DDU – KAUSHAL Kendra

Bharathidasan University

Khajamalai Campus, Tiruchirappalli-23

B.Voc. RULES AND REGULATIONS

INTRODUCTION

The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college/university education, leading to Bachelor of Vocation (B.Voc.) Degree with multiple exits such as Diploma/Advanced Diploma under the NSQF (National skill Qualifications framework).

The B.Voc. programme is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles along with broad based general education.

This would enable the graduates completing B.Voc. to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

THE MAIN OBJECTIVES OF THE SCHEME ARE:

- To provide judicious mix of skills relating to a profession and appropriate content of General Education & Skill Component.
- To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.
- To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industrial requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
- To provide vertical mobility to students coming out of 10+2 with vocational subjects.

ELIGIBILITY FOR ADMISSION

A pass in Plus Two or equivalent examination or an examination recognized as equivalent thereto by this University.

A pass in 10+2 years in ITI (Two Years) in relevant trade role.

Those who passed Vocational Higher Secondary course will get an additional weightage.

LATERAL ENTRY:

Candidate seeking admission directly in Second year of Bachelor of Vocation – Troubleshooting and maintenance of Electrical and Electronic Equipments must have passed Examination of either Diploma in relevant trade roles.

MEDIUM OF INSTRUCTIONS

Medium of instruction shall be English.

PROGRAMME STRUCTURE

The B.Voc. Troubleshooting and maintenance of Electrical and Electronic Equipments shall include:

- General Education
- Skill Components

S.No.	Type of the Courses	Number of Courses	Total Courses	Credits	Total Credits
1	**General Components**				
	A. Humanities and Social Courses	5	21	12	72
	B. Basic Courses	6		20	
	C. Applied Courses	3		12	
	D. Elective Courses	2		8	
	E. Basic Skill Courses	4		16	
	F. Entrepreneurship Development and Business Plan	1		4	
2	**Skill Components**				
	A. Applied Skill Courses	5	17	20	96
	B. Practical Courses	8		48	
	C. Skill Elective Courses	2		8	
	D. Industrial Training/Concurrent Field Practicum Course	2		20	
3	**Industrial Training/Concurrent Field Practicum Course/Project**	1	1	12	12
	Total	**39**	**39**	**180**	**180**

CURRICULUM

The curriculum in each of the years of the programme would be a suitable mix of general education and skill development components with 40:60.

DURATION

The Programme is for a period of three years. Each academic year shall comprise two Semesters viz. Odd and Even semesters. Odd Semester shall be from June / July to October / November and Even Semester shall be from November / December to April / May. There shall be not less than 90 working days which shall comprise 450 teaching clock hours for each Semester (Exclusive of the days for the conduct of University End-Semester Examinations).

SPAN OF PERIOD

a) Time = N+2 years for the completion of programme. Where 'N' stands for the normal or minimum duration prescribed for completion of the programme.

b) In exceptional circumstance a further extension of one more year may be granted.

The exceptional circumstances be spelt out clearly by the relevant statutory body concerned of the University.

c) During the extended period the student shall be considered as a private candidate and also not be eligible for ranking.

The above conditions are applicable to the Redo/Transfer/Readmission Candidates.

THE CBCS-LOCF SYSTEM

All Programmes (named after the Core subjects) mentioned earlier shall be conducted through Choice Based Credit System (CBCS) and Learning Outcomes Based Curriculum Framework (LOCF). It is an instructional package developed to suit the needs of students to keep pace with the developments in higher education and the quality assurance expected of it in the light of liberalization and globalization in higher education.

COURSES IN PROGRAMMES

The UG Programme consists of a number of Courses. The term "course" is applied to indicate a logical part of the subject matter of the programme and is invariably equivalent to the subject matter of a "paper" in the conventional sense. The following are the various categories of Courses suggested for the UG programmes: English Language Courses (ELC), Core Courses (CC), Core Practical (CP), Allied Courses (AC), Allied Practical (AP), Elective Courses (EC). Skill Based Elective (SBE) and Non-Major Elective (NME) and Project.

The ELC are meant to develop the students' communicative skill at the UG level. Core Courses are the basic courses which are compulsorily required for each of the Programme of study. These will be related to the subject of the Programme in which the candidate gets his/her degree.

A student shall choose at least two Non-major Elective Courses (NME) from outside his/her department. Major Based Elective Courses and Skill Based Elective Courses (SBE) are also open to a student to choose from his/her department. The student can choose any one and write 2 papers under the same title.

SELECTION OF STUDENTS TO THE ELECTIVE COURSE (EC)

a) The Department Committee shall follow a selection procedure on a first-come-first-served basis, fixing the maximum number of students, giving counseling to the students etc. to avoid overcrowding to particular course(s) at the expense of some other courses.

b) The Colleges shall provide all information relating to the ECs in each programme to all the students so as to enable them to choose their ECs.

- Part IV - Value Education is offered in the 1st Semester in all U.G. Courses (2 hours - 2 credits).
- Part IV - Environmental Studies course is offered in the 2nd semester in all
- UG Programmes as per the recommendation of the UGC (2 hours – 2 credits).
- Part IV - Soft Skills is offered in the 5th Semester in all U.G. Programmes. (2 hours – 2 credits).
- Part V - Extension Activities should be carried out apart from the regular class hours (1credit).
- Part V - Gender Studies is offered in the 6th Semester in all U.G. Programmes (1 hour-1 credit).

PROJECT

The candidate shall be required to take up a Project Work by group or individual and submit it at the end of the final year. The Head of the Department shall assign the Guide who, in turn, will suggest the Project Work to the students in the beginning of the final year. A copy of the Project Report will be submitted to the University through the Head of the Department on or before the date fixed by the University.

The Project will be evaluated by an internal and an external examiner nominated by the University. The candidate concerned will have to defend his/her Project through a Vivavoce.

SEMESTERS

An academic year is divided into two Semesters. In each Semester, Courses are offered in 15 teaching weeks with 30 hours per week and the remaining weeks are to be utilized for conduct of examinations and evaluation purposes.

CREDITS

The term "Credit" refers to the weightage given to a Course, usually in relation to the instructional hours assigned to it. For instance, a six-hour Course per week is assigned four to six credits, four/five-hour course per week is assigned three to five credits and two hour Course per week is given two credits. However, in no instance the credits of a Course can be greater than the hours allotted to it.

The total minimum credits, required for completing a B.Voc., Programme is 180. The details of credits for individual components and individual Courses are given in Below Table.

Years	Skill Component Credits	General Education Credits	Normal calendar duration	Exit Points / Awards
Year 3	36	24	Six Semester	B.Voc
Year 2	36	24	Four Semester	Advanced Diploma
Year 1	36	24	Two Semester	Diploma
Total	**108**	**72**		

As per the UGC guidelines, there are multiple exit points for a candidate admitted in this course. If he/she is completing all the six semester successfully, he/she will get B. Voc. Degree in Automobile Technology. If he/she is completing the first four semesters successfully, he/she will get an Advanced Diploma in Automobile Technology. If he/she is completing the first two semesters successfully, he/she will get a Diploma in Automobile Technology.

