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Shri Ramdeobaba College of
Engineering and Management, Nagpur

SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR – 440013

An Autonomous College affiliated to
Rashtrasant Tukadoji Maharaj Nagpur University,
Nagpur, Maharashtra (INDIA)

PROGRAMME SCHEME & SYLLABI
2023 – 2024

B.Tech. (ELECTRICAL ENGINEERING)

Published By

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ISO 9001 : 2015 CERTIFIED ORGANISATION

Salient Features of the Department

- The Department of Electrical Engineering was established in the year 1984 with a sanctioned UG intake of 60 students. The National Board of Accreditation has accredited the UG program fivetimes in succession in the year 2001, 2006, 2012, 2017 and 2020. Presently, the ElectricalEngineering Department also has a post graduate program (M. Tech. in Power Electronics andPower Systems) with sanctioned intake of 12, started from 2011. Department is a RecognizedResearch Centre, approved by RTM Nagpur University for Doctoral program and has sixteenwell-equipped laboratories.
- The department has well qualified and experienced faculty with industrial background and comprises of one Professor, three Associate Professors and nine Assistant Professors on roll. They have undertaken many consultancy projects and have been granted patent by government of India. Also, the faculty members are working on various research projects sponsored by different funding agencies including AICTE, RGSTC and UBA.
- The department has a conducive environment for the academic and overall development of students. Two student bodies are active in the department. One is the IEEE Student Joint Chapter and the other one is Electrical Engineering Students Association (EESA). They provide a platform for promoting the curricular, co-curricular and extracurricular students activities. The students of this department actively participate in sports and represent the college at various levels. Students are keenly interested in contributing for social cause and join the National Service Scheme (NSS) activities. Department organizes Seminars, Guest lectures, Value Added courses, Training programs and Product exhibitions for the students. Students get opportunity to enhance their technical skill by participating in the training program like PLC based automation, Photovoltaic Plant Design and Installation, IoT Applications etc. The curricula of both UG & PG programs is designed as per choice based creditsystemand current requirements of industry.
- There is a provision by which students can qualify and secure the award of Minor Specialization in any other discipline of their interest like Computer Science, Electronics, Mechanical etc. This is in addition to the degree belonging to core branch of Electrical Engineering. Such blend of two qualifications during the same period of four years increases the employability of students multiple times.
- To introduce the graduating students to the latest developments in the industry, the department organizes Technical Workshop cum Exhibition named “EMPOWER". This mega event was organized in the department for five times in year 2012, 2013, 2014, 2017 and 2018. Reputedcompanies namely ABB Limited, ARCTIC Infra Tech, GRANDSTREAM, Grundfos, Hager, Hioki, KEI Cables, L&T, Powerica, Wipro, Bergen, Biosys, HP, Rockwell Automation, Schneider, Siemens, Texas Instruments, Finolex, Highrise Transformers, TDK, Waree, Gentech, Synergy, VSP aqua mist etc. participated in the exhibition with the wide range of products to display.
- On academic front, the department results are consistently good. The department has an IEntrepreneur Development Cell to develop the entrepreneurial skills among the students. The department highly encourages the industry interaction. Students are permitted to avail one full semester internship in industry without any academic load in the college. So far, every year more

than 80% students get placed in different companies through on-campus drive with multiple job-offers in hand even before the completion of final year of graduation. Many students have secured admission at IITs, NITs and other higher ranked institutes including foreign universities for their Masters' education.

Department Vision

Department of Electrical Engineering endeavors to be one of the best departments in India havingexpertise to mould the students to cater the needs of society in the field of technology, leadership,administration, ethical and social values.Department Mission

To provide dynamic and scholarly environement for students to achieve excellence in core electrical and multidisciplinary fields by synergetic efforts of all stake holders of the Electrical Engineering Department and inculcatethe ethical and social values.

Program Educational Objectives

PEO1 : Our graduates will be able to plan, design, operate and practice in electrical and energy systems.

PEO2 : Our graduates will be able to work in multidisciplinary environments including IT applications and adapt themselves as per the emerging technological needs of Industry.

PEO3 : 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 the knowledge of mathematics, science, engineering fundamentals to the solutionof engineeringproblems.

PO2 : Problem analysis: Identify, formulate, review literature, and analyze complex engineering problems using first principles of mathematics, natural sciences and engineering sciences.

PO3 : Design/development of solutions: Design solutions for complex engineeing problems and design system components or processes that meet the specified needs with appropriate consideration for the public safety, societal and environmental considerations.

PO4 : Conduct problem investigations: Use research-based knowledge including experimentation, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5 : Modern tool usage: Select, and apply appropriate techniques, resources, and modern engineering and IT tools for analyzing the engineering activities with an understanding of the limitations.

PO6 : The engineer, industry and society: Apply contextual knowledge to assess industrial, societal and safety related issues and understand consequent relevance to the professionalengineeringpractice.

PO7 : Environment and sustainability: Understand the impact of the professional engineeringsolutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities andnorms of the engineering practice.

PO9 : Individual and team work: Function effectively as an individual and as a member or leader indiverse teams, and in multidisciplinarysettings.

PO10 : Communication: Communicate effectively on complex engineering activities such as, being able to understand and write effective reports, make effective presentations and give and receive clear instructions.

PO11 : Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team in multidisciplinaryenvironments.

PO12 : Life-long learning: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

PSO1 : Analyze ,design and develop Electrical Engineering systems considering green energy aspects in emerging applications like Electric vehicles, renewable energy etc.

PSO2 : Apply the knowledge of modern IT tools to Electrical Engineering applications.

ANNEXURE-1

Shri Ramdeobaba College of Engineering and Management, Nagpur
Department of Electrical Engineering
Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) NEP-2020 based

Contains:

Sr.No	Verticals	Courses and Abbreviations	
1	Basic and Engineering Science Courses and their Combinations to be offered in Mission Mode	Basic Science Course	BSC
		Engineering Science Course	ESC
2	Major Core Program Courses	Programme Core Course	PCC
		Programme Elective Course	PEC
3	Compulsory Multidisciplinary Minor	Multidisciplinary Minor	MDM
4	Generic/ Open Elective Courses;	Open Elective Other than a particular program	OE
5	Vocational and Skill Enhancement Courses	Vocational Skill Course Skill enhancement courses	VSC SEC
6	Humanities Social Science and Management (HSSM)	Ability Enhancement Course (AEC -01, AEC-02)	AEC
		Research Methodology	RM
		Entrepreneurship/Economics/ Management Courses	HSSM
		Indian Knowledge System	IKS
		Value Education Course	VEC
7	Field projects/ internship/ apprenticeship/ community engagement projects corresponding to the Major (core) subject,	Research Methodology	RM
		Community Engagement Projects (CEP)/Field Project	FP
		Project-I	Project
		Internship/Project-II/OJT	OJT
8	Co-curricular Courses	Co-curricular Courses	CCA

Shri Ramdeobaba College of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Semester - I

Sr. No.	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
1.	PHT1001	Physics for Electrical Engineers	2	1	0	3	50	50	100	3	BSC
2.	PHP1001	Physics for Electrical Engineers Lab	0	0	2	1	50	--	50	--	BSC
3.	MAT1001	Applied Mathematics-I	2	1	0	3	50	50	100	3	BSC
4.	MAP1001	Computational Mathematics Lab	0	0	2	1	50	--	50	--	BSC
5.	EET1002	Industrial Safety	1	0	0	1	50	--	50	--	BSC
6.	EET1001	Basic Electrical Engineering-I	3	0	0	3	50	50	100	3	PCC
7.	EEP1001	Electrical Workshop - I	0	0	2	1	50	--	50	--	VSC
8.	HUT1002	English for Professional Communication	2	0	0	2	50	50	100	2	AEC
9.	HUP1002	English for Professional Communication Lab	0	0	2	1	50	--	50	--	AEC
10.	MET1004	Engineering Graphics	2	0	0	2	50	50	100	2	ESC
11.	MEP1004	Engineering Graphics Lab	0	0	2	1	50	--	50	--	ESC
12.	HUT1004	Foundational Course in Universal Human Values	1	0	0	1	50	--	50	--	VEC
13.		Liberal / Performing Art Lab	0	0	2	1	50	--	50	--	CCA
		TOTAL	**13**	**02**	**12**	**21**					

Semester - II

Sr. No.	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
1.	CHT2003	Chemistry for Electrical Engineers	2	0	0	2	50	50	100	2	BSC
2.	CHP2003	Chemistry for Electrical Engineers Lab	0	0	2	1	50	--	50	--	BSC
3.	MAT2001	Applied Mathematics-II	2	1	0	3	50	50	100	3	BSC
4.	EET2002	Programming Skill	3	0	0	3	50	50	100	3	ESC
5.	EEP2002	Programming Skill Lab	0	0	2	1	50	--	50	--	ESC
6.	EET2001	Basic Electrical Engineering-II	3	0	0	3	50	50	100	3	PCC
7.	EEP2001	Basic Electrical Engineering-II Lab	0	0	2	1	50	--	50	--	PCC
8.	HUT2001	Foundational Literature of Indian Civilization	2	0	0	2	50	50	100	2	IKS
9.	PET2001	Sports-Yoga-Recreation	1	0	0	1	50	--	50	--	CCA
10.	PEP2001	Sports -Yoga-Recreation Lab	0	0	2	1	50	--	50	--	CCA
11.	EET2003	Analog Electronic Circuits	2	0	0	2	50	50	100	2	ESC
12.	EEP2003	Analog Electronic Circuits Lab	0	0	2	1	50	--	50	--	ESC
		TOTAL	**15**	**01**	**10**	**21**					

Exit option: Award of UG Certificate in Major after the completion of 42 credits and an additional 8 credits.						
Sr. No.	**Course Code**	**Course Title**	**Lecture**	**Tutorial**	**Practical**	**Credits**
1	EETE2001	Electrical Maintenance	3	0	0	3
2	EETE2002	Electrical Appliances	3	0	0	3
3	EEPE2003	Internship	Four weeks			2
		OR				
1	EEPE2004	Project/ Internship/On-Job Training (OJT)				8

Shri Ramdeobaba Collge of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Semester - III

