to a tiger reserve in Vidrabha region or Forest fringe villages or work with an NGO from Vidarbha region working on natural resource management. The camps (for 2 days) will cover any one of the following topics as decided by the course coordinator:
1. Awareness about each element of biodiversity (camps on moths, butterflies, birds, other wildlife etc.)
2. Environment management (water, forest, wildlife) – practices of Forest Department in managing a tiger reserve, and other aspects of water and forest conservation.
3. Sustainable natural resource management - initiatives by rural communities and local NGOs
4. Man-animal conflict and solutions (socio-economic and technical) – role of local communities and Forest Department
5. Traditional practices in environment conservation – role of local communities and local NGOs

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Semester I	
Course Code: 26HS02PR0102-12	Course: Developing Self-awareness
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Gain foundational understanding of graphology and through self-analysis will achieve greater awareness about their strengths and weaknesses & areas for personal growth
CO 2:	Equipped with tools and techniques for continuous self-improvement, using signature analysis and graphotherapy as part of their personal development journey
CO 3:	Understand how to use Neuro Linguistic Programming (NLP) strategies to set and achieve goals effectively, overcoming mental blocks and limiting beliefs.
CO 4:	Enhance ability to absorb, retain, and recall information, which can benefit academic and professional performance.

<u>Syllabus</u>
Practical 1: The Power of Handwriting (Handwriting is Brainwriting)
Practical 2: Know yourself through handwriting
Practical 3: The Role of Signature in your life
Practical 4: Graphotherapy to enhance yourself in all ways
Practical 5: Neurolinguistic Programming , S.M.A.R.T Goal
Practical 6: Effective Communication Model, Rapport Building and Anchor
Practical 7: Brain Directives & Linguistic Presuppositions
Practical 8: Neurobics

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Semester I	
Course Code: 26HS02PR0102-13	Course: Art of Poetry
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Understand the origin and development of poetry
CO 2:	Appreciate the art of poetry in life
CO 3:	Develop aesthetic sense
CO 4:	Develop holistic perspective to their personality

<u>Syllabus</u>
Practical 1: Art of poetry – orientation
Practical 2: Forms of poetry – orientation
Practical 3: Forms of poetry – recitation
Practical 4: Application of poetry – orientation
Practical 5: Application of poetry – practical session
Practical 6: Poetry and aesthetics
Practical 7: Writing poetry – orientation
Practical 8: Writing poetry – writing sessions

Text Book:	
1	The Art of Poetry 1. Fry, S. (2005). The ode less travelled: Unlocking the poetic mind. HarperCollins. 2. Addonizio, K., & Laux, D. (1997). The poet's companion: A guide to the pleasures of writing poetry. W.W. Norton & Company. 3. Lucy, J. (Ed.). (2001). The art of poetry. Penguin Books.
2	Understanding and Interpretation of Poetry 1. Hirsch, E. (1999). How to read a poem: And fall in love with poetry. Harcourt Brace & Company. 2. Pinsky, R. (1998). The sounds of poetry: A brief history. Farrar, Straus and Giroux. 3. Meyer, M. (2005). Poetry: An introduction. Bedford/St. Martin's.

3	Writing Poetry 1. Hugo, R. (1979). The triggering town: Lectures and essays on poetry and writing. W.W. Norton & Company. 2. Bradbury, R. (1990). Zen in the art of writing: Releasing the creative genius within you. Bantam Books. 3. Behn, R., & Twichell, C. (Eds.). (1992). The practice of poetry: Writing exercises from poets who teach. HarperCollins.
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Semester I	
Course Code: 26HS02PR0102-14	Course: Creative and Content Writing
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Understand and apply fundamental concepts and techniques of creative writing.
CO 2:	Apply storytelling techniques to create engaging narratives.
CO 3:	Develop and implement effective SEO and digital content strategies
CO 4:	Create and refine content using various tools and applying diverse writing styles and formats.
CO 5:	Utilize digital tools to craft multimedia narratives and create a professional portfolio.

Course Content:
<u>Creative Writing</u> Practical 1: Introduction to Creative and Content Writing Practical 2: Character and Story Development Practical 3: Crafting Compelling Narratives
<u>Content Writing</u> Practical 4: SEO and Digital Content Strategies Practical 5: Writing for Media Practical 6: Tools
<u>Content Creation</u> Practical 7: Digital Storytelling Practical 8: Creative Portfolio Launch

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Semester I	
Course Code: 26HS02PR0102-15	Course: Science of life through Bhagwad Gita
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	To understand the methodology to correctly interpret and analysis the scripture
CO 2:	To understand the application of various teaching of the Bhagwad Gita
CO 3:	Use meditation and breathing techniques for healthy mind and body.

Syllabus:	
Practical 1: Introduction to Bhagwad Gita - methodology	
Practical 2: Real life application of chapter 1-3	
Practical 3: Real life application of chapter 4-6	
Practical 4: Real life application of chapter 7-9	
Practical 5: Real life application of chapter 10-12	
Practical 6: Real life application of chapter 13-15	
Practical 7: Real life application of chapter 16-18	
Practical 8: Meditation and breathing techniques	

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Semester I	
Course Code: 26HS02PR0102-16	Course: Sanskrit Sambhashan- Spoken Sanskrit
L: 0Hrs, T:0Hrs, P:2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Enhanced writing skills in Sanskrit
CO 2:	Enhanced speaking skills in Sanskrit
CO 3:	Enhanced listening skills in Sanskrit
CO 4:	Enhanced writing skills in Sanskrit