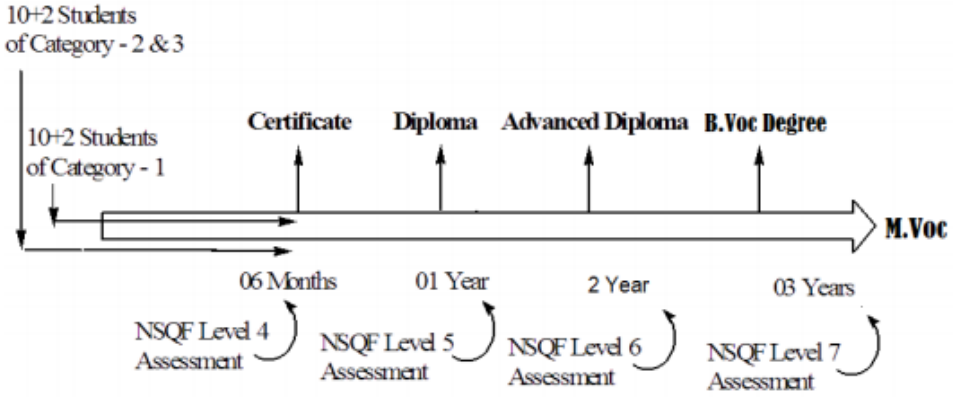

Fig. 1: Assessment of Skill Component under NSQF in Vocational Courses

COURSE

Each Course is designed with lectures/tutorials/laboratory or field work/seminar/ Projects/practical training/Assignments/Term paper or Report writing etc., to meet effective teaching and learning requirements.

EXAMINATIONS

A.

i. There shall be examinations at the end of each semester, for odd semesters in the month of October/November; for even semesters in April/May.

ii. A candidate who does not pass the examination in any course(s) may be permitted to appear in such failed course(s) in the subsequent examinations to be held in October/November or April/May. However, candidates who have arrears in Practicals shall be permitted to appear for their arrears in Practical examination only along with Regular Practical examination in the respective semester.

iii. A candidate should get registered for the first semester examination. If registration is not possible owing to shortage of attendance beyond condonation limit/regulation prescribed or belated joining or on medical grounds, the candidates are permitted to move to the next semester. Such candidates shall re-do the missed semester after completion of the course.

iv. Viva-voce: Each candidate shall be required to appear for Viva-voce Examination in defence of the Project only.

v. For the Project Report, the maximum marks will be 80 percent and for the Viva-voce is 20 percent.

vi. The results of all the examinations will be published through the College where the student underwent the Course as well as through University Website. In the case of private candidates, the results will be published through the Centres in which they appeared for the examinations as well as through University Website.

CONDONATION

Students must have 75% of attendance in each semester to appear for the examination. Students who have attendance between 65% and 74% shall apply for condonation in the prescribed form with the prescribed fee. Students who have attendance between 50% and 64% shall apply for condonation in prescribed form with the prescribed fee along with the Medical Certificate.

Students who have attendance below 50% are not eligible to appear for the examination. They shall re-do the semester(s) after completion of the Programme.

QUESTION PAPER PATTERN

Section A: For 20 Marks
(i): 10 Questions x 1 Marks = 10 Marks.
a. 5 questions for Multiple choice/
b. 5 questions fill in the blanks
(ONE questions from each unit).
(ii): 5 questions x 2 Marks = 10 Marks.
(Descriptive type/one question from each Unit)

Section B: For 25 Marks
5 Questions x 5 Marks = 25 Marks
(Internal Choice and one set of questions from each unit)

Section C: For 30 Marks
3 Questions x 10 Marks = 30 Marks
(Answer any three out of 5 questions and one question from each unit)

EVALUATION

The performance of a student in each Course is evaluated in terms of percentage of marks with a provision for conversion to grade points. Evaluation for each Course shall be done by a continuous internal assessment (CIA) by the Course teacher concerned as well as by an end semester examination and will be consolidated at the end of the semester. The components for continuous internal assessment are:

Theory		Practical	
2 tests	: 15 Marks	Continuous Performance	: 20 Marks
Group Activity/Quiz	: 5 Marks	Model Practical	: 10 Marks
Assignments	: 5 Marks	Record	: 5 Marks
Total	25 Marks	Viva	: 5 Marks
		Total	40 Marks

Attendance need not be taken as a component for continuous assessment, although the students should secure a minimum of 75% attendance in each semester. In addition to continuous evaluation component, the end semester examination, which will be a writtentype examination of at least 3 hours duration, would also form an integral component of the evaluation. The ratio of marks allotted to continuous internal assessment and to end semester examination is 25:75. The evaluation of laboratory component, wherever applicable, will also be based on continuous internal assessment and on an end-semester practical examination with 40:60 ratio.

PASSING MINIMUM

Passing Minimum		
Continuous Internal Assessment (CIA)		**University Examination (UE)**
Theory	40% out of 25 marks (i.e. 10 marks)	40% out of 75 marks (i.e. 30 marks)
Practical	40% out of 40 marks (i.e. 16 marks)	40% out of 60 marks (i.e. 24 marks)
Project	Vivo-Voce 20 Marks 40% out of 20 Marks (i.e. 8 Marks)	Project report 80 Marks 40% out of 80 marks(i.e. 32 marks)

Failed candidates in the Internal Assessment are permitted to appear for their Internal Assessment in the subsequent semesters (2 chances will be given) by writing Tests and Assignments.

A candidate who gets less than 40% in the Project must resubmit the Project Report. Such candidates need to defend the resubmitted Project at the Viva-voce within a month. A maximum of 2 chances will be given to the candidate.

CONFERMENT OF THE BACHELOR'S DEGREE

A candidate shall be eligible for the conferment of the Degree of Bachelor of Arts/ Science/Commerce/Management/Literature only if he/she has earned the minimum required credits for the programme prescribed thereof (i.e. 180 credits).

GRADING SYSTEM

1. Grading

The total marks will be calculated by adding both CIA and end-semester examinations for each of the courses. The total marks thus obtained will then be graded as per details provided in Table 1.

From the second semester onwards the total performance within a semester and the continuous performance starting from the first semester are indicated by Semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i} = \text{WAM} = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$$

(Weighted Average Marks)

where 'Ci' is the Credit earned for the Course i; 'Gi' is the Grade Point obtained by the student for the Course i. 'M' is the Marks obtained for the course i and 'n' is the number of Courses passed in that semester.

CGPA = Average GPA of all the Courses starting from the first semester to the current semester.