Sr. No.	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
1.	MAT3006	Mathematics for Electrical Engineering	2	0	0	2	50	50	100	2	ESC
2.	EET3001	Network Analysis	3	1	0	4	50	50	100	3	PCC
3.	EEP3001	Network Analysis Lab	0	0	2	1	50	--	50	--	PCC
4.	EET3002	Electrical Measurements and Instrumentation	2	1	0	3	50	50	100	3	PCC
5.	EEP3002	Electrical Measurements and Instrumentation Lab	0	0	2	1	50	--	50	--	PCC
6.	EET3003	Data Structures and Algorithms	3	0	0	3	50	50	100	3	MDM
7.	EEP3003	Data Structures and Algorithms Lab	0	0	2	1	50	--	50	--	MDM
8.	EET2980	Open Elective-I	2	0	0	2	50	50	100	2	OE
9.	CHT3001	Environmental Science	2	0	0	2	50	50	100	2	VEC
10.	HUT3001	Business Communication	2	0	0	2	50	50	100	2	AEC
		TOTAL	**16**	**02**	**06**	**21**					

Shri Ramdeobaba Collge of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Semester - IV

Sr. No.	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
1.	EET4001	Signals and Systems	2	1	0	3	50	50	100	3	PCC
2.	EET4002	Electrical Machines-I	2	1	0	3	50	50	100	3	PCC
3.	EEP4002	Electrical Machines-I Lab	0	0	2	1	50	--	50	--	PCC
4.	EET4003	Power System-I	3	0	0	3	50	50	100	3	PCC
5.	EET4004	Digital Circuits and Microprocessor	3	0	0	3	50	50	100	3	PCC
6.	EEP4004	Digital Circuits and Microprocessor Lab	0	0	2	1	50	--	50	--	PCC
7.	EET2990	Open Elective-II	3	0	0	3	50	50	100	3	OE
8.	EET4005	Electrical Panel Control Design	1	0	0	1	50	--	50	--	VSC
9.	EEP4005	Electrical Panel Control Design Lab	0	0	2	1	50	--	50	--	VSC
10.	EEP4006	Field Project / Community Engagement Project	0	0	4	2	50	--	50	--	FP/CEP
11.	HUT4004	Constitution of India	2	0	0	2	50	50	100	2	VEC
12.	IDT4510	Creativity, Innovation and Design Thinking	1	0	0	1	50	--	50		SEC
		TOTAL	**17**	**02**	**10**	**24**					

Exit option: Award of UG Diploma in Major after the completion of 87 credits and an additional 8 credits.						
Sr. No.	**Course Code**	**Course Title**	**Lecture**	**Tutorial**	**Practical**	**Credits**
		Any two of following courses:	3	0	0	3
1	EETE4001 EETE4002 EETE4003 EETE4004	Electrical Energy Conservation and AuditUtilization of Electrical Energy PLC Programming Computer Aided Electrical Engineering Drawing	3	0	0	3
2	EEPE4005	Internship	Four weeks			2
OR						
1	EEPE4006	Project/ Internship/On-Job Training(OJT)				8

Shri Ramdeobaba Collge of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Semester - V

Sr. No.	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
1.	EET5001	Electrical Machines-II	2	1	0	3	50	50	100	3	PCC
2.	EEP5001	Electrical Machines-II Lab	0	0	2	1	50	--	50	--	PCC
3.	EET5002	Power Electronics	3	1	0	4	50	50	100	3	PCC
4.	EEP5003	Power Converters Lab	0	0	2	1	50	--	50	--	PCC
5.	EET5004	Microcontroller	3	0	0	3	50	50	100	3	PCC
6.	EEP5004	Microcontroller Based Automation Lab	0	0	2	1	50	--	50	--	SEC
7.	EET5005	Program Elective-I	3	0	0	3	50	50	100	3	PEC
8.	EET5006	Object Oriented Programming	3	0	0	3	50	50	100	3	MDM
9.	EEP5006	Object Oriented Programming Lab	0	0	2	1	50	--	50	--	MDM
10.	EET3980	Open Elective-III	3	0	0	3	50	50	100	3	OE
11.	EEP5007	Simulation Lab	0	0	2	1	50	--	50	--	SEC
		TOTAL	**17**	**02**	**10**	**24**					

Program Elective-I

V Sem	1	Electromagnetic Fields PHT5001	Electrical Energy Conservation andAudit EET5005 -1	Utilization ofElectrical Energy EET5005 -2	Applied Mechanics CET5015	Biology for Engineers IDT5510

Shri Ramdeobaba Collge of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Semester - VI

Sr. No.	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
1.	EET6001	Power System–II	3	0	0	3	50	50	100	3	PCC
2.	EEP6001	Power System–II Lab	0	0	2	1	50	--	50	--	PCC
3.	EET6002	Control Systems	3	1	0	4	50	50	100	3	PCC
4.	EEP6003	Feedback Control Lab	0	0	2	1	50	--	50	--	PCC
5.	EET6004	Database Management Systems	3	0	0	3	50	50	100	3	MDM
6.	EEP6004	Database Management Systems Lab	0	0	2	1	50	--	50	--	MDM
7.	EET6005	Program Elective-II	3	0	0	3	50	50	100	3	PEC
8.	EET6006	Program Elective-III	3	0	0	3	50	50	100	3	PEC
9.	EEP6006	Program Elective-III Lab	0	0	2	1	50	--	50	--	SEC
10.	EET6007	Innovation and Entrepreneurship	2	0	0	2	50	50	100	2	HSSM
11.	EEP6008	Project Phase-I	0	0	2	1	50	--	50	--	Project
		TOTAL	**17**	**01**	**10**	**23**					

Program Elective – II and III

Sem	*Program Elective*	*Power System Track*	*Control, Automation and Drives Track*	*Renewable Energy & Electric Vehicle*
	II	Power Station Practice EET6005-1	Electric Drives and Control EET6005-2	Non-Conventional Energy Sources EET6005-3
6	III(T)	Electrical Machine Design EET6006-1	PLC and SCADA EET6006-2	Photovoltaic System Engineering EET6006-3
	III(L)	Electrical Workshop-II EEP6006-1	PLC and SCADA Lab EEP6006-2	Photovoltaic System Engineering Lab EEP6006-3

Exit option: Award of B.Voc in Major after the completion of 134 credits and an additional 8 credits.						
Sr. No.	Course Code	Course Title	Lecture	Tutorial	Practical	Credits
1		**Any two of following:**	3	0	0	3
	EETE6001 EETE6002 EETE6003	Industrial Electrical SystemsPower Quality in Industries Electric Vehicles	3	0	0	3
2	EEPE6005	Internship	Four weeks			2
OR						
1	EEPE6006	Project/Internship/On-Job Training(OJT)				8

Shri Ramdeobaba Collge of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Semester - VII

Sr. No.	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
1.	EET7001	Switchgear and Protection	3	0	0	3	50	50	100	3	PCC
2.	EEP7001	Switchgear and Protection Lab	0	0	2	1	50	--	50	--	PCC
3.	EET7002	Electric Vehicles	3	0	0	3	50	50	100	3	PCC
4.	EET7003	Program Elective-IV	3	0	0	3	50	50	100	3	PEC
5.	EEP7003	Program Elective-IV Lab	0	0	2	1	50	--	50	--	PEC
6.	HUT7001	Principles of Economics and Management	2	0	0	2	50	50	100	2	HSSM
7.	EEP7004	Project Phase-II	0	0	6	3	50	50	100	--	Project
		TOTAL	**11**	**00**	**10**	**16**					

Program Elective – IV

Sem	*Program Elective*	*Power System Track*	*Control, Automation and Drives Track*	*Renewable Energy &Electric Vehicle*
	IV(T)	High Voltage Engineering EET7003 -1	Digital Signal Processing EET7003 -2	IoT Applications for Energy EET7003 -3
7	IV(L)	High Voltage Engineering Lab EEP7003 -1	Digital Signal Processing Lab EEP700 3-2	IoT Applications for Energy Lab EEP7003 -3

Shri Ramdeobaba Collge of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Semester - VIII

Sr. No.	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
1.	EET8001	Program Elective-V	3	0	0	03	50	50	100	3	PEC
2.	EET8002	Program Elective-VI	3	0	0	03	50	50	100	3	PEC
3.	EEP8003	Project Phase-II	0	0	12	06	100	100	200	---	Project
		TOTAL	6	00	12	12			400		
						OR					
1.	EEP8004	Full Semester Industry	--	--	--	12	200	200	400		Internship/
		Internship /TBI									OJT
						OR					
1.	EET8005	Research Methodology	4	0	0	4	50	50	100		RM
2.	EEP8006	Research Internship	--	--	--	8	150	150	300	3	Internship

Program Elective- V and VI

Sem	*Program Elective*	*Power System Track*	*Control, Automation and Drives Track*	*Renewable Energy & Electric Vehicle*
8	V	Modern ElectricalGrids EET8001 -1	Power Quality EET8001 -2	Advance Electrical Drives EET8001 -3
	VI	Flexible AC Transmission Systems EET8002 -1	Industrial Electrical Systems EET8002 -2	Energy Storage and EV Charging Infrastructure EET8002 -3

Shri Ramdeobaba Collge of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Program Elective Tracks and list of courses

Sem	Program Elective No			Courses		
5	I	Electromagnetic Fields PHT5001	Electrical Energy Conservation and Audit EET5005-1	Utilization of Electrical Energy EET5005-2	Applied Mechanics CET5015	Biology for Engineers IDT5510

Sem	Program Elective	Power System Track	Control, Automation and Drives Track	Renewable Energy & Electric Vehicle
6	II	Power Station Practice EET6005-1	Electric Drives and Control EET6005-2	Non-Conventional Energy Sources EET6005-3
	III (T)	Electrical Machine Design EET6006-1	PLC and SCADA EET6006-2	Photovoltaic System Engineering EET6006-3
	III (L)	Electrical Workshop-II Lab EEP6006-1	PLC and SCADA Lab EEP6006-2	Photovoltaic System Engineering Lab EEP6006-3
7	IV (T)	High Voltage Engineering EET7003-1	Digital Signal Processing EET7003-2	IoT Applications for Energy EET7003-3
	IV (L)	High Voltage Engineering Lab EEP7003-1	Digital Signal Processing Lab EEP7003-2	IoT Applications for Energy Lab EEP7003-3
8	V	Modern Electrical Grids EET8001-1	Power Quality EET8001-2	Advance Electrical Drives EET8001-3
	VI	Flexible AC Transmission Systems EET8002-1	Industrial Electrical Systems EET8002-2	Energy Storage and EV Charging Infrastructure EET8002-3

Shri Ramdeobaba Collge of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Honors in "Distributed Energy Generation Systems"

Sem	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
III	EETH3100	Renewable and Distributed Energy Sources	3	0	0	3	50	50	100	3	Honors
IV	EETH4100	Energy Storage System	3	0	0	3	50	50	100	3	Honors
V	EETH5100	Distributed Generation and Smart grids OR Equivalent SWAYAM NPTEL course approved by the Department	4	0	0	4	50	50	100	3	Honors
VI	EETH6100	Design of Power Converter for Distributed Generation System OR Equivalent SWAYAM NPTEL course approved by the Department	4	0	0	4	50	50	100	3	Honors
VII	EETH7100	Power Quality Improvement Techniques OR Equivalent SWAYAM NPTEL course approved by the Department OR Project	4	0	0	4	50	50	100	3	Honors
		TOTAL	18	00	00	18					

Honors with Research

Desirous students will be required to work on a research project or dissertation in Electrical Engineering for 18 credits in the fourth year (Semester VII and VIII). These credits will be over and above the minimum 162 credits prescribed for the B. Tech. Electrical Engineering Programme.