Syllabus:	
संस्कृतसम्भाषणशिबिरस्य पाठ्यक्रमः	
प्रथमं दिनम्	द्वितीयं दिनम्
- गीतम् - पठत संस्कृतम्..... । - मम नाम -भवतः नाम किम्? भवत्याः नाम किम्? द्वयोः मध्ये परिचयः । परस्परं 5 जनान् । - सः कः? सा का? तत् किम्? - एषः, एषा, एतत् । - अहम्, भवान्, भवती..... अभिनयः । - आम्, न, वा/किम्..... अभिनयः । - अस्ति x नास्ति..... अभिनयः । - अत्र, तत्र, कुत्र, सर्वत्र, अन्यत्र, एकत्र - अभिनयः । - षष्ठी - तस्य, एतस्य, कस्य, तस्याः, एतस्याः, कस्याः, मम, भवतः, भवत्याः..... अभिनयः । मम नासिका, भवतः नासिका, भवत्याः नासिका । एतत् कस्य? अह्नि प्रदर्श्य प्रश्नः । - दशरथस्य..., सीतायाः..., लेखन्याः..., पुस्तकस्य..... । स्फोरकपत्रस्य (Flash Card) उपयोगः करणीयः । 'पुत्रः' 'पतिः' इत्यादीनां वाक्यपत्राणाम् (Charts) उपयोगः करणीयः । - गीतम् - मनसा सततं स्मरणीयम् । - आवश्यकम्, मास्तु, पर्याप्तम्, धन्यवादः, स्वागतम् । - पूर्वनिश्चितसम्भाषणप्रदर्शनम् । - क्रियापदानां पाठनम् - गच्छति । आगच्छति । पठति । लिखति । खादति । पिबति । क्रीडति । वदति । उत्तिष्ठति । उपविशति । - गच्छामि । आगच्छामि..... । - गच्छतु । आगच्छतु..... । - सङ्ख्याः - (अ) 1, 2, 3, 4,.....10 । (आ) 10, 20, 30,.....100 । - समयः - 5.00, 5.15, 5.30, 4.45 । - कथा - गतानुगतिको लोकः । (काचित् कथा सरलया भाषया वक्तव्या) । - रटनाभ्यासः (पूर्वमेव लिखितानि पठितानि च कानिचित् वाक्यानि वाचनीयानि) । - एकं वाक्यम् (प्रत्येकं छात्रः एकं वाक्यं वदेत् ।) - सूचना । - ऐक्यमन्त्रः ।	- गीतम् । - पुनस्स्मरणम् । - शब्देषु लिङ्गभेदज्ञापनम् - यथा -सः सुधाखण्डः, सा कुञ्जिका, तत् पुष्पम् । - बहुवचनपाठनम् - बालकाः..., बालिकाः..., लेखन्याः..., पुस्तकानि... । - ते, के, ताः, काः, तानि, कानि, एते, एताः, एतानि, भवन्तः, भवत्यः, वयम् । (चित्राणि उपयोक्तव्यानि ।) - वचनपरिवर्तनाभ्यासः । यथा - सः बालकः - ते बालकाः । - अस्ति - सन्ति । - कति? - सप्तमी - हस्ते । उत्पीठिकायाम् । लेखन्याम् । पुस्तके । (स्फोरकपत्रस्य प्रयोगः करणीयः ।) वाक्यपत्रस्य उपयोगेन वाक्यानि वाचनीयानि । - कदा? - उत्तराणां प्रश्नाः । (शिक्षकः आरम्भे उत्तरं वदेत्, अनन्तरं छात्राः तस्य प्रश्नं पृच्छेयुः ।) यथा - रामः प्रातःकाले शालां गच्छति । रामः कदा शालां गच्छति? - अद्य, श्वः, परश्वः, प्रपरश्वः, ह्यः, परह्यः, प्रपरह्यः, इदानीम् । - गीतम् । - गच्छन्ति । गच्छामः । गच्छन्तु । - शिष्टाचारः - सुप्रभातम्/नमस्कारः/शुभरात्रिः/हरिः ओम्/क्षम्यताम्/चिन्ता मास्तु । - प्रातर्विधिः - दन्तधावनम् इत्यादयः शब्दाः पाठनीयाः । - सङ्ख्या - 1-50 । - समयः - 6.05, 6.10, 5.55, 5.50 - स्वागतसम्भाषणम् । (शिक्षकः सहशिक्षकेण सह कृत्वा प्रदर्शयेत्) - कथा । - रटनाभ्यासः । - वाक्यद्वयम् (प्रत्येकम् अपि छात्रः वाक्यद्वयं वदेत् ।) - सूचनाः । - ऐक्यमन्त्रः ।
तृतीयं दिनम्	

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Semester I	
Course Code: 26HS02PR0102-17	Course: Kirtan Kala
L: 0Hrs, T:0Hrs, P:2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Learn from the inspiring spiritual journey of the saints and the history of Kirtan tradition
CO 2:	Learn about the musical instruments used in the art of Kirtan
CO 3:	Develop communication skills

Syllabus:
● कीर्तन परंपरेचा इतिहास आणि अखिल भारतातील कीर्तन परंपरांचा परिचय ● चार महिन्यात वीस संतचरित्रांचा परिचय अधिक त्याविषयी प्रवचन ● वीस संतांचा वाङ्मयीन परिचय ● प्रमुख पाच कीर्तन पद्धतींचे मांडणी तंत्र. ● पूर्वरंग - उत्तररंग सहित कीर्तनप्रक्रियेतील सर्व महत्वाचे टप्पे. ● कीर्तनासाठी आवश्यक असणारी कंठ संगीतात्मक माहिती ● ढोल, मृदंग, वीणा, तबला, पेटी या वाद्यांची ओळख. ● प्रवचनांसाठी अभ्यासग्रंथांचे मार्गदर्शन. ● वक्तृत्व कला, संभाषण कला, संवाद कौशल्य, कथाकथन यांची रहस्ये ● कीर्तनाचे अनुषंगाने संस्कृत मराठी श्लोक, सुभाषिते व प्रमाणाधार अशी ओव्या अभंगांची शिंदोरी.

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Semester I	
Course Code: 26HS02PR0102-18	Course: Introduction to German Language and culture
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Demonstrate basic knowledge about Germany, the culture and similarities/differences between India and Germany
CO 2:	Learn to use simple language structures in everyday communication.
CO 3:	Develop ability to write in basic German about themselves and others.
CO 4:	Develop ability to read and understand beginner level texts in German.

<u>Syllabus</u>
Practical-1: Orientation about Germany, the language, and culture
Practical-2: Vocabulary building for everyday conversations
Practical -3: Numbers, days and time
Practical-4: Introducing Oneself & Others
Practical-5: Reading Skills: Reading simple text in German language
Practical-6: Basic Verbs & Sentence Construction
Practical-7: Food & Dining, Giving Directions & Transportation
Practical-8: Writing Skills: Write basic German and practice

Text Book:	
1	German Made Easy by Diego A. Agundez
2	Teach Yourself Complete German: Learn to Read, write, Speak and Understand A new Language by Paul Coggle, Heiner Schenke
3	Netzwerk A1 by Helen Smitz, Stefanie Dengler and Paul Rusch
4	Deutsche Welle (DW) – www.dw.com/learngerman
5	BBC Languages – German – www.bbc.co.uk/languages/german
6	Goethe-Institut – www.goethe.de

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Semester I	
Course Code: 26HS02PR0102-19	Course: Adventure Sports
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Understand the principles and benefits of adventure sports
CO 2:	Develop basic skills in selected adventure sports.
CO 3:	Learn and apply safety measures and risk management techniques.
CO 4:	Foster teamwork, leadership, and problem-solving skills.