Note: The GPA and the CGPA shall be calculated separately for the following three

Parts:
Part I: LCs; Part II: ELCs; and Part III: CCs, ACs, and ECs.

Classification of Final Results

(i) For each of the three parts, there shall be separate classification on the basis of the CGPA as indicated in Table - 2.

(ii) (ii) For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/Literature as Outstanding/ Excellent/ Very Good/ Good/ Above Average/ Average, the marks and the corresponding CGPA earned by the candidate in Part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in the LCs and the ELCs.

(iii)(iii)Grade in Part IV and Part V shall be shown separately and it shall not be taken into account for classification.

(iv)(iv)Absence from an examination shall not be taken as an attempt.

Table 1 Grading of the Courses

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above but below 90	9	A+
70 and above but below 80	8	A
60 and above but below 70	7	B+
50 and above but below 60	6	B
40 and above but below 50	5	C
Below 40	0	R.A.

Table 2 Final Result

CGPA	Corresponding Grade	Classification of Final Results
9.00 and above	O	Outstanding
8.00 and above but below 8.99	A+	Excellent
7.00 and above but below 7.99	A	Very Good
6.00 and above but below 6.99	B+	Good
5.00 and above but below 5.99	B	Above Average
4.00 and above but below 4.99	C	Average
Below 4.00	R.A.	Re-Appearance

Credit based weighted Mark System is adopted for individual semesters and cumulative semesters in the column 'Marks Secured' (for 100).

Total Number of Credits to Be Earned For Award of the Degree = 180 (As per UGC B.Voc Guidelines)

DDU – KAUSHAL Kendra
Bharathidasan University
Khajamalai Campus, Tiruchirappalli-23

B.Voc. Degree in Troubleshooting and maintenance of Electrical and Electronic Equipments– Structure of the Syllabus
(W.e.f the academic year 2023-24)

Core Course Code	Category	Subject Order	Name of the Subject	L	T	P	C	Marks		
								CIA	ESE	Total
Semester - I										
22KHSC101	HSC01	II	Business Communication	4	0	0	4	25	75	100
22KHSC102	HSC02	IV	Value Education	2	0	0	2	25	75	100
22KBVT101	BC01	III	Basic Electrical Engineering and House Wiring	4	0	0	4	25	75	100
22KBVT102	BSC01	III	Consumer Electronics	4	0	0	4	25	75	100
22KBVT103	BSC02	III	Fundamentals of computers and calculations	4	0	0	4	25	75	100
22KBVT104	PC01	III	House Wiring - Lab	0	0	6	6	40	60	100
22KBVT105	PC02	III	Consumer Electronics Lab	0	0	6	6	40	60	100
Total				**30**			**30**	-	-	**700**
Semester – II										
22KHSC201	HSC03	IV	Environmental Studies	2	0	0	2	25	75	100
22KBVT201	BC02	III	Measurements and Instrumentation	4	0	0	4	25	75	100
22KBVT202	BC03	III	Basic Electronics Engineering	4	0	0	4	25	75	100
22KBVT203	BSC03	III	Computer Hardware and Servicing	4	0	0	4	25	75	100
22KBVT204	PC03	III	Electronics and Measurements Lab	0	0	6	6	40	60	100
22KBVT205	ITC01	III	Industrial Training Level - I	0	0	10	10	40	60	100
Total				**30**			**30**	-	-	**600**

B.Voc. Degree in Troubleshooting and maintenance of Electrical and Electronic Equipments– Structure of the Syllabus

(W.e.f the academic year 2023-24)

Core Course Code	Category	Subject Order	Name of the Subject	L	T	P	C	Marks		
								CIA	ESE	Total
Semester - III										
22KBVT301	BC04	III	Human Resource Management	2	0	0	2	25	75	100
22KBVT302	BC05	III	DC Machines	4	0	0	4	25	75	100
22KBVT303	AC01	III	Sensors and Transducers	4	0	0	4	25	75	100
22KBVT304	BSC04	III	Electrical Estimation	4	0	0	4	25	75	100
22KBVT305	ASC01	III	Telecommunication Systems	4	0	0	4	25	75	100
22KBVT306	PC04	III	DC Machines Lab	0	0	6	6	40	60	100
22KBVT307	PC05	III	Telecommunication Systems Lab	0	0	6	6	40	60	100
Total				**30**			**30**	**-**	**-**	**700**
Semester – IV										
22KBVT401	BC06	IV	Total Quality Management	2	0	0	2	25	75	100
22KBVT402	AC02	III	Transformer and AC Machines	4	0	0	4	25	75	100
22KBVT403	AC03	III	Digital Electronics	4	0	0	4	25	75	100
22KBVT404	ASC02	III	Electronic Security Systems	4	0	0	4	25	75	100
22KBVT405	PC06	III	AC Machines Lab	0	0	6	6	40	60	100
22KBVT406	ITC02	III	Industrial Training Level - II	0	0	10	10	40	60	100
Total				**30**			**30**	**-**	**-**	**600**

B.Voc. Degree in Troubleshooting and maintenance of Electrical and Electronic Equipments– Structure of the Syllabus

(W.e.f the academic year 2023-24)

Core Course Code	Category	Subject Order	Name of the Subject	L	T	P	C	Marks		
								CIA	ESE	Total
Semester - V										
22KHSC501	HSC04	IV	Soft Skills Development	2	0	0	2	25	75	100
EC01		III	Elective Course - I	4	0	0	4	25	75	100
EC02		III	Elective Course - II	4	0	0	4	25	75	100
22KBVT501	ASC03	III	Industrial Electronics	4	0	0	4	25	75	100
22KBVT502	ASC04	III	Medical Electronics	4	0	0	4	25	75	100
22KBVT503	PC07	III	Product Testing Lab	0	0	6	6	40	60	100
22KBVT504	PC08	III	Digital Security Systems Lab	0	0	6	6	40	60	100
Total				**30**			**30**	**-**	**-**	**700**
Semester – VI										
22KHSC601	HSC05	IV	Gender Studies	2	0	0	2	25	75	100
22KHSC602	EDBP01	III	Entrepreneurship Development and Business Plan	4	0	0	4	25	75	100
22KBVT601	ASC05	III	Renewable Energy Sources	4	0	0	4	25	75	100
SEC01		III	Skill Elective Course - I	4	0	0	4	25	75	100
SEC02		III	Skill Elective Course - II	4	0	0	4	25	75	100
22KBV602	P01	III	Project	0	0	12	12	20	80	100
Total				**30**			**30**	**-**	**-**	**600**