Shri Ramdeobaba Collge of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Minors in Electric Vehicles (EV)

Sem	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
III	EETM3100	Basics of Electrical Engineering and EV	3	0	0	3	50	50	100	3	Minors
IV	EETM4100	EV Motors and their Control	3	0	0	3	50	50	100	3	Minors
V	EETM5100	EV Energy Management andCharging Infrastructure	4	0	0	4	50	50	100	3	Minors
VI	EETM6100	EV Communication and Instrumentation	4	0	0	4	50	50	100	3	Minors
VII	EETM7100	EV Policies and Safety Aspects	4	0	0	4	50	50	100	3	Minors
		TOTAL	**18**	**00**	**00**	**18**					

Open Elective courses offered by the Department

Scheme of Examination

Sem	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)	Category
			L	T	P		Continuous Evaluation	End Sem Exam	Total		
III	EET2980-1	Electrical Engineering: Introduction and Applications	2	0	0	2	50	50	100	2	OE
	EET2980-2	Renewable Energy Systems									
IV	EET2990-1	Electrical Appliances	3	0	0	3	50	50	100	3	OE
	EET2990-2	Energy Storage Systems									
	EET2990-3	Solar Photovoltaic Systems									
V	EET3980-1	Energy Management and Audit	3	0	0	3	50	50	100	3	OE
	EET3980-2	Automation with PLC									
	EET3980-3	Electric Vehicles									

Shri Ramdeobaba Collge of Engineering and Management, Nagpur

Teaching and Evaluation Scheme for B. Tech. (Electrical Engineering) Session : 2023-24

Sr. No	Vertical	Courses and Abbreviations		I	II	III	IV	V	VI	VII	VIII	Actual Credits	Actual Total
1	Basic and Engineering Science Courses and their Combinations to be offered in Mission Mode	Basic Science Course	**BSC**	9	6							15	27
		Engineering Science Course	**ESC**	3	7	2						12	
2	Major Core Program Courses	Programme Core Course	**PCC**	3	4	9	14	12	9	7		58	77/71
		Programme Elective Course	**PEC**					3	6	4	6/0	19/13	
3	Compulsory Multidisciplinary Minor	Multidisciplinary Minor	**MDM**			4		4	4			12	12
4	Generic/ Open Elective Courses;	Open Elective Other than a particular program	**OE**			2	3	3				8	8
5	Vocational and Skill Enhancement Courses	Vocational Skill Course	**VSC**	1			2					3	7
		Skill enhancement courses	**SEC**				1	2	1			4	
6	Humanities Social Science and Management (HSSM)	Ability Enhancement Course (AEC -01, AEC-02)	**AEC**	3		2						5	15
		Entrepreneurship/ Economics/ Management Courses	**HSSM**						2	2		4	
		Indian Knowledge System	**IKS**		2							2	
		Value Education Course	**VEC**			2	2					4	
7	Field projects/ internship/ apprenticeship/ community engagement projects corresponding to the Major (core) subject,	Research methodology	**RM**								4	4	16/22
		Comm. Engg. Project (CEP)/Field Project	**FP**				2					2	
		Project-I	**Project**						1	3		4	
		Internship/Project-II /OJT	**OJT**								6/12	6/12	
8	Co-curricularCourses	Co-curricular Courses	**CCA**	2	2							4	4
		Total Credits (Major)		**21**	**21**	**21**	**24**	**24**	**23**	**16**	**12**	**162**	

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : PHT1001 **Course : Physics for Electrical Engineers**

Core/Elective/Practical/Other: BSC **Credits : 03, L : 2 Hrs.,T : 1Hrs., P : 0Hrs.,Per week**

Course Objectives

1. To train the student to work with oscillatory phenomena in mechanical, electrical and optical systems and waves;
2. To train student to work with electrostatics, magnetostatics, optics and allied devices.

Course Outcomes

After successful completion of the course students will understand and be able to,

1. Analyze the simple harmonic oscillator, damped oscillator and forced oscillator.
2. Discuss the formation of waves on a string, their reflection at the boundary of a different medium and formation of standing waves
3. To outline basic concepts in electrostatic and magnetostatics.
4. To apply the materials for their application in electrical engineering.
5. To apply the understanding of optoelectronic devices for their applications in the related field.

Module 1 : Oscillations

Quick review of simple harmonic motion, mechanical and electrical oscillators, vector and complex numbers, Phasor representation, damped oscillations: under, critical and over damping, forced oscillations, impedance, energy and power supplied by driving force, Q-factor, related numerical/problems.

Module 2 : Waves

Correlated harmonic oscillations in space and time, Transverse and Longitudinal waves; Transverse wave on a string, characteristic impedance, reflection and transmission at a string-string boundary, Impedance matching, related numerical/problems.

Module 3 : Introduction to Electric and Magnetic Fields

Coulomb's law, electric field intensity, Gauss's law, definition of potential difference and potential, potential gradient, energy density in electrostatic field, ampere's circuital law, related simple numerical/problems.

Module 4 : Semiconductors and Solar Photovoltaic Cells

Band theory of solids, valence band, conduction band, intrinsic semiconductors, doping, extrinsic semiconductors, p-n junction diode.

Solar cell: solar energy spectrum, photovoltaic principle, I-V characteristics, conversion efficiency, irradiance, effect of change in irradiation and temperature on solar PV output, solar cell materials, related numerical/problems.

Module 5: Introduction to Electrical Engineering Materials

Dielectric Materials: Dielectrics, dielectric polarization, dielectric susceptibility, relation between dielectric constant and susceptibility, relation between polarization and electric field intensity, types of polarization, temperature dependence of polarization, dielectric loss, dielectric breakdown, piezoelectricity, ferroelectricity. A brief outline of Insulators and types of insulation (A, E, B, F, C).

Magnetic materials: Magnetic field, magnetization, magnetic susceptibility, magnetic induction, relationship between b and h absolute permeability, relation between permeability to susceptibility,classification of magnetic materials, soft and hard magnetic materials.

Module 6: LED and Laser Diode

Interaction of radiation with matter, spontaneous emission, simulated emission, Einstein coefficient, metastable states, LEDs: Principle, device structure, materials, characteristics.

Laser diode : Principle, components of laser system, injection pumping, population inversion, laser characteristics, related numerical/problems.

Text Book(s)

1. The Physics of Vibrations and Waves (Sixth Edition), H J Pain John-Wiley 2005.
2. Engineering Electromagnetics by H. Hayt, John Buck, Mc Graw Hill Higher Edn, 2006
3. Optoelectronics and Photonics by S. O. Kasap, Pearson, 2009.

References

1. Applied Physics by S. Jain, G. G. Sahasrabudhe and S. M. Pande, Universities Press 2013.
2. Engineering Physics by M.N. Avadhanulu and Kshirsagar S. Chand, 2019.

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : PHP1001 **Course : Physics for Electrical Engineers Lab**

Core/Elective/Practical/Other: BSC **Credits : 01, L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week**

The Physics Laboratory course will consist of experiments illustrating the principles of physics relevant to the study of science and engineering. Students will show that they have learnt laboratory skills that will enable them to properly acquire and analyze the data in physics laboratory and draw valid conclusions.

Course Outcomes

After successful completion of the course students will be able to

1. Prepare for measurements used in various experiments and analyze errors involved in the measurements.
2. Explore various methods for finding experimental parameters.
3. Acquire the experimental and graph plotting skills.
4. Prepare laboratory reports on the experimental results.
5. Analyze the characteristics of a device.

In addition to the demo experiments, the Lab turns will be utilized for performing the experiments based on the following lists as specific to Program.

1. Measurements, Error analysis and graph plotting.
2. Study of Simple pendulum.
3. To find magnetic field by magnetometer.
4. Frequency, amplitude and phase determination using C.R.O.
5. Study find wavelength of Laser beam.
6. Study of Laser bream characteristics.
7. To find relative permittivity of a dielectric material.
8. Study of PN junction diode.
9. IV characteristics of Solar Cell.
10. Study of LED.
11. Study of Ohm's law.
12. Data analysis using Mathematica.

Suggested References

1. Physics Lab Manual written by the Teaching Faculty of Physics Department, RCOEM. A minimum of 8 experiments are to be performed from the above list of experiments.

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : MAT1001 **Course : Applied Mathematics - I**

Core/Elective/Practical/Other: BSC **Credits : 03, L : 2 Hrs.,T : 1 Hrs., P : 0 Hrs., Per week**

Course Objective

The objective of this course is to familiarize the prospective engineers with techniques in Ordinary differential equation, statistics, probability and differential calculus.

It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcomes

On successful completion of the course, the students will able to:

1. Recognize first order ordinary differential equations that can be solved by each of the four methods-Linear DE, exact DE, reducible to linear DE and reducible to exact differential equations and use the appropriate method to solve them.
2. Solve higher order ordinary differential equations with constant and variable coefficients.
3. Find best fit curve by method of least square method and calculate correlation, regressions.
4. Recognize and understand discrete, continuous probability distributions and apply Binomial distribution, Poisson distribution and Normal distribution to appropriate problems.
5. Internalize multivariable calculus and apply it find Jacobians, maxima and minima of function/ Solve numerical integrations by Newton coat formulas and Gauss-Legendre Quadrature.