<u>Syllabus</u>
Tent pitching, knot practice session and Tent allotment
Activities like Jumarring and Climbing
Individual challenge like Burma bridge, ladder bridge, multi vine
Group Task like improvise raft making and Kayaking
Activities like Archery rifle shooting, cycle ride

Pattern of Classes: 30 Hrs. Camp (2 Days and 1 Night)

Assessment Pattern: Assessment Type	Weightage in Marks	Total Marks
Practical 26HS04PR0102-1 / 26HS04PR0202-1	Internal Marks – 25 Marks External Marks – 25 Marks	50
Total – 50 Marks		

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Semester I	
Course Code: 26HS02PR0102-20	Introduction to Defense Forces & Obstacle Training
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Describe the Structure and Functions of Defence Forces
CO 2:	Demonstrate Knowledge of Defence Training Protocols
CO 3:	Navigate Basic Obstacle Courses & Connect Obstacle Training to Defence Preparedness
CO 4:	Collaborate and Problem-Solve in Team-Based Exercises

<u>Syllabus</u>
Knot and Hitch practice session
Activities like Rappelling & Wall Climbing
Burma bridge & ladder bridge
First Aid
Rifle Shooting
Horse riding
Group Task and Team building activities

Pattern of Classes: 30 Hrs. Camp (2 Days and 1 Night)

Assessment Pattern: Assessment Type	Weightage in Marks	Total Marks
Practical 26HS04PR0102-2 / 26HS04PR0202-2	Internal Marks – 25 Marks External Marks – 25 Marks	50
Total – 50 Marks		

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Semester I	
Course Code: 26HS0PR0102-21	Course: First Aid & Disaster Management
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Identify and Categorize Disasters
CO 2:	Conduct Risk Assessments
CO 3:	Develop Emergency Plans
CO 4:	Implement Response Strategies

<u>Syllabus</u>
Basic First Aid
Transportation of Casualty
Injury Prevention & Cure
Various Types of Knots & Hitches
Various team building activities
Fire emergencies & use of extinguishers (Optional)
Snake Bite & Environmental emergencies

Assessment Pattern: Assessment Type	Weightage in Marks	Total Marks
Practical 26HS04PR0102-3 / 26HS04PR0202-3	Internal Marks – 25 Marks External Marks – 25 Marks	50
Total – 50 Marks		

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Semester I	
Course Code: 26HS02PR0102-22	Course: Basic Nutritional Course
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Accurately describe the functions of key nutrients and their impact on health,
CO 2:	Create balanced meal plans based on established dietary guidelines,
CO 3:	Critically evaluate nutrition information to distinguish between credible and misleading sources

<u>Syllabus</u>
Unit I • Introduction to Nutrition – Define Balanced Diet, Nutrition, Optimum Nutrition, Nutrients, Concept of Health, Recommended Dietary Allowances (RDA) • Carbohydrates (sources, functions and digestion) • Proteins (sources, functions and digestion) • Fats (sources, functions and digestion) • Micronutrients (vitamins and minerals-sources, functions and digestion) Practical I • Display of all the foods with the help of students and while demonstrating teacher will again explain role and importance of nutrition in daily life. Deficiency will lead to chronic diseases and its prevention is very necessary for the quality of life.
Unit II • What is Body Mass Index? • What is Basal Metabolic Rate? • What is Ideal Body Weight? (Male/Female) • How to read labels on Food Packets? • How to choose smart food and Concept of Rainbow diet, My Food Pyramid or My plate given by ICMR-NIN.
Practical II • Calculation of Body Mass Index, Basal Metabolic Rate, Ideal Body Weight (Male/Female) with the use of self-body measurements. • Demonstration of Rainbow diet, My Food Pyramid or My plate in a class.

Assessment Pattern: Assessment Type	Weightage in Marks	Total Marks
Practical 26HS04PR0102-4 / 26HS04PR0202-4	Internal Marks – 25 Marks External Marks – 25 Marks	50
Total – 50 Marks		

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Semester I	
Course Code: 26HS02PR0102-23	Course: Stress Management Through Yoga & Meditation
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Understand the basics of stress management.
CO 2:	Analyze stress triggers and to manage them.
CO 3:	Evaluate the responses to stressful situations.
CO 4:	Apply the techniques of Yog & Meditation for stress management in day-to-day life.

<u>Syllabus</u>
Unit-1 Introduction to Stress: The Meaning of Stress, types of stress: distress, eustress Stress Management Techniques I: Treatment 1- (Asanas): Tadasana, Trikonasana, Vrikshasana, Garudasana,, Ardha-Padamasana, Padamasana, Vajarasana, Ushtrasana, Gomukhasna,, Paschimottanasan, ,Ardha Halasana, ,Setu-Bandhanasa, Naukasana, Bhujangasana, and Dhanurasana; along with relaxing asanas
Unit-2 Spiritual approach to stress management. Stress Management Techniques II Treatment 2 – (Prananyam) Deep breathing, Yoga, Mindfulness meditation Rechak, Purak, Kumbhak, Nadi Suddhi and Bhramari Pranayama. Measuring Academic stress- It can be measure using questionnaire: Academic stress Scale (Sun .et al 2011).

Assessment Pattern: Assessment Type	Weightage in Marks	Total Marks
Practical 26HS04PR0102-5 / 26HS04PR0202-5	Internal Marks – 25 Marks External Marks – 25 Marks	50
Total – 50 Marks		

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Semester I	
Course Code: 26HS02PR0102-24	Course: Audio Recording & Dubbing
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes:	
After completion of the course, students will be able to	
CO1:	Develop a Comprehensive Understanding of Audio in Content Creation
CO2:	Equip students with in-depth knowledge of the role, benefits, and applications of audio in enhancing digital content across various platforms.
CO3:	Design and Implement a Personalized Audio Setup. Enable students to build and optimize their own audio recording setups tailored for platforms such as YouTube, Instagram, podcasts, and other digital media outlets.
CO4:	Enhance Presentation and Marketing Skills Through Audio Integration. Demonstrate how high-quality audio contributes to effective communication, audience engagement, and brand marketing in both professional presentations and promotional content.