Semester – V

Elective Courses

Core Course Code	Category	Subject Order	Name of the Subject	L	T	P	C	Marks		
								CIA	ESE	Total
22KBVTE11	EC01	III	Power Plant Engineering	4	0	0	4	25	75	100
22KBVTE12		III	Principles of Management	4	0	0	4	25	75	100
22KBVTE13		III	Control of Electrical machines	4	0	0	4	25	75	100
22KBVTE14		III	Television Engineering	4	0	0	4	25	75	100
22KBVTE21	EC02	III	Electrical Principles in Ground Water Investigation	4	0	0	4	25	75	100
22KBVTE22		III	Business Ethics and Business Environment	4	0	0	4	25	75	100
22KBVTE23		III	Logistics Paper	4	0	0	4	25	75	100
22KBVTE24		III	Automobile paper	4	0	0	4	25	75	100

Semester – VI

Elective Courses

Core Course Code	Category	Subject Order	Name of the Subject	L	T	P	C	Marks		
								CIA	ESE	Total
22KBVTE31	SEC01	III	Transmission and Distribution	4	0	0	4	25	75	100
22KBVTE22		III	Power Management	4	0	0	4	25	75	100
22KBVTE33		III	Modern Power Converters	4	0	0	4	25	75	100
22KBVTE34		III	Electrical Machine Design	4	0	0	4	25	75	100
22KBVTE41	SEC02	III	Special Electrical Machines	4	0	0	4	25	75	100
22KBVTE42		III	Protection and switch gear	4	0	0	4	25	75	100
22KBVTE43		III	SMPS and UPS	4	0	0	4	25	75	100
22KBVTE44		III	Electronics Manufacturing Technology	4	0	0	4	25	75	100

BUSINESS COMMUNICATION

	L	T	P	C
Semester – I				
22KHSC101	4	0	0	4

OBJECTIVES

To enable participants to communicate clearly and with impact, by improving their verbal and non-verbal communication style, as well as enhancing interpersonal skills.

LEARNING OUTCOMES

- ✓ Apply communication strategies and principles to prepare effective communication for domestic and international business situations.
- ✓ Capable of effectively monitoring, analyzing, and adjusting their own communication behavior.
- ✓ Demonstrate proficiency in the use of written English, including proper spelling, grammar and punctuation.

UNIT – 1 INTRODUCTION TO COMMUNICATION:

Communication – Definition – Need for Effective Communication – Process of Communication: levels of communication and flow of communication, use of language in communication, communication networks and significance of technical communication - **Barriers to Communication:** Types of barriers, Miscommunication, Noise, Overcoming measures.

UNIT – II NON-VERBAL AND INTERCULTURAL COMMUNICATION:

Importance of non-verbal communication – Types - personal appearance - facial expressions- movement- posture – gestures - eye contact –voice - beliefs and customs- worldview and attitude.

UNIT – III ORAL COMMUNICATION:

Listening - types and barriers to listening - speaking - planning and audience awareness - persuasion- goals - motivation and hierarchy of needs - attending and conducting interviews- participating in discussions, debates - and conferences - presentation skills- paralinguistic features -fluency development strategies.

UNIT-IV LETTER WRITING:

Component, sales letter- enquiries- orders- layout and process, email communication, bad news messages, persuasive written communication, memos, notice, agenda and minutes of meeting.

UNIT –V REPORT WRITING:

Report – importance of reports – types – characteristics of a good report – preparing a report – report by individuals – report by committees –agenda and minutes of meeting.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Stuart Bonne E., Marilyn S Sarow and Laurence Stuart(2007), Integrated Business Communication in a Global Market Place.3rd ed. John Wiley India, New Delhi,
2. Lesikar, Raymond V., John D Pettit, and Mary E FlatlyLesikar's (2007.) Basic Business Communication, 10th ed. Tata McGraw-Hill, New Delhi,
3. McGrath, E. H., S.J,Basic (2008) Managerial Skills for All, 8th ed. Prentice-Hall of India, New Delhi, Raman, Meenakhshi, and Prakash Singh, Business Communication. O U P, New Delhi,.
4. Guffey, Mary Ellen. (2010), Business Communication: Process and Product. 3rd ed.

VALUE EDUCATION

Semester – I	L	T	P	C
22KHSC102	2	0	0	2

OBJECTIVES:

- To understand the philosophy of life and values through Thirukural
- To analyse the components of values education to attain the sense of citizenship
- To understand different types of values towards National Integration and international understanding
- To learn yoga as value education to promote mental and emotional health
- To understand human rights, women rights and other rights to promote peace and harmony

COURSE OUTCOMES:

- Apply the values in thirukural to be peaceful, dutiful and responsible in family and society
- Develop character formation and sense of citizenship
- Be secular, self-control, sincere, respectful and moral.
- Master yoga, asana and meditation to promote mental health
- Be attitudinal to follow the constitutional rights

UNIT I : PHILOSOPHY OF LIFE AND SOCIAL VALUES:

Human Life on Earth (Kural 629) -Purpose of Life (Kural 46) -Meaning and Philosophy of Life (Kural 131, 226) -Family (Kural 45), Peace in Family (Kural 1025) Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) Five responsibilities / duties of Man (a) to himself (b) to his family (c) to his environment (d) to his society, (e) to the Universe in his lives (Kural 43, 981).

UNIT-II – HUMAN VALUES AND CITIZENSHIP:
Aim of education and value education: Evolution of value oriented education, Concept of Human values: types of Values- Character Formation – Components of Value education- A P J Kalam's ten points for enlightened citizenship- The role of media in value building.

UNIT-III VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT:
Constitutional or national values: Democracy, socialism, secularism, equality, Justice, liberty, freedom and fraternity - Social Values: Pity and probity, self-control, universal brotherhood - Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith -Religious Values: Tolerance, wisdom, character - Aesthetic Values- Love and appreciation of literature and fine arts and respect for the sameNational Integration and International Understanding

UNIT IV: YOGA AND HEALTH:
Definition, Meaning, Scope of Yoga - Aims and objectives of Yoga - Yoga Education with modern context - Different traditions and schools of Yoga - Yoga practices: Asanas, Pranayama and Meditation.

UNIT V: HUMAN RIGHTS:
Concept of Human Rights: Indian and international perspectives- Evolution of Human Rights- definitions under Indian and International documents -Broad classification of Human Rights and Relevant Constitutional Provisions: Right to Life, liberty ad Dignity- Right to equality- Right against exploitation- Cultural and Educational Right- Economic Rights- Political Rights- Social Rights - Human Rights of Women and Children – Peace and harmony.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)
BOOKS FOR REFERENCES:

1. Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613 004
2. Leah Levin, Human Rights, NBT, 1998
3. V.R. Krishna Iyer, Dialetics and Dynamics of Human Rights in India, Tagore Law Lectures.
4. Yogic Thearpy - Swami Kuvalayananda and Dr.S.L.Vinekar, Government of India, Ministry of Health, New Delhi.
5. SOUND HEALTH THROUGH YOGA - Dr.K.Chandrasekaran, Prem Kalyan Publications, Sedaptti, 1999.
6. Grose. D. N – "A text book of Value Education' New Delhi (2005)
7. Gawande . EN – "Value Oriented Education" – Vision for better living. New Delhi (2002) Saruptsons
8. Brain Trust Aliyar- "Value Education for Health, Happiness and Harmony" Erode (2004) Vethathiri publications

BASIC ELECTRICAL ENGINEERING AND HOUSE WIRING

Semester – I	L	T	P	C
22KBVT101	4	0	0	4

OBJECTIVES

- To explain the fundamental terms in electricity, electrostatics.
- To explain the fundamentals of wiring and applications.
- To explain the working of battery and inverter connection
- To explain the purpose of Earthing.