Syllabus

Module 1 : First order ordinary differential equations (7 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 2 : Ordinary differential equations of higher orders (8 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 3 : Statistics (7 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 4 : 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, Eulers Theorem, chain rule, total derivative, Jacobians, Maxima, minima and saddle points; Method of Lagrange multipliers.Module 5: Probability (8 hours) (For All Branches except Mechanical Branch)

Probability spaces, conditional probability, independence, Bay's Theorem, Discrete random variables, Binomial distribution, Poisson distribution, Normal distribution. Relation between binomial, Poisson and Normal distributions.

OR

Module 5 : Numerical Integration (8 hours)

(Only for Mechanical Branch) Simpson's 1/3rd rule, 3/8th rule, Trapezoidal rule, Gauss-Legendre Quadrature.

Textbooks/References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall. India, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000. 7.Theory and Problems of probability and statistics : 2nded :J. R. Spiegal ,Schaum series
8. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune - 411030 (India).
7. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : MAP1001 **Course : Computational Mathematics Lab**

Core/Elective/Practical/Other: BSC **Credits : 01, L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week**

Course Outcomes

By using open source software Sage Math Students will be able to

CO1 : Download Sage Math and use it as an advance calculator.

CO2 : Sketch and analyze function graphs.

CO3 : Apply the concepts of differential calculus to find extreme value of continuous functions and analyze solutions of differential equations

CO4 : Evaluate improper integrals and its applications to find length, area, volume, centre of gravity and mass.

CO5 : Analyze and calculate eigen values, eigen vectors, rank nullity, and solve system of linear equations of a matrix / linear map.

CO6 : Analyze the data to find best fit curve.

Mapping of Course outcomes (COs) with Experiments

Exp. No.	Name of Experiments	Mapped COs
1	To use SageMath as advanced calculator	CO1
2	2D Plotting with SageMath	CO2
3	3D Plotting with SageMath	CO2
4	Differential Calculus with SageMath	CO3
5	Solution of differential equations in SageMath	CO3
6	Basics of Linear Algebra	CO5
7	Curve Fitting by using SageMath	CO6
8	Integral Calculus with SageMath	CO4

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : EET1002 **Course : Industrial Safety**

Core/Elective/Practical/Other: BSC **Credits : 01, L : 1 Hrs.,T : 0 Hrs., P : 0 Hrs., Per week**

Course Outcomes

After the completion of the Course, students will be able to

CO1 : Discuss the concepts of industrial safety and industrial safety management

CO2 : Explain the method of maintaining accident record and reporting to real life problems

CO3 : Evaluate the safety performance of an organization

CO4 : Recognize hazards and hazard assessment tools and methods

Syllabus

MODULE - I : Concept of Safety

Definition and measurement of risk, reliability and hazard potential; elements of risk assessment; – risk analysis techniques – risk reduction resources – industrial safety and risk assessment. - Concepts of disaster control, job safety analysis, safety survey and safety inspection, Basic understanding of Industrial safety: environmental, electrical, dock, transport and nuclear safety; safety in hazardous industries like chemical, mining, construction etc.

MODULE - II : Hazards and Hazard Assessment

Definition and types of Hazards, difference between Risk and Hazard, Hazard assessment, procedure, methodology; preliminary hazard analysis (PHA), human error analysis, hazard operability studies (HAZOP), Tools for Hazard Identification, Evaluating Hazards.

MODULE - III : Safety Management Systems

Safety management systems in Indian industry; engineering aspects of safety management, Safety legislations, implementation and monitoring of safety programs. Recent Trends of development of safety engineering approaches, Safety training, Introduction to OSHA, ILO standards and guidelines

Text Book

Charles D. Reese, Occupational Health and Safety Management: A Practical Approach,Third Edition, CRC Press, ISBN 9781138749573 - CAT# K32753 201

Reference Books

1. Benjamin O. Ali, Fundamental Principles of Occupational Health And Safety, SecondEdition, ISBN-9221204545, International Labour Office, 2008
2. D. S. S. Ganguly, C. S. Changeriya, Safety Engineering, Chetan Publication; ISBN-13: 978- 81934 52264, 2016

3. R. K. Jain And Prof. Sunil S. Rao, Industrial Safety, Health And Environment ManagementSystems, Khanna Publishers, ISBN: 978-81-7409-210-6, 2000
4. Krishnan N.V. "Safety Management in Industry" Jaico Publishing House, Bombay, 1997.
5. Industrial safety management, L M Deshmukh, TATA McGraw Hill, 2010
6. Safety, Reliability and Risk Analysis: Theory, Methods and Applications- Vol 1. Sebastián Martorell,
7. C. Guedes Soares and Julie Barnett, CRC press.

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : EET1001 **Course : Basic Electrical Engineering - I**

Core/Elective/Practical/Other: PCC **Credits : 03, L : 3 Hrs.,T : 0 Hrs., P : 0 Hrs., Per week**

Course Outcomes

After the completion of the course, the students will be able to

CO1 : Analyse DC circuits and magnetic circuits using fundamental concepts and circuit laws (KVL and KCL).

CO2 : Apply the fundamental laws of electrical engineering to solve simple AC circuits.

CO3 : Identify different types of wiring system and various safety devices.

CO4 : Select illumination requirement for different premises.

CO5 : Discuss various power generation sources and draw the single line representation of power system.

CO6 : Classify various power converters and list their applications.

Syllabus

Module 1 : DC Circuits and Magnetic circuits (10 Hours)

Electrical circuit elements, voltage and current sources, Kirchhoff laws, star- delta transformation, **Magnetic circuits:** Basic terminologies of magnetic circuits, Right hand thumb rule, B-H characteristics and series magnetic circuits.

Module 2 : Single Phase and Three phase AC Circuits (10 Hours)

Representation of sinusoidal waveforms, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting series and parallel, series resonance, power factor improvement. Three phase balanced circuits, voltage, and current relations in star and delta connections.

Module 3 : Wiring and Electrical Installations (05 Hours)

Introduction of wiring, selection of wiring, types of wiring, I.E. (Indian Electricity) rules of domestic wiring, testing and installation of domestic wiring, Earthing formats for electrical connections Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, RCCB and Earthing.

Module 4 : Illumination (05 Hours)

Types of lamps, illumination schemes for domestic, industrial and commercial premises, lumens required for different categories.

Module 5 : Introduction to Power system (04 Hours)

Introduction to power generation (Thermal, Hydro, Nuclear, Wind, and Solar) with block schematic presentation only. Single line diagram for Generation, Transmission & Distribution through different voltage levels.

Module 6 : Introduction to Power Converters (04 Hours)

Basic schematic, introduction to power converters, types of power converters (DC-DC, DC-AC, AC-DC, AC-AC) and their practical applications.

Textbooks /Reference books

1. An introduction to Electrical Engineering Materials, C.S. Indulkar, S. Chand Publishing, 2008.
2. Electrical Wiring Estimating and Costing, S. L. Uppal, Khanna Publishers, 1976.
3. A Textbook of Electrical Technology, Volume 1, B. L. Thereja, S. Chand Publications, 2005
4. Basic Electrical Engineering, D. C. Kulshreshtha, McGraw Hill, 2009.
5. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill, 2010
6. Basic Electrical Engineering: S. B. Bodkhe, N. M. Deshkar, P. P. H. Pvt. Ltd. Second Edition, 2008.
7. Principles of Power System: V.K. Mehta, S.Chand, 2005
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
10. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : EEP1001 **Course : Electrical Workshop - I**

Core/Elective/Practical/Other: VSC **Credits : 01, L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week**

Course Outcome

After the completion of the course, the students will be able to

CO1 : Understand and select appropriate switchgears, wires and cables for various LT installations.

CO2 : Understand and design wiring and earthing schemes for various LT installations.

CO3 : Understand and draw polar curves for various lamps.

CO4 : Perform experiments on basic DC and AC electric circuits and make valid conclusions from observed results.

CO5 : Calculate the energy bill and verify the same with that provided by the utility for a specific installation and specific period.

CO6 : Write effective reports based on own observations and conclusions.

List of Experiments

1. To study the different types of switch gears and accessories for LT installations.
2. To study the different types of wires and cables for different applications.
3. To study the symbols of various components used in electrical system and understand simple single line diagrams.
4. To design electrical wiring scheme for residential applications.
5. To design electrical wiring scheme for commercial/industrial applications.
6. To study the meter cubicles for 1-phase and 3-phase AC systems.
7. To verify the quality of earthing by measuring various parameters
8. To find out the luminous efficacy and polar curve of a light source.
9. To verify Kirchhoff's law of DC circuits.
10. To verify Kirchhoff's law of AC circuits.
11. To study the balanced three phase system for star and delta connected load.
12. Improvement of power factor by using static capacitors.
13. To study B-H curve of different magnetic materials
14. Calculation and verification of energy bill of a house.

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : HUT1002 **Course : English for Professional Communication**

Core/Elective/Practical/Other: AEC **Credits : 02, L : 2 Hrs.,T : 0 Hrs., P : 0 Hrs., Per week**

Course Objectives

The main objective of this course is to enhance the employability skills of students as well as prepare them for effective work place communication.

Course Outcomes

On successful completion of the course the students will be able to achieve the following:

CO1 : Demonstrate effective use of word power in written as well as oral communication.

CO2 : Understand the techniques of listening and apply the techniques of reading comprehension used in professional communication.

CO3 : Apply the principles of functional grammar in everyday as well as professional communication.

CO4 : Effectively implement the comprehensive principles of written communication by applying various writing styles.

CO5 : Create precise and accurate written communication products.

Syllabus

Unit - 1 : Vocabulary Building

1.1 Importance of using appropriate vocabulary

1.2 Techniques of vocabulary development

1.3 Commonly used power verbs, power adjectives and power adverbs.

1.4 Synonyms, antonyms, phrases & idioms, one-word substitutions and standard abbreviations

Unit - 2 : Listening and Reading Comprehension

2.1 Listening Comprehension: active listening, reasons for poor listening, traits of a good listener, and barriers to effective listening

2.2 Reading Comprehension: types and strategies.

Unit - 3 : Functional Grammar and Usage

3.1 Identifying Common Errors in use of: articles, prepositions, modifiers, modal auxiliaries, redundancies, and clichés

3.2 Tenses

3.3 Subject-verb agreement, noun-pronoun agreement

3.4 Voice

Unit - 4 : Writing Skills

4.1 Sentence Structures

4.2 Sentence Types

4.3 Paragraph Writing: Principles, Techniques, and Styles

Unit - 5 : Writing Practices

5.1 Art of Condensation: Précis, Summary, and Note Making

5.2 Correspondence writing techniques and etiquettes – academic writing

5.3 Essay Writing

Books

1. Communication Skills. Sanjay Kumar and Pushp Lata. 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 Heasly. Cambridge University Press. 2006.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : HUP1002 **Course : English for Professional Communication Lab**

Core/Elective/Practical/Other: AEC **Credits : 01, L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week**

Course Objective

To enhance competency of communication in English among learners

Course Outcomes

On completion of English Lab course, students will be able to achieve the following:

CO1: Apply effective listening and speaking skills in professional and everyday conversations.