<u>Syllabus</u>
Practical 1: Orientation in Sound and Basics of Audio
Practical 2: Orientation in Input and Output
Practical 3: Orientation in Audio Devices (Hardware & Software)
Practical 4: Audio Recording: Song, Voiceover, Dubbing
Practical 5: Audio Editing
Practical 6: Audio Session I
Practical 7: Audio Session II
Practical 8: Audio Session III

Reference Book:	
1	Sound and Recording: Applications and Theory – Francis Rumsey & Tim McCormick (Focal Press)
2	Practical Recording Techniques – Bruce Bartlett & Jenny Bartlett (Routledge)
3	Mixing Audio: Concepts, Practices and Tools – Roey Izhaki (Focal Press)
4	The Art of Sound Recording – David Moulton

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5	Digital Audio Editing: Correcting and Enhancing Audio – Simon Langford (Focal Press)
6	. Mixing Secrets for the Small Studio – Mike Senior (Focal Press)
7	The Mixing Engineer’s Handbook – Bobby Owsinski (Hal Leonard)
8	Audio Engineering 101 – Tim Dittmar (Focal

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Semester I	
Course Code: 26HS02PR0102-25	Course: Art of Basic Film Making
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Elective	Course Type: CCA

Course Outcomes:	
After completion of the course, students will be able to	
CO1:	Understand the basic concepts, history, and evolution of film as an art form.
CO2:	Apply principles of visual storytelling, framing, and composition in short film projects.
CO3:	Develop creative and technical skills related to camera handling, lighting, sound, and editing.
CO4:	Work collaboratively to conceptualize, plan, shoot, and edit a short film, demonstrating teamwork, creativity, and problem-solving skills.

<u>Syllabus</u>
Practical 1: Introduction and Orientation to Film Making
Practical 2: Basics of Visual Storytelling and Cinematic Language
Practical 3: Camera Handling and Shot Composition
Practical 4: Lighting and Sound Techniques
Practical 5: Scripting and Storyboarding
Practical 6: Shooting Exercises and On-Set Practice
Practical 7: Basics of Editing and Post-Production
Practical 8: Final Short Film Project and Screening

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Semester I	
Course Code: 26HS02TH0103-2	Foundational Course in Universal Human Values
L: 1Hrs, P:0Hrs per Week	Total Credits: 01
Compulsory/Elective: Compulsory	Course Type: VEC

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Understand value education in life and implement self-exploration.
CO 2:	Create an in-depth understanding of harmony within a human being.
CO 3:	Understand and implement values to maintain harmony in a family.
CO 4:	Understand and implement values to maintain harmony in a society
CO 5:	Understand and implement values to maintain harmony in nature/existence and develop a holistic perspective of life.

<u>Syllabus</u>
Module I: Course Introduction - Understanding Value Education (04 Hours) 1. Meaning of Value Education 2. Need of value education, guidelines and content of value education. 3. Exploring our aspirations and concerns: Self-exploration (Content and process of self-exploration) 4. Basic human aspirations: Continuous happiness and prosperity 5. Role of UHV; Strengthening of self-reflection.
Module II: Understanding Harmony in Human Being (03 Hours) 1. Harmony of the self and the body. a. Understanding human being as a co-existence of the sentient 'I' and the material 'Body' b. Understanding the needs of Self ('I') and 'Body'. c. Understanding the activities of Self ('I') and 'Body'. d. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). 2. Programs to ensure Sanyam and Health.
Module III: Understanding Harmony in the Family: Harmony in Human-Human Relationship (03 Hours) 1. Understanding values in human-human relationship: a. Trust as the foundational value of a relationship and respect in a family b. Ensuring health of family and friends by implementing values c. Understanding the meaning of trust; d. Difference between intention and competence e. Understanding the meaning of respect, f. Difference between respect and differentiation.
Module IV: Understanding Harmony in the Society: Harmony in Human-Human Relationship (02 Hours)

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| 1. Understanding harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) |
| 2. Visualizing a universal harmonious order in society: Undivided Society, Universal Order- from family to world family. |

Module V: Understanding Harmony in Nature and Existence (03 Hours)

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| 1. Understanding harmony in Nature |
| 2. Interconnectedness and mutual fulfilment among the four orders of Nature |
| 3. Holistic perception of harmony at all the levels of existence |

Text Book:

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| 1 | A Foundation Course in Human Values and Professional Ethics, R.R Gaur, R Athana, G.P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019, ISBN 948-93-87034-47-1 |
| 2 | A Textbook on Professional Ethics and Human Values by R S Naagarazan, New Age International Private Limited; First edition, 2020. |
- Reference Books

Reference Book:

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|---|---|
| 1 | Human Values, A.N. Tripathi, Human Values, New Age Intl. Publishers, New Delhi, 2004. |
| 2 | Human Values and Professional Ethics by Gurpreet Singh Uppal, 2015. |
| 3 | Values and Ethics in Profession by Prof. Mazumdar, Everest Publishing House; 3rd Edition, 2013. |
| 4 | Human Values and Professional Ethics by Jayshree Suresh, B S Raghavan, S Chand; Fourth edition, 2003. |
| 5 | https://fdp-si.aicte-india.org/UHV-II_Lectures_PPTs.php |
| 6 | https://fdp-si.aicte-india.org/UHV-II%20Practice%20Sessions.php |
| 7 | https://fdp-si.aicte-india.org/UHV-II%20Class%20Note.php |

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Semester II	
Course Code: 26HS05TP0202	Course: Semiconductor Physics
L: 3 Hrs, P: 2Hrs per Week	Total Credits: 04
Compulsory/Elective: Compulsory	Course Type: BSC

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Explain the quantum mechanical principles governing electron behavior and energy band formation in solids.
CO 2:	Analyze the electrical properties of semiconductor materials under equilibrium conditions.
CO 3:	Apply semiconductor transport and junction concepts to evaluate device behaviour under different operating conditions.
CO 4:	Analyze the performance and applications of semiconductor-based optoelectronic devices.
CO 5:	Apply electromagnetic field laws to analyze electric and magnetic fields.
CO 6:	Perform measurements using standard instruments and interpret experimental data using linear and non-linear graphs.