LEARNING OUTCOMES

- The student will have the ability to solve electrical circuits problems related to basic laws
- The student will be able to perform simple house wiring.
- The student will able to perform charging and discharging of battery and also earthing.

UNIT –I FUNDAMENTALS OF ELECTRICITY:

Fundamental terms, definitions, units & effects of electric current-Resistors-types of resistors & properties of resistors-Ohm's Law - Simple electrical circuits and problems- Resistance-Series and parallel circuits- Kirchoff's Laws and applications- Problems

UNIT– II ELECTROSTATICS:

Electric Flux-Electric Flux Density-electric Field Intensity-electric potential - Coulomb's laws of electrostatics - concept of capacitance - Relationship between Voltage, Charge and capacitance – energy stored in a capacitor – capacitors in series and in parallel – Problems.

UNIT – III – HOUSE AND INDUSTRIAL WIRING:

House Wiring - Classification of wires and cables - Importance of Protective device in circuits (Fuses) - Alarm and a switch - lamp, a fan with an individual switch and two way switch, stair case wiring. Series, Parallel wiring circuit and its uses

Industrial Wiring - Types of wiring for industrial purpose – Basics of Circuit breakers and its types - UG cables and laying techniques - Classification and uses of relay circuits

UNIT – IV - INVERTER WIRING AND BATTERY:

Inverter - Basic series inverter. Single phase half bridge Inverter - Single Phase full bridge inverter. Design an Inverter for Home appliances - Design a Battery for an inverter circuit. / Classification of cells –construction – chemical action and physical changes during charging, discharging - internal resistance and specific gravity of lead acid, nickel iron and nickel cadmium cells.

UNIT – V – EARTHING:

Earthing - Necessity of Earthing - Methods of Earthing – Pipe Earthing and Plate Earthing – IE rules for Earthing – Earthing Procedure - Action to be taken to reduce Earthing Resistance – ELCB types and Operation

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. N. Mittle - 1990 "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi,
2. Muthusubramanian R, Salivahanan S and Muraleedharan K A, 2006, "Basic Electrical, Electronics and Computer Engineering",Tata McGraw Hill, Second Edition, - Delhi
3. Nagsarkar T K and Sukhija M S, 2005 - "Basics of Electrical Engineering", Oxford press Delhi
4. Mehta V K, 1994 "Principles of Electronics", S.Chand& Company Ltd, Delhi
5. MahmoodNahvi and Joseph A. Edminister, 2002 "Electric Circuits", Schaum' Outline Series, McGraw Hill –Delhi
6. DU-KA 2016, "Basic Electrical Engineering", School of skill education and entrepreneurship, Institute for entrepreneurship and career development (IECD), Bharathidasanuniversity,Trichy–23.

CONSUMER ELECTRONICS

Semester – I	L	T	P	C
22KBVT102	4	0	0	4

OBJECTIVES

- To know the concepts of illumination and lighting
- To know the working, fault identification and servicing of consumer electronics.

LEARNING OUTCOMES

- The student will be able to perform the wiring of various lights based on the concept of illumination.
- The student will able to identify the faults and services the components in consumer electronic devices.

UNIT - I - ILLUMINATION:

Introduction - Definition and units of different terms used in illumination-plane Angle, Solids angle, Light, Luminous flux, Luminous Intensity, Luminous Efficacy candle power, Lumen, Illumination, M.S.C.P, M.H.C.P, M.H.S.C.P- Reduction factor, Luminance, glare Lamp efficiency. - LAWS OF ILLUMINATION – Designing of Good lighting System.

UNIT II – LIGHTING:

Sources of light-Arc lamp, Incandescent lamp, Fluorescent Tube –Induction Lamp- Energy saving lamps (C.F.L and L.E.D lamps)-limitation and disposal of C.F.L-benefits of led lamps-comparison of lumen output for LED, CFL and incandescent lamp.

UNIT - III– HOME APPLIANCES – I:

Electric Fan: Working, fault identification and servicing – Working of fluorescent lamp and LED lamp –Illumination concepts – working principle of electric toaster, electronic stabilizer, vacuum cleaner, hotplate - Fault Diagnosis and Error Remover Techniques and Practices

UNIT - IV– HOME APPLIANCES – II:
Operational study of home appliances - Dismantle and reassemble automatic iron, storage heater, washing machines, wet grinders, mixer grinder, etc. - Fault Diagnosis and Error Remover Techniques and Practices

UNIT V – HOME APPLIANCES – III:
Basic Principle, Working and Operation of Induction Stove, Hair Dryer, Toaster, Kettle and Microwave Oven - Fault Diagnosis and Error Remover Techniques and Practices

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Nagsarkar T K and Sukhija M S,"Basics of Electrical Engineering", Oxford press-Delhi
2. Mehta V K, 2002 "Principles of Electronics", S.Chand& Company Ltd, (1994), McGraw Hill, Delhi
3. DU-KA 2016, "Basic Electrical Works", School of skill education and entrepreneurship, Institute forentrepreneurship and career development (IECD), Bharathidasan university, Trichy –23

FUNDAMENTALS OF COMPUTERS AND CALCULATIONS

Semester – I	L	T	P	C
22KBVT103	4	0	0	4

OBJECTIVES

To provide a strong foundation in workshop calculation and to get familiar with usage of computers.

LEARNING OUTCOMES

- ✓ This subject helps the students to get a better understanding on workshop calculation and will gain a logical and reasoning ability to solve arithmetic problems in competitive examinations.
- ✓ The student will able to use MS-Word, MS-Excel and MS-Powerpoint

UNIT – I – MS-WORD:
INTRODUCTION - Word work space, starting and quitting Word, Creating and manipulating various documents, Editing of proofing files, Merging documents and macros.
PRIMARY COMMANDS IN FILE MENU - Open Commands, New commands, Save, Save As, and save all commands, The Close command, The Page setup, The Print commands, The Exit commands, Cut, Copy, and Paste commands, The Undo and Repeat commands, FORMAT COMMANDS - Font commands, Paragraph commands

UNIT –II – MS – EXCEL:

SIMPLE WORKSHEET - Entering text, entering values, entering dates and times, copying entries, moving Entries, inserting and deleting cells

FORMATTING BASICS - Changing Character Style, Changing Alignment, Changing row and column Width, Printing Worksheets, Preview Worksheets, Setting up the pages

EXISTING WORKBOOKS - Simple calculations, Doing Arithmetic, Totaling column of values, Using the IF function, Using the nested IF function

UNIT – III – MS POWER POINT:

Main Features of Power Point - Making the presentation - Creating Template with the Auto Content Wizard. Creating a Presentation with a Template. Creating a presentation from Scratch

DIFFERENT VIEWS - Normal Slide, Outline, Slide Sorter, Slide Show, Notes, Slide Master

Animation, Art and Sound - Controlling Transitions between slides. Animating Different Parts of a slide. Inserting a Motion Clip. Including Sounds in slides.