CO2: Demonstrate the techniques of effective Presentation Skills

CO3: Evaluate and apply the effective strategies for Group Discussions

CO4: Analyse and apply the effective strategies for Personal Interviews

CO5: Implement essential language skills- listening, speaking, reading, and writing

Syllabus

List of practical

Computer Assisted + Activity Based Language Learning

Practical 1: Everyday Situations: Conversations and Dialogues – Speaking Skills

Practical 2: Pronunciation, Intonation, Stress, and Rhythm

Practical 3: Everyday Situations: Conversations and Dialogues – Listening Skills

Activity Based Language Learning

Practical 4: Presentation Skills: Orientation & Mock Session

Practical 5: Presentation Skills: Practice

Practical 6: Group Discussions: Orientation & Mock Session

Practical 7: Group Discussions: Practice

Practical 8: Personal Interviews: Orientation & Mock Session

Practical 9: Personal Interviews: Practice

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : MET1004 **Course : Engineering Graphics**

Core/Elective/Practical/Other: ESC **Credits : 02, L : 2 Hrs.,T : 0 Hrs., P : 0 Hrs., Per week**

Course Outcomes

The expected learning outcome is that, the students shall be able to

1. Draw and interpret technical drawings
2. Convert 2-D to 3-D drawing and vice versa.
3. Represent the various positions of planes and solids in different orientations.

Syllabus

UNIT 1 : Introduction to Engineering Drawing and Engineering Curves : Principles of Engineering Graphics and their significance, usage of drawing instruments, Lettering and dimensioning, Engineering Curves - Conic sections, Cycloid and Involute etc.

UNIT 2 : Orthographic Projections : Theory of Projections, Concept of Projection, First & Third angle projection methods. Orthographic Projections: Conversion of given 3-dimensionalview to 2-dimensional representation.

UNIT 3 : Projections of Lines and Planes : Projections of lines (line inclined to both planes), Projections of planes (inclined to both the planes), Concept of auxiliary plane method for projections of the plane.

UNIT 4 : Projections of Solids : Projections of right, regular solids inclined to both the Planes (including Auxiliary Views) – Prism, Pyramid, Cylinder, Cone.

UNIT 5 : Isometric Projections: Principles of Isometric projection - Isometric Scale, IsometricViews, Isometric Views of Simple Solids, and Conversion of Orthographic views to Isometric Views / Projection.

Text Books

1. Engineering Drawing by N. D. Bhatt, Charotar Publishing House Pvt. Ltd.
2. Engineering Drawing with an Introduction to AutoCAD" by D. A. Jolhe Tata McGrawHill Publications
3. Engineering Drawing by R. K. Dhawan, S. Chand Publications
4. Engineering Drawing by K. L. Narayana & P. Kannaiah, SciTech Publication

Reference Books

1. AutoCAD 14 for Engineering Drawing by P. Nageshwara Rao, Tata McGraw Hill Publications.
2. A text book of Engineering Drawing by P. S. Gill, S.K.Kataria & sons, Delhi.
3. Engineering Drawing and Computer Graphics by M. B. Shah & B. C. Rana, Pearson Education.

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : MEP1004 **Course : Engineering Graphics Lab**

Core/Elective/Practical/Other: ESC **Credits : 01, L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week**

Course Outcomes

The expected learning outcome is that, the students shall be able to:

1. Draw and interpret technical drawings.
2. Plan the sheet layout for the given drawing.
3. Convert 2-D to 3-D drawing and vice versa
4. Represent the various positions of planes and solids in different orientations.
5. Use & demonstrate drafting package.

Module 1 : Introduction to Computer Aided Drawing

Introduction, Computer screen, layout of the software, standard tool bar / menu and description of most commonly used tool bars, and navigational tools.

Commands and creation of Lines, coordinate points, axes, poly-lines, square, rectangle, Polygon, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz., tangency, parallelism, inclination and perpendicularity.

Module 2 :

Drafting and annotation, dimensioning and scale. Electrical and Electronics symbol, Electrical wiring connection, D.C. Motor and Generator, Transformer and Control Panel Wiring etc.

Practical's to be performed from the list as below

Sr. No.	List of Sheets (Based on Theory syllabus)
1	Engineering Curves
2	Orthographic Projection
3	Projection of Straight Lines
4	Projection of Planes
5	Projections of Solids
6	Isometric Projection
7	Drawings related to Electrical Engineering

Syllabus for B. Tech. Semester I
Department of Electrical Engineering

Course Code : HUT1004 **Course : Foundational Course in Universal Human Values**

Core/Elective/Practical/Other: VEC **Credits : 01, L : 1 Hrs.,T : 0 Hrs., P : 0 Hrs., Per week**

Course Objectives

- To help the student see the need for developing a holistic perspective of life
- To sensitize the student about the scope of life – individual, family (inter-personalrelationship), society and nature/existence
- To strengthen self-reflection
- To develop more confidence and commitment to understand, learn and act accordingly

Course Outcome

On completion of course, students will be able to achieve the following:

CO1 : Develop a holistic perspective of life

CO2 : Better understanding of inter-personal relationships and relationship with society and nature.

CO3 : An ability to strengthen self-reflection

Syllabus

Unit 1 : Aspirations and concerns

Need for Value Education: Guidelines and content of value education.

Exploring our aspirations and concerns: Knowing yourself, Basic human aspirations Need for a holistic perspective, Role of UHV; Self-Management: harmony in human being

Unit 2 : Health

Harmony of the Self and Body, Mental and physical health; Health for family, friends and society.

Unit 3 : Relationships and Society

Harmony in relationships, Foundational values: Trust, Respect, Reverence for excellence, Gratitude and love; harmony in society; harmony with nature.

Reference Material

The primary resource material for teaching this course consists of

Text Book

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

Reference Books

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W.
6. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
8. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
9. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
10. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

Shri Ramdeobaba College of Engineering and Management
Department of Humanities
Liberal/Performing Arts (basket)

Sr. No.	Course Code	Course Name	Sem	Hours /week	Credits	Maximum marks	Department
						Continuous Evaluation	
1)	HUP1003-1/HUP2003-1	Fundamentals of Indian Classical Dance: Bharatnatayam	I/II	2	1	50	Humanities
2)	HUP1003-2/HUP2003-2	Fundamentals of Indian classicalDance: Kathak	I/II	2	1	50	Humanities
3)	HUP1003-3/HUP2003-3	Introduction to Digital Photography	I/II	2	1	50	Humanities
4)	HUP1003-4/HUP2003-4	Introduction to Japanese Languageand Culture	I/II	2	1	50	Humanities
5)	HUP1003-5/HUP2003-5	Art of Theatre	I/II	2	1	50	Humanities
6)	HUP1003-6/HUP2003-6	Introduction to French Language	I/II	2	1	50	Humanities
7)	HUP1003-7/HUP2003-7	Introduction to Spanish Language	I/II	2	1	50	Humanities
8)	HUP1003-8/HUP2003-8	Art of Painting	I/II	2	1	50	Humanities
9)	HUP1003-9/HUP2003-9	Art of Drawing	I/II	2	1	50	Humanities
10)	HUP1003-10/HUP2003-10	Nature camp	I/II	2	1	50	Humanities
11)	CHP1008-1/CHP2008-1	Art of Indian traditional cuisine	I/II	2	1	50	Chemistry
12)	CHP1008-2/CHP2008-2	Introduction to Remedies by Ayurveda	I/II	2	1	50	Chemistry
13)	PEP1001-1/PEP2001-1	Disaster Management through AdventureSports	I/II	2	1	50	Physical Education
14)	PEP1001-2/PEP2001-2	Self-defense Essentials and Basic Knowledge of Defense forces	I/II	2	1	50	Physical Education

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUP1003-1
HUP2003-1
L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week

Course : Fundamentals of Indian Classical Dance : Bharatnatayam
Credits : 01

Course Objective

The course aims to introduce the students to Bharatnatyam, an important element of Indian traditional knowledge system. The course will not only provide the learning and skill to perform this art but would also enhance many mental and physical aspects of the students such as strength, flexibility, discipline, self-confidence, creativity, focus, coordination, etc.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1: Understand the importance of dance and Bharatnataym as an Indian danceform

CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give Pratham (1st level formal exam of Bharatnatayam).

Syllabus

Practical - 1 : Orientation in Bharatnatayam

Practical - 2 : Tattu Adavu till 8, Naatta Adavu 4 Steps, Pakka Adavu 1 step, MettaAdavu 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, editedby Sreenath Nair, 2015
3. Bharatanatyam How to ... : A Step-by-step Approach to Learn the Classical Form,Eshwar Jayalakshmi, 2011

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUP1003-2
HUP2003-2
L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week

Course : Fundamentals of Indian Classical Dance : Kathak
Credits : 01

Course objective

The course aims to introduce the students to Kathak, an important element of Indian traditional knowledge system. The course will not only provide the learning and skillto perform this art but would also enhance many mental and physical aspects of the students such as strength, flexibility, discipline, self-confidence, creativity, focus, coordination, etc.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1: Understand the importance of dance and Kathak as an Indian dance form

CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give Prarambhik

(1st level formal exam of Kathak).

Syllabus

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 Todasand 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)

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUP1003-3
HUP2003-3

Course : Introduction to Digital Photgraphy

L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week

Credits : 01

Course Objective

The course aims to develop basic skills of students in digital photography to lay a foundation for them as a hobby and/or a profession.

Course Outcome

At the end of the course the students will be able to achieve the following:

CO1: Develop an understanding of the technical aspects and aesthetics of Photography.

CO2: Apply the rules of digital photography for creating photographs.

CO3: Develop skills to enhance photographs through post processing.