Syllabus
Module I: Electron Behavior & Band Formation Concept of Matter Waves, Wave Function and its Physical Significance, Schrödinger Wave Equations, Quantum Tunneling Phenomenon, Formation of Energy Bands in Solids, Kronig–Penney Model, E–k (Energy–Wave Vector) Diagram, Valence Band, Conduction Band, and Forbidden Energy Gap, Effective Mass of Charge Carriers.
Module II: Electronic Materials & Carrier Statistics Classification of electronic materials, Direct and indirect bandgaps, Density of States (DOS), Fermi-Dirac distribution function, Fermi Level (E_F).
Module III: Intrinsic and Extrinsic Semiconductors Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier transport: diffusion and drift.
Module IV: Non-Equilibrium Semiconductors Carrier generation and recombination, Continuity equation, p-n junction diode, Zero-applied bias, forward bias, reverse bias.
Module V: Optoelectronic Devices Optical absorption in semiconductors, Light emitting diodes, Laser diode, Stimulated emission and photon amplification, Einstein Coefficients, Solar Energy Spectrum, Solar Cells.
Module VI: Electromagnetic Fields: Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss's Law, Divergence, Electric field and potential due to point, line, plane and spherical charge distributions, Effect of dielectric medium, Capacitance of simple configurations, Biot-Savart's law, Ampere's law, Curl, Faraday's law, Lorentz force, Inductance, Magnetomotive force, Reluctance, Magnetic circuits, Self and Mutual inductance of

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simple configurations.

Text Books:

1	Semiconductor Physics and Devices (Fourth Edition), Donald A. Neamen, McGraw-Hill 2012.
2	Optoelectronics and Photonics: Principles and Practices by S. O. Kasap, Prentice Hall 2001
3	Engineering Electromagnetics by William H. Hayt Jr., John A. Buck, McGraw-Hill Education, 9th Edition, 2018.

Reference Books:

1	Physics of Semiconductor Devices, Simon M. Sze, Wiley-Interscience (1981)
2	Semiconductor Device Physics and Design, Umesh K Mishra and Jasprit Singh, Springer 2008.

Semiconductor Physics Lab

List of Experiments:

1. Basic Measurements
2. Parameter extraction from V-I characteristics of a Zener diode
3. Resistivity measurement of semiconductor by Four Probe method
4. To find the energy gap of a thermistor
5. Study the characteristics of Solar cells
6. Verification of Ohm's law and error analysis of the data using Linear Least Squares Fit (LLSF) method
7. Study of energy values and wave function using Mathematica software
8. Verification of Planck's constant.
9. Determination of wavelength of LASER light by diffraction method

Reference:

1	Laboratory manual of the Physics Department
2	Principles and Practices by S. O. Kasap, Prentice Hall 2001

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Semester II	
Course Code: 26HS03TH0216	Course: Engineering Mathematics II
L: 3Hrs, P: 0 Hrs per Week	Total Credits: 03
Compulsory/Elective: Compulsory	Course Type: BSC

Course Outcomes:	
After completion of the course, students will be able to	
CO 1	Interpret the solutions of system of linear equations and use the concepts of Eigen values, Eigen vectors to find diagonalization of matrices, reduction of quadratic form to canonical form.
CO 2	Evaluate definite and improper integrals using Beta, Gamma functions. Also trace cartesian curves.
CO 3	Solve multiple integration by change of order, change of variable methods and apply it to find area, volume, mass and center of gravity.
CO 4	Understand geometric meaning of gradient, curl, divergence
CO 5	Perform line, surface and volume integrals of vector-valued functions.

Syllabus	
Module I Linear Algebra: (08 hours) Rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigen values and eigenvectors; Diagonalization of matrices; Orthogonal transformation and quadratic to canonical forms, Introduction to n-dimensional space, Singular value decomposition and its application in reducing the dimensionality of images and data.	
Module II: Integral Calculus: (08 Hours) Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Tracing of curves (Cartesian form)	
Module III: Multiple Integrals (10 Hours) Multiple Integration: Double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: area, mass and volume by double integration, Center of mass and Gravity (basic concepts).	
Module IV: Vector Calculus (Differentiation) (07 Hours) Scalar point function, Vector point function, vector differentiation, gradient, divergence and curl, directional derivatives with their physical interpretations, solenoidal and irrotational motions, Scalar potential function.	
Module V: Vector Calculus (Integration) (07 Hours) Vector integration: Line integrals, work done, conservative fields, surface integrals and volume integrals, Stoke's theorem, Gauss divergence theorem, Green's theorem and their simple applications.	
Topics for self-learning	
1	Rolle's theorem, Mean value theorems, Indeterminate forms, Applications of definite

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	integrals to evaluate perimeter, area, surface areas and volumes of revolutions.
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Textbooks/References:	
1	Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
4	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 th Reprint, 2010.
5	P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Volume I & II, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).
6	Biomedical Statistics -Shantikumar Yadav , Sompal Singh, Ruchika Gupta
7	Theory and Problems of Probability and Statistics - M.R. Spiegel (Mc Graw Hill) Schaum Series

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Semester II	
Course Code: 26EE07TP0201	Course: Fundamentals of Electrical Engineering-II
L: 3 Hrs, P: 2 Hrs per Week	Total Credits: 04
Compulsory/Elective: Compulsory	Course Type: PCC

Course Outcomes:	
After completion of the course, students will be able to	
CO1:	Analyze the performance characteristics and speed control techniques of DC machines
CO2:	Evaluate losses, efficiency, and performance characteristics of single-phase transformers
CO3:	Explain the construction, working principle, and characteristics of single and three-phase induction motors
CO4:	Explain LED lightning system including types, operating principles, drivers and its advantages
CO5:	Perform precise measurements and analyse experimental results
CO6:	Explain the principles, procedures, and outcomes of experiment performed

<u>Syllabus</u>
Module I: DC Machines (10 Hours) Basic principle & operation of DC generators and DC motors (separately excited, shunt and series), Induced EMF equation, Back emf and its significance, Torque and power, Characteristics of DC motors, speed control of DC motors, Losses & Efficiency, Three point starter, Application of DC motor.
Module II: Single Phase Transformer (10 Hours) Basic principle, types of single-phase transformer, Ideal and practical transformer, Operation under no load and load condition, equivalent circuit and parameters, open circuit and short circuit test, direct loading test, voltage regulation, losses and efficiency.
Module III: Three phase Induction Motor (06 Hours) Three phase induction motor: Construction, working principle, , rotating magnetic field, types, synchronous speed, slip, torque equation and torque-speed characteristics, applications.
Module IV: Single phase Induction Motor (03 Hours) Single phase Induction motors: Construction, double revolving magnetic field, working principle, types of single-phase induction motors and, applications.