GRAPHS, CHARTS, TABLES AND COLUMNS - Organization Chart Slide, Creating a table Slide. Creating two columns Slide.

UNIT – IV - UNITS AND MEASUREMENTS:

Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa.Square and Square Root, method of finding out square roots, Ratios and proportion calculation. Percentage - Simple interest and compound interest.

UNIT – V –MENSURATION:

Mensuration: Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi-circle, Volume of solids –cube, cuboid, cylinder and sphere. Surface area of solids–cube, cuboids, cylinder and sphere.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. A. K. Xavior 2009, Workshop Calculations and Science JKP publications, Madurai
2. KapilDev, 2011 Workshop Calculation & Science (Mechanical) by Computech Publications Limited - Delhi
3. Professional Office Procedure by Susan H Cooperman, Printice Hall Edition.
4. DU-KA 2016, "Workshop calculation and science", School of skill education and entrepreneurship, Institute for entrepreneurship and career development (IECD), Bharathidasan university, Trichy –23

HOUSE WIRING – LAB

Semester – I	L	T	P	C
22KBVT104	0	0	6	6

OBJECTIVES

The student will acquire practical knowledge on

1. Analyzing different of wires using SWG
2. Perform Soldering
3. Usage of Multimeter
4. Series and Parallel Board
5. Battery Charging
6. Stair case Wiring

LEARNING OUTCOME

- ✓ The student will gain hands on experience in identifying different types of wire gauges, testing the polarity of the supply, multimeter usage, battery charging and Stair case wiring.

LIST OF EXPERIMENTS

- Measurement sizes of diff. wire using standard wire gauge
- Removal of insulation of wires and cables using standard procedure.
- Soldering practice on joints Thimble and terminals
- Preparation of test lamp and series parallel board.
- Testing of polarity of AC and DC supply.
- Mounting of different accessories on wooden board and making their connection.
- Connection of ammeter and voltmeter with load and measurement of their current and voltage.
- Verification of ohm's law
- Connection of wattmeter with loads and measurement of their power.

  Making various types of series and parallel circuits.
- Charging of battery using Battery charger
- Preparation of electrolyte for load acid battery and measure of its specific gravity by hydrometer.

  Measurement of resistance and voltage using multimeter.
- Preparation of heating elements
- Making various joint in wire and cable such on T-joint, straight joint, union joint, married joint, Britannia joint
- Controlling of lamps from one switch, two switches and three switches
- Preparation of simple house wiring circuits
- Preparation of distribution board
- Preparation of stair case wiring
- Cutting, holding and threading of conduit pipes.
- Carry out plate earthing and pipe earthing
- Connection of energy meter, MCB, ELCB in domestic wiring installation

CONSUMER ELECTRONICS LAB

Semester – I	L	T	P	C
22KBVT105	0	0	6	6

OBJECTIVES

The student will be able to assemble and install

1. Fluorescent lamp
2. Ceiling Fan
3. Geyser
4. Immersion Heater
5. Iron Box
6. Mixer Grinder
7. Wet Grinder
8. Vacuum Cleaner
9. Washing Machine
10. Hot plate
11. Voltage stabilizer

LEARNING OUTCOME

- ✓ The student will gain hands on experience in assembling and installation of various home appliances.

LIST OF EXPERIMENTS

1. Fluorescent lamp
2. Ceiling Fan
3. Geyser
4. Immersion Heater
5. Iron Box
6. Mixer Grinder
7. Wet Grinder
8. Vacuum Cleaner
9. Washing Machine
10. Hot plate
11. Electric Kettle
12. Voltage stabilizer

ENVIRONMENTAL STUDIES

	L	T	P	C
Semester – II				
22KHSC201	2	0	0	2

COURSE OBJECTIVES:

- To appreciate the scope of Environmental Studies, Community ecology and the interdisciplinary nature of environmental issues
- To have a basic knowledge of Natural resources its classification, concepts, and natural resources of India.
- The course designed to gain knowledge on values of biodiversity and conservation on global, national, and local scales
- To study about sources and effects of environmental pollution like air, water, soil, thermal, marine, nuclear and noise
- To understand the concerns related to Sustainable Development on environment and health
- To introduce the students in the field of Law and Policies and Acts both at the national and international level relating to environment.

COURSE OUTCOMES:

- Understand the environmental importance including interactions across local to global scales.
- The learners to update and analyze environmental relationships and interactions of environmental components
- The student to gain knowledge on importance of natural resources in a systematic way.
- The course content is introduce the concept of renewable and non-renewable energy resources and its scenario in India and at global level
- The students will know the relationship between biodiversity and ecosystem functions, direct and indirect values of biodiversity resources and their bioprospecting opportunities.
- The learners can gain awareness related on environmental pollution, causes and pollution control with case studies.
- Student to obtain the environmental ethics and gain knowledge about the sustainable development.
- Learners should realize the environmental legislation and policies of national and international regime and know the regulations applicable to industries and other organizations with significant Environmental aspects

Unit: 1 THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, scope and importance. Need for public awareness

Unit: 2 NATURAL RESOURCES:

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land as a resources, land degradation, man induced Landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit: 3 ECOSYSTEMS

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession.
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem:-
  a. Forest ecosystem
  b. Grassland ecosystem
  c. Desert ecosystem
  d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)

Unit: 4 BIODIVERSITY AND ITS CONSERVATION

- Introduction – Definition : Genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit: 5 ENVIRONMENTAL POLLUTION

Definition Causes, effects and control measures of:

a. Air Pollution b. Water Pollution c. Soil Pollution d. Marine Pollution e. Noise pollution f. Thermal Pollution g. nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.
- Ill-Effects of Fireworks: Firework and Celebrations, Health Hazards, Types of Fire, Firework and Safety

Unit: 6 SOCIAL ISSUES AND THE ENVIRONMENT

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation
- Public awareness.

Unit: 7 HUMAN POPULATIONS AND THE ENVIRONMENT

- Population growth, variation among nations.
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights - Value Education
- HIV/ AIDS - Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case studies.