CO4: Create a portfolio of their photographs in selected genre.

Syllabus

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) The Digital Photography Book: The Step-by-Step Secrets for howto Make Your Photos Look Like the Pros, Rocky Nook, USA
2. Larry Hall (2014) Digital Photography Guide: From Beginner to Intermediate: A Compilation of Important Information in Digital Photography, Speedy PublishingLLC, Newark
3. J Miotke (2010) Better Photo Basics: The Absolute Beginner's Guide to TakingPhotos Like a Pro, AMPHOTO Books, Crown Publishing Group, USA

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUP1003-4
HUP2003-4

Course : Introduction to Japanese Language and Culture

L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week

Credits : 01

Course Objective

The course aims to develop basic communication skills in Japanese Language and help develop a basic understanding of Japanese culture in cross-cultural communication.

Course Outcome

CO1: Gain a brief understanding about Japan as a country and Japanese culture.

CO2: Develop ability to use vocabulary required for basic level communication in Japanese language.

CO3: Able to write and read the first script in Japanese language.

CO4: Able to frame simple sentences in Japanese in order to handle everyday conversations

CO5: Able to write in basic Japanese about the topics closely related to the learner.

Syllabus

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)

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUP1003-5
HUP2003-5

Course : Art of Theatre

L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week

Credits : 01

Course Objectives

The course aims to develop in the students, an actor's craft through physical and mental training.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1 : Understand and synthesize the working of the prominent genres of theatre across the world.

CO2 : Apply the skill of voice and speech in theatre and public speaking

CO3 : 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.

CO4 : Apply skills acquired related to technical/production aspects of theatre and also develop problem solving and interpersonal skills.

Syllabus

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

Reference Books

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

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUP1003-6
HUP2003-6
Course : Introduction to French Language
L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week
Credits : 01

Course Objective

To help build a foundation and interest in French language so that the students can pursue the proficiency levels of the language in higher semesters.

Course Outcomes

On successful completion of the course the students will be able to achieve the following:

CO1 : Demonstrate basic knowledge about France, the culture and similarities / differences between India and France

CO2 : Learn to use simple language structures in everyday communication.

CO3 : Develop ability to write in basic French about themselves and others.

CO4 : Develop ability to understand beginner level texts in French

Syllabus

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

Recommended Reading

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

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUP1003-7
HUP2003-7

Course : Introduction to Spanish Language

L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week

Credits : 01

Course Objective

To help build a foundation and interest in Spanish language so that the students can pursue the proficiency levels of the language in higher semesters.

Course Outcomes

On successful completion of the course the students will be able to achieve the following:

CO1 : Demonstrate basic knowledge about Spain, the culture and similarities / differences between India and France

CO2 : Learn to use simple language structures in everyday communication.

CO3 : Develop ability to write in basic Spanish about themselves and others.

CO4 : Develop ability to read and understand beginner level texts in Spanish

Syllabus

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

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUP1003-8
HUP2003-8 **Course : Art of Painting**

L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week **Credits : 01**

Course Objective

Painting is fundamentally about learning to see, and to transport that vision onto paper through a variety of mark making techniques. This course aims to develop basic skills of students in painting to lay a foundation for them as a hobby and/or a profession.

Course Outcome

At the end of the course the students will be able to achieve the following:

CO1 : Become familiar with the basic methods, techniques & tools of painting.

CO2 : Train the eye and hand to develop sense of balance, proportion and rhythm.

CO3 : Develop the ability to observe and render simple natural forms.

CO4 : Enjoy the challenging and nuanced process of painting.

Syllabus

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.

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUP1003-9
HUP2003-9
Course : Art of Drawing

L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week
Credits : 01

Course Objective

Drawing is fundamentally about learning to see, and to transport that vision onto paper through a variety of mark making techniques. This course aims to develop basic skills of students in drawing to lay a foundation for them as a hobby and/or a profession.

Course Outcome

At the end of the course the students will be able to achieve the following:

CO1 : Become familiar with the basic methods, techniques & tools of drawing.

CO2 : Train the eye and hand to develop sense of balance, proportion and rhythm.

CO3 : Develop the ability to observe and render simple natural forms.

CO4 : Enjoy the challenging and nuanced process of drawing.

Syllabus

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

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUP1003-10 **Course : Nature Camp**
HUP2003-10
L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week **Credits : 01**

Course Objective

To create an opportunity for the students to develop affinity with nature and thus subsequently impact their ability to contribute towards sustainability of nature.

Course Outcome

After the completion of the course the students will be able to do the following:

CO1 : Develop an affinity with nature by observing and understanding it marvels with guidance from experts

CO2 : Develop an understanding of the challenges and solutions associated with nature and its conservation.

Course Content

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 co-odinator:

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

Syllabus for B. Tech. Semester I/II
Department of Electrical Engineering

Course Code : CHP1008-1 **Course : Art of Indian Traditional Cuisine**
CHP2008-1 **Category : Basket of Liberal Learning Course**
L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week **Credits : 01**

Course Outcome

At the end of the course the students will be able to achieve the following:

CO1 : Understand the factors that affect regional eating habits and the unique ingredients found in various states of India

CO2 : Get insight to prepare popular dishes from various regions of India.

Modules

Module 1: Indian Regional foods and snacks - factors effecting eating habits.

Module 2: Indian gravies – ingredients, their importance

Module 3: Indian Sweets - ingredients, their importance

Module 4: Presentation of Indian Meals, Menu Planning, Food Costing

Module 5: Food Preservatives and Safety

List of Experiments

1) Introduction to cookery : dos and don'ts
2) Introduction to Indian cuisine, philosophy and classification.
3) Regional influence on Indian Food- factors affecting eating habits
4) Preparation of Garam masala and or Chat masala with ingredients and their importance
5) Preparation of different gravies such as white, yellow or brown gravies with ingredients and their importance
6) Preparation of Indian sweets like Besan ke laddu with ingredients and their importance
7) Presentation of meal, Menu planning and Food costing
8) Common chemical food preservatives and their safety standards.

Reference Books

[1] Arora, K.,; Theory of cookery; First Edition, Frank Brothers Company (Pub) Pvt. Ltd., 2008 ISBN: 9788184095036, 8184095031

[2] Philip, Thangam . E.,; Modern Cookery: Vol. 1; Sixth Edition, Orient BlackSwan., 2008 ISBN: 9788125040446, 8125040447ali

[3] Parvinder S;Quantity Food Production Operations and Indian Cuisine (Oxford Higher Education); First Edition; Oxford University Press, 2011 ISBN 10: 0198068492 ISBN 13: 9780198068495

[4] Singh, Yogesh; A Culinary Tour of India; First Edition I.K. International Publishing House Pvt. Ltd. ISBN 978-93-84588-48-9

[5] Singh Shakesh;Simplifying Indian Cuisine;First Edition, Aman Publications, ISBN81-8204-054-X

[6] Dubey Krishna Gopal; The Indian Cuisine;PHI Learning Pvt. Ltd.ISBN978-81 203-4170-8

Syllabus for B. Tech. Semester I/II
Department of Electrical Engineering

Course Code : CHP1008-2 **Course : Introduction to Remedies by Ayurveda**
CHP2008-2 **Category : Basket of Liberal Learning Course**
L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week **Credits : 01**

Course Outcome

At the end of the course the students will be able to achieve the following

CO1: Know basic principle of Ayurvedic formulations.

CO2: Different types of Natural Remedies.

CO3: Basic idea about their Characterization

Module 1- Introduction to Ayurveda

Module 2- Different types of Ayurvedic formulations: Churn, Bhasma, Vati, Tailum

Module 3- Introduction to Methods of preparation

Module 4 - Characterization, applications

Practicals based on above Syllabus

1) Preparations of some medicinal oils like Bramhi tel, Bramhi Awala, Vatnashak Tel, Bhurngraj Tel etc.
2) Preparation of Churn, like Trifala Churn, Hingastak Churn, Trikut Churn etc.
3) Preparation of some Bhasmas and vati

Books

1) Chemistry and Pharmacology of Ayurvedic Medicinal Plants by Mukund Sabnis, Chaukhambha Amarbharati Prakashan.
2) Everyday Ayurveda by Shailesh Rathod
3) A text Book of Rasashastra by Vikas Dhole and Prakash Paranjpe
4) A text Book of Bhaiajya Kalpana Vij¯nana

Syllabus for B. Tech. Semester I/II
Department of Electrical Engineering

Course Code : PEP1001-1 **Course : Disaster Management Through Adventure Sports**
PEP2001-1 **Category : Basket of Liberal Learning Course**
L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week **Credits : 01**

Objectives Course

To enable the student:

1. To inculcate rational thinking and scientific temper among the students.
2. To develop critical awareness about the social realities among the students.
3. To build up confidence, courage and character through adventure sports.

Course Outcomes

On completion of the course, students will be able to:

1. Understand the meaning and importance of Adventure sports.
2. Learn the various types of adventure sports, the equipment and resources required to practice disaster Management activities.
3. Learn the safety measures about different risk and their management.
4. To apply Disaster management theory to institutional & Societal problems and situations.

Course Content

1. Basic adventure
2. First AID
3. various types of knots
4. Shelter making
5. Disaster management
6. Team building and goal setting
7. Realization of fear, risk and their roles and analysing safety Management Plan

Syllabus for B. Tech. Semester I/II
Department of Electrical Engineering

Course Code : PEP1001-2
PEP2001-2

Course : Self-Defense Essentials and Basic Knowledge of Defense Forces

Category : Basket of Liberal Learning Course

L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week

Credits : 01

Course Outcomes

On completion of the Course the student will be able to:

- Understand the meaning, need and fitness requirements to implement self-defense
- Learn the basic techniques of selected combative sports.
- Learn to prepare basic Physical Training for Defense forces.
- Implement survival techniques during emergencies.

Course Content

- General conditioning and self-defense specific conditioning
- Applications of techniques of combative sports for self-defense.
- Self-defense techniques for specific situations: chain snatching, knife or stick attack, holding from back or front etc.
- Basic Military Knowledge and exposure making students Confident, bold, disciplined and trains them to join Armed Forces.

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : CHT2003 **Course : Chemistry for Electrical Engineering**

Core/Elective/Practical/Other: BSC **Credits : 02, L : 2 Hrs.,T : 0 Hrs., P : 0 Hrs., Per week**

Course Outcomes

After the successful completion of the course, students shall be able to

CO 1 : Investigate the chemical properties of materials for various technological applications.