Module V: Illumination (07 Hours)

Basic requirement of lighting scheme, important terms related with illumination: Lux, Lumens, solid angle, Illuminance, Laws of illumination, LED driver circuits and types, Design of LED driver circuits, Types of lamps. Introduction to Domestic wiring.

Textbooks/References:

1	Electrical Machinery: I. J. Nagrath and D. P. Kothari, Tata McGraw-Hill Education, 2004
2	A Text Book of Electrical Technology, B. L. Theraja (Vol. I & II), S. Chand, 2005
3	Basic Electrical Engineering, D. C. Kulshreshtha, McGraw Hill, 2009.
4	Basic Electrical Engineering: S. B. Bodkhe, N. M. Deshkar, P. P. H. Pvt. Ltd.
5	Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill, 2010
6	Electrical Machines, Dr. P.S. Bimbhra, Khanna Publishers, Third Edition,
7	Electrical Machines, Ashfaq Hussain, Dhanpat Rai & Co., Third edition, 2015
8	Electrical Wiring Estimating and Costing, S. L. Uppal, Khanna Publishers, 1976

Reference Books:

Basic Electrical Engineering by Fitzgerald and Higginbotham, TMH.
Basic Electrical and Electronics Engineering by S.K.Bhattacharya, Pearson Publications

List of Experiments:

1. To study B-H curve of different magnetic materials.
2. To check the functioning of single phase transformer.
3. To perform - Polarity marking on two winding transformers. - Conversion of two-winding transformer into autotransformer.
4. To study speed control of D.C. shunt motor by: - Armature Voltage Control method. - Field current control method.
5. To reverse the direction of rotation of DC shunt motor
6. To perform load Test on D.C. shunt motor.
7. To study the different types of switchgears and accessories for LT installations.
8. To study the different types of wires and cables for different applications.
9. To study the symbols of various components used in electrical system and understand simple single line diagrams.
10. To design electrical wiring scheme for residential applications.

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| 11. To verify the quality of earthing by measuring various parameters. |
| 12. To find out the luminous efficacy and polar curve of a light source |

Semester II	
Course Code: 26EE07TP0202	Course: Analog Electronics Circuits
L: 3Hrs, P: 2 Hrs per Week	Total Credits: 04
Compulsory/Elective: Compulsory	Course Type: ESC

Course Outcomes:	
After completion of the course, students will be able to	
CO1	Explain the working and characteristics of diodes and their use in rectifier circuits
CO2	Appreciate the basic structure, working principle, and V–I characteristics of BJT and MOSFET.
CO3	Explain the concept of negative feedback and analyze basic inverting and non-inverting op-amp circuits
CO4	Analyze basic op-amp based on linear and non-linear applications for given specifications

Syllabus
MODULE-I: (6 Hours) Diode Circuits: P-N junction diode, V-I characteristics of a diode; Diode as a switch, half-wave and full-wave rectifiers, Zener diode characteristics and applications
MODULE -II: (6 Hours) BJT Circuits: Structure and V-I characteristics of a BJT; BJT as a switch. BJT as an amplifier, biasing circuits; common-emitter, common-base and common-collector amplifiers
MODULE -III: (8 Hours) MOSFET Circuits: MOSFET structure and V-I characteristics. MOSFET as a switch. MOSFET as an amplifier, biasing circuits and analysis, common-source, common-gate and common-drain amplifiers
MODULE -IV: (8 Hours) Feedback amplifier and Op-amp fundamentals: General Feedback amplifier Structure, Properties of Negative Feedback, Characteristics of operational amplifier, open loop Op-amp, basic inverting and non- inverting Op-amp amplifiers with negative feedback
MODULE -V: (8 Hours) Op-amp linear and nonlinear applications: Voltage follower, summing amplifiers,

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integrators and differentiators, difference amplifiers & instrumentation amplifiers, Clipper, Clamper, Comparators, Schmitt trigger circuits
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Text Books:

1	Adel S. Sedra, Kenneth C. Smith, Arun N. Chandorkar, "Microelectronics Circuits:Theory and Applications," Seventh Edition, Oxford University Press, 2017.
2	Sergio Franco,"Design with Operational Amplifiers and Analog Integrated Circuits,"Fourth Edition, McGraw-Hill Education, 2014.
3	Ramakant Gayakwad," OP-AMPS and linear integrated circuits" 4th Edition, PHI
4	D. Roy Choudhary, Shail Jain "Linear Integrated Circuits", 4th Edition, New Age International

Reference Books:

1	Jacob Millman, Christos Halkias, Chetan Parikh, "Millman's Integrated Electronics,"Second edition, McGraw Hill Education, 2017.
2	Donald Neamen, "Electronic Circuits: Analysis and Design," Third Edition, McGrawHillPublication, 2006.

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Semester II	
Course Code: 26EE07TP0203	Course: Data Structures and Algorithms
L: 2Hrs, P: 2Hrs per Week	Total Credits: 03
Compulsory/Elective: Compulsory	Course Type: ESC

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Discuss abstract data types and algorithm performance using time and space complexity concepts.
CO 2:	Develop programs using linear data structures such as stacks, queues, and linked lists.
CO 3:	Apply searching and sorting algorithms to organize and retrieve data efficiently.
CO 4:	Demonstrate nonlinear data structures and their operations such as trees and graphs.
CO 5:	Execute, debug, and validate programs to ensure correct functionality.

<u>Syllabus</u>
Module I: Data Structures and Algorithms Basics (03 Hours) Organizations, data structure operations; abstract data types (ADTs) and their characteristics. Algorithms: definition, characteristics, analysis of an algorithm, asymptotic notations, time and space tradeoffs.
Module II: Stacks and Queues (07 Hours) Stack ADT: Overview of Array ADT, Representation of Stack, Implementation of Stack using Array, Stack Operations and Applications of Stacks Queue ADT: Introduction, Queue implementation using arrays, Operations on Queue, Types of Queues and Applications of Queues.
Module III: Linked Lists (04 Hours) Singly Linked Lists: representation in memory, Operations on Singly Linked List : traversing, searching, insertion, deletion, reversal, ordering, etc. Linked representation of stacks and queues.
Module IV: Searching and Sorting (06 Hours) Searching: Linear and Binary Search Methods and complexity analysis of search methods. Sorting: Different approaches to sorting, Bubble sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, Heap Sort and their complexity analysis.