Unit: 8 FIELD WORK

Visit to a local area to document environmental assets-river / forest/ grassland/ hill / mountain

REFERENCES :

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahamedabad – 380013, India, E-mail: mapin@icenet.net(R)
3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
6. De A.K. Environmental Chemistry, Wiley Eastern Ltd
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford University, Press 473p.
9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press 1140 p.

MEASUREMENT AND INSTRUMENTATION

Semester – II	L	T	P	C
22KBVT201	4	0	0	4

OBJECTIVES

- To define basic measurement terms.
- To learn about various operating forces and effects used in instruments.
- To study the construction and working of Moving coil and Moving Iron instruments, CT and PT and electrostatic voltmeter**.**
- To understand the measurement of resistance using different means.
- To study Single phase and Three phase power measurement using wattmeter.
- To study the construction and working of single phase, three phase energy meter and study about calibration.
- To learn about the measurement of inductance and capacitance using bridges.
- To study about CRO and its applications.

LEARNING OUTCOMES

- To acquire knowledge on Basic functional elements of instrumentation
- To understand the concepts of Fundamentals of electrical and electronic instruments
- Ability to compare between various measurement techniques
- To acquire knowledge on Various storage and display devices
- To understand the concepts Various transducers and the data acquisition systems
- Ability to model and analyze electrical and electronic Instruments and understand the operational features of display Devices and Data Acquisition System.

UNIT – I – CLASSIFICATION AND CHARACTERISTICS OF INSTRUMENTS:
General - Definition of Measurement – functions of Measurement system (Indicating, Recording and controlling function) – Applications of measurement systems – classification – Absolute and secondary instruments – Indicating Recording and Integrating Instruments – Analog and Digital – Definition of True value, accuracy, precision, error and error correction – Instrument efficiency – Effects used in instruments – operating forces – Deflecting, controlling and damping forces – constructional details of moving system – Types of Supports - Balancing – Torque weight ratio – control system (spring control and gravity control) Damping systems – Magnets – pointers and scales.

UNIT-II - MEASUREMENT OF CURRENT, VOLTAGE AND RESISTANCE:
Types of Instruments – construction, working and torque equation of moving coil, Moving iron, dynamometer type (Shaded pole) Instruments – Extension of instrument range using shunts and multipliers. (Calculation, requirements and simple problems). Tong tester – Electrostatic voltmeter – Rectifier type instruments –Instruments transformers CT and PT – Testing, Errors and characteristics of CT and PT - Classification of Resistance – measurement using conventional method – (Ammeter – voltmeter method) Measurement of low resistance using Kelvin's Bridge ohmmeter – measurement of Medium resistance using Wheatstone bridge – High resistance using Megger - earth resistance- – using Earth tester – Multimeters.

UNIT-III – MEASUREMENT OF POWER AND ENERGY:
Power in D.C and A.C Circuits – watt meters in power measurement – Electrodynamometer type and LPF watt meters – Three phase power measurement using Three phase wattmeter- Reactive power measurement in balanced load. Measurement of Energy in AC circuits – Single phase and Three phase energy meters construction and operation – Errors and Error correction – calibration using RSS meter - Digital Energy meter.

UNIT – IV – MEASUREMENT OF POWER FACTOR, FREQUENCY AND PHASE DIFFERENCE:
Power factor meters – single phase and Three phase Electro dynamometer type – construction and working – phase sequence Indicator – phase difference measurement using synchroscope –Trivector meter – Merz price maximum demand Indicator. Frequency measurement – Frequency meter – Weston type – Digital Frequency meter – (Simplified Block diagram)

UNIT-V – MEASUREMENT OF L, C AND WAVEFORMS:
Measurement of Inductance – Maxwell's Inductance Bridge – Andersons Bridge – Measurement of capacitance using Schering bridge. CRO – Block diagram – CRT – Applications - Measurements of voltage, frequency and phase difference using CRO - Time base and synchronization – Dural trace CRO – Digital storage oscilloscope – Block diagram

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. A.K. Sawhney Puneet Sawhney 2009 "A Course in Electrical And Electronics Measurements and Instrumentation Dhanpat Rai & Co (P) Ltd., New Delhi 1993
2. HS Kalsi " Electronic Instrumentation" Tata Mc Graw Hill Publishing Co., Delhi 2010
3. Albert D. Helfrick William David Cooper "Modern Electronic Instrumentation and Measurement techniques" Prentic – Hall of India (P) Ltd., New Delhi 2010
4. Dr.S.K.Battacha riya Dr. Renu Vig "Electronics and Instrumentation" S.K. Kataria & Sons, New Delhi.
5. Umesh Sinha Satya Prakashan "A course in Electrical and Electronic Measurement and Instrumentation"New Delhi.

BASIC ELECTRONICS ENGINEERING

Semester – II	L	T	P	C
22KBVT202	4	0	0	4

OBJECTIVES:

The student should be made to:

- Understand the structure of basic electronic devices.
- Familiarize the operation and applications of transistor like BJT, FET and UJT
- Familiarize the operation and applications of SCR, DIAC, TRIAC and MOSFET

LEARNING OUTCOME

- The student will be able design applications using electronic devices
- Analyze the characteristics of different electronic devices such as diodes, transistors and thyristors.
- Choose and adapt the required components to construct Filters.

UNIT – I - SEMICONDUCTOR DEVICES:

Semiconductor Devices and Applications - Properties of conductor, insulator and semiconductor - Characteristics of PN Junction Diode –Zener Diode –Reverse Breakdown – Half wave and Full wave Rectifiers (with and without filters) – Voltage regulation using Zener Diode.

UNIT – II - BIPOLAR JUNCTION TRANSISTOR:

Bipolar Junction Transistor and configurations – NPN and PNP transistor operation - Transistor as an amplifier and switch –CB,CE,CC configurations - Biasing and its types - classification of amplifiers- RC coupled amplifier – emitter follower and its applications

UNIT – III – FET and UJT:
Field Effect Transistor – construction – working principle of FET – difference Between FET and BJT – classification of FET – characteristics of FET – Applications – FET amplifier (common source amplifier).
Uni Junction Transistor – construction – equivalent circuit – operation – Characteristics – UJT as a relaxation oscillator

UNIT – IV- SCR, DIAC, TRIAC:
SCR – introduction – working – VI-characteristics -comparison between SCR and transistor – SCR as a switch, controlled rectifier. TRIAC working principle, Characteristics – DIAC – characteristics – DIAC as bi- directional switch.