CO 2 : Apply the knowledge of material property and energy to analyse environmental issues.

CO 3 : Apply the knowledge of molecular interactions, rationalise bulk properties and process using thermodynamic considerations. and energy to analyse environmental issues.

CO 4 : Analyze the impurities present in the water and suggest the methodology for its removal

Syllabus

Unit 1 : Nano-material (7 Hours)

Nanomaterials: Introduction, Classification and size dependent properties (surface area, Optical and catalytic properties). Synthesis of nano-materials (Top down and Bottom up approach).

Carbon nanomaterials: Introduction, types, synthesis by modified CVD method, functionalization and applications of CNT and Graphene. Applications of Nanomaterials

Unit 2 : Battery Technology (7 Hours)

Introduction to electrochemistry: Types of battery, characteristics of battery and applications of battery, battery ageing, battery waste management and recycling.

Unit 3 : Chemical Thermodynamics and Corrosion Science (7 Hours)

Thermodynamic functions: Energy, work, entropy, enthalpy and free energy, numericals based on these thermodynamic functions.

Corrosion: Introduction, mechanisms of corrosion, types of corrosion and prevention measures.

Unit 4 : Water Technology [8 Hours]

Impurities in natural water, hardness and alkalinity, Disadvantages of hardness i. e. sludge and scale formation, softening of water using lime-soda, numerical on Lime Soda calculations and ion-exchange method, advantages and limitations of these water softening processes, Desalination of water using Reverse Osmosis.

Text Books

1. A. K. Das and M. Das, An introduction to nanomaterials and nanoscience, CBS Publishers and Distributors
2. Smart nanomaterials for sensor application, Li S, Ge Y, Li H, 2012, Bentham Science Publishers, ISBN: 9781608055425.
3. C. N. Rao, A Muller and A. K. Cheetam, The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Wiley-VCH, 2004.
4. e- Waste recycling and management: present scenarios and Environmental issues by Khan, Anish, and Abdullah M. Asiri. 2019, Springer, Vol.33. ISBN: 978-3-030-14186-8
5. Michael J. Moran and Howard N. Shapiro, Fundamentals of Engineering Thermodynamics, Fifth Edition, John Wiley and Sons, 2006.
6. Donald L. Pavia, Gary M. Lampman, George S. Kriz, and James R. Vyvyan, Introduction to Spectroscopy, Fifth Edition, Cengage Learning, 2009.
7. P. C. Jain and Monica Jain, Engineering Chemistry, Dhanpat Rai Publication.
8. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand Publications.

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : CHP2003 **Course : Chemistry for Electrical Engineering Lab**

Core/Elective/Practical/Other: BSC **Credits : 01, L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week**

Laboratory Outcomes

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

The students will be able to:

1. Estimate the amount of different impurities present in the water/waste samples.
2. Investigate molecular/system properties such as acid value, saponification value, surface tension, viscosity of aqueous or industrial important liquids/mixtures etc.
3. Synthesize a polymer or nanomaterial.

List of Experiments for Chemistry Lab

1. Introduction of volumetric analysis and Material safety MSDS data sheet.
2. To find out types of alkalinity and estimation of their extent in the water sample.
3. Estimation of temporary, permanent and total hardness present in the water sample using complex metric titration method.
4. Estimate the amount of ferrous and ferric ions present in the given Fe2 + /Fe3 + solution.
5. Determination of relative and kinematic viscosities of aqueous solutions of Poly-ethylene glycol (Polymeric Liquid) using Redwood Viscometer (type I or II) at different temperatures.
6. To study effect of bonding of water molecules with electrolyte (NaCl/KCl) and non-electrolyte solute (Soap) in the solution through Surface Tension Determination.
7. Determination of acid value of given lubricating/ fuel oil.
8. Determination of saponification value of given lubricating/ fuel oil.
9. Synthesis a polymer / drug molecule / Nano-material. (Demonstration Experiment)

Text Books/Reference Books

1. A Textbook on Experiments and Calculations 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.
3. Collection of Interesting General Chemistry Experiments, A by A. J. Elias, Universities Press Publications.
4. College Practical Chemistry by V. K. Ahluwalia, S. Dhingra and A. Gulati, Universities Press Publications.
5. Advanced Practical Medicinal Chemistry by Ashutosh Kar, New Age International Publisher.
6. Applied Chemistry by Dr. A.V. Bharati, Das Ganu Publications.

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : MAT2001 **Course : Applied Mathematics - II**

Core/Elective/Practical/Other: BSC **Credits : 03, L : 2 Hrs.,T : 1 Hrs., P : 0 Hrs., Per week**

Course Objective

The objective of this course is to familiarize the prospective engineers with techniques in Calculus and multivariate analysis. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Outcomes

On successful completion of the course, the students will able to:

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.
2. Evaluate definite and improper integrals using Beta, Gamma functions. Also trace cartesian curves.
3. Solve multiple integration by change of order, change of variable methods and apply it to find area, volume, mass and center of gravity.
4. Understand geometric meaning of gradient, curl, divergence
5. Perform line, surface and volume integrals of vector-valued functions./Analyze and compare different sets of data and classify the data by means of diagrams and graph.

Syllabus

Module 1: Matrices (8 hours)

Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigen values and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical forms, Introduction to n-dimensional space.

Module 2: Integral Calculus (8 hours)

Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Tracing of curves (Cartesian form)

Module 3: 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 4 : Vector Calculus (Differentiation)(7hours)

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 5: Vector Calculus (Integration) (7 hours)

(All Branches except Biomedical Engineering) 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.

OR

Module 5 : Descriptive Statistics (7- Lectures) (Only for Bio-Medical Engineering)

Types of statistical data: categorical, ranked, discrete, and continuous. Distinction between univariate, bi-variate, and multivariate statistics, Visualization techniques such as joint contingency tables, scatter plots, 2D histograms and line graphs, Measures of central tendency and Dispersion .

Topics for self-learning

Rolle's theorem, Mean value theorems, Indeterminate forms, Applications of definite integrals to evaluate perimeter, area, surface areas and volumes of revolutions.

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, 11th Reprint, 2010.
5. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Volume I & II, Pune VidhyarthiGrihaPrakashan, Pune-411030 (India).
6. Biomedical Statistics -Shantikumar Yadav , Sompal Singh, Ruchika Gupta
7. Theory and Problems of Probability and Statistics - M.R. Spiegal (Mc Graw Hill) Schaum Series

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : EET2002 **Course : Programming Skill**

Core/Elective/Practical/Other: ESC **Credits : 03, L : 3 Hrs.,T : 0 Hrs., P : 0 Hrs., Per week**

Course Outcomes

On successful completion of course student will learn:

CO1: To formulate simple algorithms for arithmetic and logical problems, translate the algorithms to programs (in C language), test and execute the programs and correct syntax and logical errors.

CO2: To implement conditional branching, iteration and recursion, to decompose a probleminto functions and synthesize a complete program using divide and conquer approach.

CO3: To use arrays, pointers, structures and I/O operations for the formulation of algorithms and programs.

CO4: To apply programming to solve matrix addition, multiplication problems and searching & sorting problems.

Syllabus

UNIT-I: Introduction to Programming : Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)

Idea of Algorithm: Steps to solve logical and numerical problems. Representation ofAlgorithm: Flowchart / Pseudocode with examples. Arithmetic expressions and precedence

UNIT-II: C Programming Language : Introduction to C language: Keywords, Constant, Variable, Data types, Operators, Types of Statements, Preprocessor Directives, Decision Control Statement-if, if-else, Nested if-else statement, Switch case, Loops and Writing and evaluation of conditionals and consequent branching.

UNIT-III: Arrays and Basic Algorithms : Arrays: 1-D, 2-D, Character arrays and Strings. Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definitionrequired)

UNIT-IV: Functions and Recursion : User defined and Library Functions, Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference. Recursion: As a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT-V: Pointers and Structures : Structures, Defining structures, Array of Structures, Introduction to pointers, Defining pointers, Pointer arithmetic, pointer operators, Use of Pointers in self-referential structures, notion of linked list (no implementation)

UNIT-VI: File handling : Streams in C, Types of Files, File Input/ Output Operations: Modes of file opening, Readingand writing the file, Closing the files, using fflush().

Text Books

1. Programming in ANSI C : E. Balguruswami McGraw Hill
2. Mastering C: K. R. Venugopal and S. R. Prasad, Tata McGraw Hill

Reference Books

1. Programming with C: Byron Gottfried, Schaums Outline Series.
2. Let Us C: Yashwant Kanetkar, BPB Publication

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : EEP2002 **Course : Programming Skill Lab**

Core/Elective/Practical/Other: ESC **Credits : 01, L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week**

Course Outcomes

On successful completion of course student will be able to:

1. Understand the fundamentals of C programming and choose the loops and decisionmaking statements to solve and execute the given problem.
2. Implement different Operations on arrays also design functions to solve the givenproblem using C programming.
3. Understand pointers, structures, unions and apply them to develop programs.
4. Implement file Operations in C programming for a given application.

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : EET2001 **Course : Basic Electrical Engineering - II**

Core/Elective/Practical/Other: PCC **Credits : 03, L : 3 Hrs.,T : 0 Hrs., P : 0 Hrs., Per week**

Course Outcomes

After the completion of the course, the students will be able to

CO 1 : Explain the construction, working and types of DC machine and discuss the characteristics and applications of DC motor.

CO 2 : Explain the construction, working principle of single-phase transformer and determine its performance at given operating condition.

CO 3 : Compare the different types of three-phase transformer and discuss their clock-hour marking.
CO 4 : Explain single phase AC motors and state their applications.

CO 5 : Discuss various drive train topologies used in electric vehicle and the function of each component.

Syllabus

Module 1: DC Machines (08 Hours)

Basic principle & operation of DC generators and DC motors (separately excited, shunt and series), Induced EMF equation, Characteristics of DC motors, speed control of DC motors, Losses & Efficiency, Application of DC motor.

Module 2: Transformers: Single Phase (10 Hours)

Ideal and practical transformer, equivalent circuit, losses in transformers, regulation, and efficiency, OC and SC tests.

Module 3: Transformer: Three Phase (04 Hours)

Types of construction, Comparison between three phase transformer and a bank of three single phase transformers, Clock hour marking, Connections of three phase transformer, Differences between Power transformer and distribution transformer, Applications.