Module V: Trees and Graphs (06 Hours)

Trees: Introduction, basic terminology, binary trees and their operations, binary search trees (BST), expression trees, tree traversals (inorder, preorder, postorder), and basic operations on binary search trees.

Graphs: Introduction, basic terminology, graph representations, graph traversal algorithms (Depth First Search and Breadth First Search) with complexity analysis, and shortest path algorithms.

Module V: Trees: (06 Hours)

Introduction, basic terminology, binary tree and operations, binary search tree [BST], expression tree, traversing a binary tree, Operations on Binary Search Tree.

MODULE VI: Graphs (06 Hours):

Introduction, basic terminology, graph traversal algorithm (DFS, BFS) with complexity analysis, shortest path algorithms.

Textbooks:

1	E Balagurusamy , Data Structures Using C, MC Graw Hill, Nineteenth reprint 2023.
2	Ellis Horowitz, Sartaj Sahni & Susan Anderson-Freed, Fundamentals of Data Structures in C, Second Edition, Universities Press, 2008.
3	Mark Allen Weiss; Data Structures and Algorithm Analysis in C; Second Edition; Pearson Education; 2002.
4	G.A.V. Pai; Data Structures and Algorithms: Concepts, Techniques and Application; First Edition; McGraw Hill; 2008.

Reference books:

1	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein; Introduction to Algorithms; Third Edition; PHI Learning; 2009.
2	Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran; Fundamentals of Computer Algorithms; Second Edition; Universities Press; 2008
3	A. K. Sharma; Data Structures using C, Second Edition, Pearson Education, 2013

Experiments based on

1. Write a program in C to implement insertion and deletion operation in an array
2. Write a program in C to implement PUSH and POP operations on Stack using array.
3. Write a program in C to check nesting of parentheses using a Stack.
4. Write a program in C to evaluate postfix expression using Stack.
5. Write a program in C to implement a Queue and perform its common operations.
6. Write a program in C to implement a linked list and perform its common operations.

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| 7. Write a program in C to implement binary tree traversal using INORDER, PREORDER and POSTORDER techniques. |
| 8. Write a program in C to implement searching and sorting techniques in array. |
| 9. Write a program in C to implement DFS and BFS graph traversal algorithm. |
| 10. Open ended experiment. |

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Semester II	
Course Code: 26HS02TH0203-1	Course: Foundational Literature of Indian Civilization
L: 1 Hrs, P: 0Hrs per Week	Total Credits: 01
Compulsory/Elective: Compulsory	Course Type: IKS

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Understand the Indian knowledge system and its scientific approach.
CO 2:	Get introduced to the Vedic corpus and recognize the multi-faceted nature of the knowledge contained in the Vedic corpus.
CO 3:	Understand the salient features of the philosophical systems of the Vedic and non-Vedic schools.
CO 4:	Develop an understanding about the foundation of Vedic Mathematics

<u>Syllabus</u>
Module I: Overview of Indian Knowledge System Importance of ancient knowledge, defining IKS, IKS classification framework, Historicity of IKS, Some unique aspects of IKS.
Module II: The Vedic corpus Introduction of Vedas, four Vedas, divisions of four Vedas, six Vedangas, Distinct features of Vedic life.
Module III: Indian Philosophical systems Development and unique features, Vedic schools of philosophy, Samkhya and Yoga School of philosophy, Nayay and Vaisesika school of philosophy, Purva-mimamsa and Vedanta schools of Philosophy, Non-vedic philosophies: Jainism, Buddhism, and other approaches
Module IV: Vedic Maths -1 Introduction of Vedic Mathematics, Bodhyan geometry, circular functions, inverse circular functions.
Module V: Vedic Maths -2 Multiplication of polynomials by <i>nikhilam</i> and <i>urdhvatiryagbhyam</i> sutra. Verification by <i>Gunitasamuccayah</i> . Division of two polynomials using <i>parāvartya yojayet</i> . HCF and LCM of two polynomials using <i>ādyamādyenāntyamantyena</i> and <i>ānurūpyeṇa</i> . Factorization of polynomials up-to degree 3 using <i>ānurūpyeṇa</i> , <i>Lopanasthāpanābhyām</i> , <i>ādyamādyenāntyamantyena</i> .

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Reference material	
1	B. Mahadevan, Vinayak Rajat Bhar, Nagendra Pavana R. N., “Introduction to Indian Knowledge System: Concepts and Applications” PHI, 2022
2	S.C. Chatterjee and D.M. Datta, An introduction to Indian Philosophy, University of Calcutta, 1984

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Semester II	
Course Code: 26HS04PR0201	Course: Health, Fitness & Wellbeing
L: 0Hrs, T: 0Hrs, P: 2Hrs per Week	Total Credits: 01
Compulsory/Elective: Compulsory	Course Type: CCA
Aim of the Course	
The course aims to foster Health and wellness through Healthy and Active Lifestyle and creating awareness about the fundamentals of Physical Education, Sports, Yoga, Recreation and its effectiveness through practical experiences and hands on activities.	

Objectives of the Course	
1:	To impart the students with basic concepts of Sports, Yoga and Recreational activities for health and wellness.
2:	To familiarize the students with health-related Exercise and evaluate their Health-related Fitness.
3:	To make Overall growth & development with team spirit, social values and leadership qualities among students through various sports, games and Yogic activities.
4:	To create Environment for better interaction and recreation among students as neutralizer for stress through various minor and recreational games.

Course Outcomes:	
After completion of the course, students will be able to	
CO 1:	Understand fundamental skills, basic principle and practices of sports and Yoga.
CO 2:	Practically learn the principles of implementing general and specific conditioning of physical exercises and yoga.
CO 3:	Develop Health-related fitness and Body-mind co-ordination through various fitness activities, sports, recreational games and yoga.
CO 4:	Practice Healthy & active living with reducing Sedentary Life style.