Module 4. Single phase AC Motors (08 Hours)

Single Phase induction motor, Double revolving field theory Methods of starting using auxiliary winding, capacitor start-run type, capacitor start induction run type, applications. Introduction to universal motor and its applications.

Module 5: Introduction to Electric and Hybrid Electric Vehicles

Comparison of electric vehicle with conventional vehicle, main components in electric vehicle, classification of electric and hybrid electric vehicle based on drive train topology, names of motors used in electric vehicle, market scenario of electric vehicle.

Textbooks /Reference Books

1. Electrical Machinery: I. J. Nagrath and D. P. Kothari, Tata McGraw-Hill Education, 2004
2. Electrical Machines, Dr. P.S. Bimbhra, Khanna Publishers, Third Edition,
3. Electrical Machines, Ashfaq Hussain, Dhanpat Rai & Co., Third edition, 2015
4. A Text Book of Electrical Technology, B. L. Theraja (Vol. II), S. Chand, 2005
5. Basic Electrical Engineering: S. B. Bodkhe, N. M. Deshkar, P. P. H. Pvt. Ltd.
6. Power Electronics: M. Rashid, Pearson Education India, 2004.

Other reference material (e.g. e-resources):

In addition to the suggested textbooks, lecture notes shall be provided for self-study modules

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : EEP2001 **Course : Basic Electrical Engineering - II Lab**

Core/Elective/Practical/Other: PCC **Credits : 01, L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week**

Course Outcome

After the completion of the course, the students will be able to

CO1 : Draw equivalent circuit and evaluate regulation and efficiency of a transformer by performing different tests.

CO2 : Identify HV/LV windings and discuss different types of three-phase transformer connections.

CO3 : Analyze the performance of DC and AC motors

CO4 : Study the operation of DC- DC converters

CO5 : Write effective reports based on observations and conclusions.

List of Experiments

1. To determine Regulation and Efficiency of a single- phase transformer using opencircuit (O.C.) and short circuit (S.C.) tests
2. To determine Regulation and Efficiency of a single- phase transformer using DirectLoading test
3. To study connection of three phase transformer (star-star, delta-delta, star-delta, delta-star)
4. To study speed control of D.C. shunt motor by:

a) Armature Voltage Control method.

b) Field current control method.

5. To study reversal of rotation of a three phase induction motor
6. To study Buck converter
7. To study Boost converter
8. Demonstration of cut-set of DC machine and three phase induction motor.

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : HUT2001 **Course : Foundational Literature of Indian Civilization**

Core/Elective/Practical/Other: IKS **Credits : 02, L : 2 Hrs.,T : 0 Hrs., P : 0 Hrs., Per week**

Course Outcome

At the end of the course the students will be able to achieve the following:

CO1: Understand the Indian knowledge system and its scientific approach

CO2: Get introduced to the Vedic corpus and recognize the multi-faceted nature ofthe knowledge contained in the Vedic corpus

CO3: Understand the salient features of the philosophical systems of the Vedic and non-Vedic schools

CO4: Develop a basic understanding of the ancient wisdom recorded in variousIndian literary work

Syllabus

Unit 1: Overview of Indian Knowledge System: Importance of ancient knowledge, defining IKS, IKS classification framework, Historicity of IKS, Some unique aspects of IKS.

Unit 2: The Vedic corpus: Introduction of Vedas, four Vedas, divisions of four Vedas, six Vedangas, Distinct features of Vedic life.

Unit 3: 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

Unit 4: Indian wisdom through ages: Panchtantras, Purans: contents and issues of interests, Itihasa: uniqueness of the two epics (Ramayan and Mahabharata), Key issues and messages from Ramayana, Mahabharata – a source of worldly wisdom; Indian ancient Sanskrit literature: Kalidas, Vishakadutta, Bhavbhuti, Shudraka**any one text as decided by the course teacher

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

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : PET2001 **Course : Sports - Yoga - Recreation**

Core/Elective/Practical/Other: CCA **Credits : 02, L : 1 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week**

Aim of the Course

The course aims at creating awareness about the fundamentals of Physical Education, Sports, Yoga, Recreation and its effectiveness to promote Health and wellness through Healthy Lifestyle.

Course Objectives

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

On completion of the course, students will be able to:

1. Understand fundamental skills, basic principle and practices of sports and Yoga.
2. Practically learn the principles of implementing general and specific conditioning ofphysical exercises and yoga.
3. Develop Health-related fitness and Body-mind co-ordination through variousfitnessactivities, sports, recreational games and yoga.
4. Practice Healthy & active living with reducing Sedentary Life style.

Course Content

Unit 1 : Theory: Introduction

- Meaning, Definition and Importance of Health & Wellness
- Dimensions of Health and Wellness
- Factors influencing Health and Wellness
- Physical Fitness, Nutrition, Habits, Age, Gender, Lifestyle, Body Types
- Health & Wellness through Physical Activities, Sports, Games, Yoga and Recreation activities
- Causes of Stress & Stress relief through Exercise and Yoga
- Safety in Sports

Unit 2 : Practical- Exercises for Health and Wellness

- Warm-Up and Cool Down - General & Specific Exercises
- Physical Fitness Activities
- Stretching Exercises
- General & Specific Exercises for Strength, Speed, Agility, Flexibility, coordinativeabilities
- Cardiovascular Exercises
- Assessment of BMI
- Relaxation techniques
- Physical Efficiency Tests

Unit 3 : Yoga

- Shukshma Vyayam
- Suryanamaskar
- Basic Set of Yogasanas – Sitting, standing, supine and prone position
- Basic Set of Pranayama & Meditation

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)

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : EET2003 **Course : Analog Electronics Circuits**

Core/Elective/Practical/Other: ESC **Credits : 02, L : 2 Hrs.,T : 0 Hrs., P : 0 Hrs., Per week**

Course Outcomes

After the completion of the course, the students will be able to,

CO1: Discuss the operation and analyze the characteristics of semiconductor diodes, and MOSFET.

CO2: Design and analyze electronic circuits containing non-linear elements such as diodes,& MOSFET using the concepts of biasing, load lines, operating point and incremental analysis.

CO3: Analyze inverting and non- inverting configurations of operational amplifier with negative feedback, evaluate performance parameters of operational amplifier.

CO4: Design simple Op-amp circuits.

Syllabus

MODULE 1: [04 Hours]

Diode Circuits: P-N junction diode, V-I characteristics of a diode; half-wave and full- waverectifiers, Zener diodes, clamping and clipping circuit.

MODULE 2: [10 Hours]

MOSFET Circuits: MOSFET structure and V-I characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuit - gain, input andoutput impedances, trans-conductance.

MODULE 3: [08 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, Op-ampparameters & their analysis.

MODULE 4: [08 Hours]

Op-amp linear and nonlinear applications: voltage follower, summing amplifiers, integrators and differentiators, difference amplifiers & instrumentation amplifiers, Clipper, Clamper, Comparators, Schmitt trigger circuits, Oscillators and Active filters design.

Textbook

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.

Reference Books

1. Donald Neamen, "Electronic Circuits: Analysis and Design," Third Edition, McGraw-HillPublication, 2006.
2. Donald Neamen, "Semiconductor Physics and Devices: Basic Principles," Fourth edition,McGraw-Hill, 2011.
3. Jacob Millman, Christos Halkias, Chetan Parikh, "Millman's Integrated Electronics,"Second edition, McGraw Hill Education, 2017.
4. Ramakant Gayakwad," OP-AMPS and linear integrated circuits" 4th Edition, PHI
5. D. Roy Choudhary, Shail Jain "Linear Integrated Circuits", 4th Edition, New Age International

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : EEP2003 **Course : Analog Electronics Circuits Lab**

Core/Elective/Practical/Other: ESC **Credits : 01, L : 0 Hrs.,T : 0 Hrs., P : 2 Hrs., Per week**

Course Outcomes

At the end of this course students will demonstrate the ability to

1. Understand the operating principle of MOSFET differential amplifier and its analysis.
2. To analyze inverting and non- inverting configurations of operational amplifier with negative feedback, evaluate performance parameters of operational amplifier and design basic linear and nonlinear Op-amp circuits.
3. Use operational amplifier in the design of Oscillators, Filters, waveform generators and comparator circuits.

Syllabus

Experiments are based on syllabus of Analog Electronic Circuits subject.

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : EETE2001 **Course : Electrical Maintenance**

Core/Elective/Practical/Other: 1 yr Exit Course **Credits : 03, L:3 Hrs.,T:0 Hrs., P:0 Hrs., Per week**

Course Outcomes

The students will be able to demonstrate the skills to

CO1: Prepare maintenance schedules for electrical equipment and follow the various maintenance practices

CO2: Test and maintain rotating electrical machines.

CO3: Test and maintain single phase and three phase transformers.

CO4: Test and maintain insulation systems of electrical equipment

Syllabus

Module1: General Introduction

a) Objectives of particular testing, Significance of ISS, concept of tolerance, routine test, type test, special tests

b) Method of testing, direct, indirect, distractive and non-distractive testing methods.

c) Concept of routine, preventive and breakdown maintenance, advantages of preventive Maintenance, introduction to Total productive maintenance [TPM].

d) 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.

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.

Syllabus for B. Tech. Semester II
Department of Electrical Engineering

Course Code : EETE2002 **Course : Electrical Appliances**

Core/Elective/Practical/Other: 1 yr Exit Course **Credits : 03, L:3 Hrs.,T:0 Hrs., P:0 Hrs., Per week**

Course Outcomes

Upon completion of this course, students will be able to.

CO1: Discuss the concept of Energy Efficiency of Electrical appliances & types of power supply units used in these appliances.

CO2: Explain working principle & application of different electrical motors.

CO3: Describe working principle of appliances used for heating & cooling purpose.

CO4: Identify the different electrical power supply backup equipment like battery, Inverter, UPS, & photovoltaic system.

CO5: Explain construction & working principle of electrical domestic appliances. CO6: Test & perform maintenance of Consumer Electrical Appliances.

Syllabus

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 ofFans, 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]

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

MODULE 6: [06 Hours]

Illumination-Construction, Working Principle, Ratings/Specifications, Control of LED Lights.

Text Book/ Resources

1) Consumer Electronics by S P Bali, Pearson

2) Handbook of Repair & Maintenance of domestic electronics appliances: BPBPublications

3) Literature available through e-resources.

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