Course Content:	
• Module I: • Warm up and Cool Down and Stretching Exercises. • General and Specific Exercises. • Calculation of BMI & Resting Pulse Rate. • General and Specific exercises for strength, Speed, Agility, Cardiovascular	

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Endurance, Flexibility, Coordinative abilities. - Practice of Fundamental Skills of Volleyball, Table Tennis and Chess, etc. - Knowledge and practice of the Equipment used in a Gymnasium and its application.
Module II: - Yoga: Standing, Sitting, Prone & Supine positions. - Suryanamaskar. - Pranayama, Meditation and Relaxation Techniques. - Recreational Games. - Practice of Fundamental Skills of Basketball, Football, Carrom, etc. - Health related Physical Fitness Test.

Assessment Type	Weightage in Marks	Total Marks
Practical	Physical Efficiency Test – 30 Marks Sports/Games skill Activity/Project – 10 Marks Yoga Activities – 10 Marks	50
	Total = 50 Marks	

References:	
1	Russell, R.P. (1994). Health and Fitness Through Physical Education. USA: Human Kinetics.
2	Uppal, A.K. (1992). Physical Fitness. New Delhi: Friends Publication.
3	AAPHERD “Health related Physical Fitness Test Manual.”1980 Published by Association drive Reston Virginia
4	Kumar, Ajith. (1984) Yoga Pravesha. Bengaluru: Rashtrothanna Prakashana.
5	Dr. Devinder K. Kansal, A Textbook of Test Evaluation, Accreditation, Measurements and Standards (TEAMS ‘Science)

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Semester II	
Course Code:	Course: Electrical Maintenance
L: 3Hrs, T: 0Hrs, P: 0Hrs per Week	Total Credits: 03
Compulsory/Elective: Exit course	Course Type: I Year Exit Course

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Prepare maintenance schedules for electrical equipment and follow the various maintenance practices
CO 2:	Test and maintain rotating electrical machines.
CO 3:	Test and maintain single phase and three phase transformers.
CO 4:	Test and maintain insulation systems of electrical equipment

<u>Syllabus</u>
Module1: General Introduction Objectives of particular testing, Significance of ISS, concept of tolerance, routine test, type test, special tests Method of testing, direct, indirect, distractive and non-distractive testing methods. Concept of routine, preventive and breakdown maintenance, advantages of preventive Maintenance, introduction to Total productive maintenance [TPM]. Testing Methods: Conceptual understanding to detect the fault by test results of Megger Testing, Resistance Testing, Turns ratio testing, Three phase sequence, Testing.
Module 2: Transformer routine maintenance Testing: Type, Routine and Special Tests as per IS for Distribution and Power Transformer, Radiator choking, Breather silica jell bad condition, leakages from tank joints, Loose connections at terminals. Conservator top-up need, contamination of transformer oil properties, transformer de-hydration need etc. Effect of each reason on transformer.
Module 3: Rotating Machine/ Motors maintenance Testing: Needs and Standards, Tolerance, Types: Routine, Special and Supplementary tests, Methods of Testing: Direct, Indirect and regenerative with advantages and applications, Induction Motor Testing: Routine Type and Special Test of Single and Three Phase Induction motor as per IS. Alternator and Synchronous motor Testing: Routine Type and Special Test of Three Phase alternator and Synchronous motor as per IS.

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Module 4: Maintenance of Electrical Machine Insulation

Factors affecting life of Insulation material, Measurement of Insulation Resistance and Interpretation of condition of Insulation,

Transformer Oil: Properties, contamination agents, tests,

Strengthening Insulations: Weakening agents, cleaning, Drying, Re-varnishing, baking impregnation, Filtration.

Module 5: Miscellaneous equipment maintenance

Maintenance Solar panel, Battery.

Text Books:

1	A text book of Electrical Maintenance, M.A. Choudhary, Publisher: Nirali Prakashan
2	Maintenance of Electrical Equipment, S. M. Choudhari, Techknowledge publications
3	Maintenance of Electrical Equipment, by Sonje Swati M., Publisher: Tech-Neo
4	Testing, Commissioning, Operation and Maintenance of Electrical Equipments, S.Rao, Khanna publishers
5	Operation and Maintenance of Electrical Equipment Vol.1 and Vol.2, By :B.V.S.Rao, Media Promoters and publishers Pvt.Ltd

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Semester II	
Course Code:	Course: Electrical Appliances
L: 3Hrs, T:0Hrs, P:0Hrs per Week	Total Credits:3
Compulsory/Elective: Exit course	Course Type: I Year Exit Course

Course Outcomes: After completion of the course, students will be able to	
CO 1:	Discuss the concept of Energy Efficiency of Electrical appliances & types of power supply units used in these appliances.
CO 2:	Explain working principle & application of different electrical motors.
CO 3:	Describe working principle of appliances used for heating & cooling purpose.
CO 4:	Identify the different electrical power supply backup equipment like battery, Inverter, UPS, & photovoltaic system.
CO 5:	Explain construction & working principle of electrical domestic appliances.
CO 6:	Test & perform maintenance of Consumer Electrical Appliances.

<u>Syllabus</u>
Module 1: [06 Hours] Basics of DC & AC systems, voltage-current-power relationships, AC DC sources for appliances, Star rating, Energy efficiency in Electrical appliances, Importance of IS codes, IE codes.
Module 2: [08 Hours] Introduction to AC/DC Motors for Appliances (FHP Motors) - Single Phase Motors (FHP), DC Motors, BLDC Motors, Universal Motors.
Module 3: [08 Hours] HVAC Appliances-: Construction, Working Principle, Ratings/Specifications, Control of a) Resistance heating: Water heaters, Room Heater, Tea/ Coffee Maker, Oven, Toasters, Iron b) Non Resistive heating: Induction heaters, Microwave oven c) Cooling Appliances: Construction, Working Principle, Ratings/Specifications, Control of Fans, Desert Coolers, Air conditioner, Refrigerator
Module 4: 08 Hours] Power supply Equipment: Battery and battery chargers, Switch mode power supply, Inverter, Uninterrupted Power Supply (UPS), Photovoltaic power System
Module 5: [06Hours]

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Other Consumer appliances: Construction, Working Principle, Ratings/Specifications, Control Mixer, Grinder, Juicer, Vacuum Cleaner, Air Purifier, Washing Machines, Weighing scale, Elevator
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Module 6: [06 Hours]

Illumination-Construction, Working Principle, Ratings/Specifications, Control of LED Lights.
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Text Book/ Resources:

1	Consumer Electronics by S P Bali, Pearson
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2	Handbook of Repair & Maintenance of domestic electronics appliances: BPB Publications
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3	Literature available through e-resources.
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