UNIT – V – MOSFET:
MOSFET – types & characteristics of N channel MOSFET and P channel MOSFET- Characteristics of enhancement and depletion mode MOSFET – MOSFET as a switch. Applications of SCR, TRIAC, DIAC and MOSFET.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES
1. R.S. Sedha,2006 "Applied Electronics" S. Chand &Co., Delhi
2. Muthusubramanian R, Salivahanan S and Muraleedharan K A, 2006 "Basic Electrical, Electronics and Computer Engineering",Tata McGraw Hill, Second Edition,
3. Mehta V K, 1994 "Principles of Electronics", S.Chand& Company Ltd.
4.DU-KA 2016, "Electronics and computer hardware", School of skill education and entrepreneurship, Institute for entrepreneurship and career development (IECD), BDU, Trichy

COMPUTER HARDWARE AND SERVICING

Semester – II	L	T	P	C
22KBVT203	4	0	0	4

OBJECTIVES:
The student should be made to:
- be familiar with the components of motherboard.
- Be familiar to the technology of memory storage devices.
- Study the maintenance of desktop and notebook PC.

LEARNING OUTCOME
- The student will be able to identify the components of motherboard.
- The student will be able to format Operating System for a PC.
- The student will be able to maintain the desktop computers.

UNIT – I - MOTHERBOARD COMPONENTS

Introduction:

Hardware, Software and Firmware. Mother board, IO and memory expansion slots, SMPS, Drives, front panel and rear panel connectors.

Processors:

Architecture and block diagram of multicore Processor, Features of new processor (Definition only)-chipsets (Concepts only).

UNIT – II - MEMORY STORAGE DEVICES

Primary Memory: Introduction-Main Memory, Cache memory – DDR2, DDR3 and Direct RDRAM.

Secondary Storage: Hard Disk – Construction – Working Principle Specification of IDE, Ultra ATA, Serial ATA; HDD Partition - Formatting.

Removable Storage: DVD –ROM and DVD –RW: construction and reading & writing operations; Blue-ray – Introduction –Disc Parameters.

UNIT – III – I/O DEVICES

Keyboard: Signals – operation of membrane and mechanical keyboards–troubleshooting; wireless Keyboard.

Mouse: types, connectors, operation of Optical mouse and Troubleshooting.

Printers: Introduction – Types of printers- Dot Matrix, Inkjet Laser, MFP (Multi-Function Printer) and Thermal printer – Operation, Construction and Features-Troubleshooting.

I/O Ports: Serial, Parallel, USB, Game Port and HDMI.

UNIT – IV- INTERFACE

Displays: Principles of LED, LCD and TFT Displays.

Graphic Cards: VGA and SVGA card.

Modem: Working principle.

Power Supply: Servo Stabilizers, online and offline UPS - working principles; SMPS: Principles of Operation and block diagram of ATX Power supply, Connector Specifications.

UNIT – V – MAINTENANCE AND TROUBLE SHOOTING OF DESKTOP AND LAPTOPS

Bios-setup: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS -setup.

POST: Definition – IPL hardware – POST Test sequence – beep codes.

Types of laptop –block diagram – working principles– configuring laptops and power settings -SMD components, ESD and precautions.

Laptop components: Adapter – types, Battery – types, Laptop Mother Board - block diagram, Laptop Keyboard and Touchpad.

Installation and Troubleshooting: Formatting, Partitioning and Installation of OS – Trouble Shooting Laptop Hardware problems - Preventive maintenance techniques for laptops.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Computer Installation and Servicing D.Balasubramanian Arasan Ganesan Institute of Technology 1993
2. The complete PC upgrade and Maintenance Mark Minasi BPB Publication 1997
3. Troubleshooting, Maintaining and Repairing PCs Stephen J Bigelow Tata MCGraw Hill Publication 2004
4. Computer Networks Andrew S.Tanenbaum Prentice-Hall of India, New Delhi 2002
5. Data Communication and networking Behrouz A.Forouzan Tata Mc-Graw Hill, New Delhi 2006
6. Data and Computer Communications William Stallings Prentice-Hall of India Eighth Edition 2007

MEASUREMENT AND INSTRUMENTATION – LAB

Semester – II	L	T	P	C
22KBVT204	0	0	6	6

OBJECTIVES

1. To measure the values of unknown resistances, inductance and capacitances
2. To measure the single and three phase power.

LEARNING OUTCOME:

- ✓ The student will be able to find out the values of unknown resistances, inductance and capacitance.
- ✓ They will be able to measure the single phase and three phase power.

LIST OF EXPERIMENTS

1. Measurement of low resistance
2. Measurement of medium resistance
3. Measurement of high resistance
4. Measurement of inductance by different methods
5. Measurement of capacitance by different methods
6. Measurement of ratio & phase angle errors of Instrument transformers (C.T & P.T testing).
8. Study and use of L.V.D.T & Resistance strain gauge.
9. Measurement of different electrical & non-electrical quantities, parameters by using analog, digital meters, different types of transducers & instrumentation schemes.
10. Measurement of single phase and three phase power.
11. Study and usage of clamp meter
12. Testing of insulation resistance

INDUSTRIAL TRAINING – LEVEL - I

Semester – II	L	T	P	C
22KBVT205	0	0	10	10

Level – I

Students will be provided an implant industrial training at appropriate industry/industries for a minimum of 3 weeks and a maximum of 4 weeks

Technical part of the curriculum will be dealt with practical part of the curriculum to the students in order to get ready for industrial demands.

OBJECTIVE

- ✓ Students will be exposed to gain hands-on-experience in Trouble Shooting and Maintenance of Transformer and Wiring

LEARNING OUTCOME

- ✓ The student will become a commercial electrician in the areas of Domestic Wiring.

HUMAN RESOURCE MANAGEMENT

Semester – III	L	T	P	C
22KBVT301	2	0	0	2

Objectives:

- The course aims at introducing the students to various aspects of human resources management.
- The important functions of a human resources manager such as recruitment and selection processes interview methods.
- Performance appraisal, training and development, disciplinary procedures, collective bargaining and employee welfare.

UNIT I: PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT:

Evolution of Human Resource Management – The Importance of the Human Factor – Objectives of Human Resource Management – Role of Human Resource Manager – Human Resource Policies – Understanding business process in the context of Human Resource Management – Computer Applications in Human Resource Management.

UNIT II: THE CONCEPT OF BEST-FIT EMPLOYEE :

Importance of Human Resource Planning – Forecasting Human Resource requirements – Internal and External sources. Selection Process – Screening – Tests – Validation – Interview – Medical Examination – Recruitment. Induction – Importance – Practices Socialization benefits.

UNIT III: TRAINING AND EXECUTIVE DEVELOPMENT:

Types of training methods – Purpose – Benefits – Resistance. Executive development programmes – Common practices – Benefits – Self Development .

UNIT IV: SUSTAINING EMPLOYEE INTEREST:

Compensation Plans – Rewards – Motivation – Theories of motivation – career Management – Developing Mentor – Portage Relationships.

UNIT V: PERFORMANCE EVALUATION AND CONTROL PROCESS:

Methods of Performance Evaluation – Feedback – Industry practices, Promotion, Demotion, Transfer and Separation – Implications of job change. The control process – Importance – Methods – Requirements of Effective Control System. Grievances – causes – Implications – Redressed Methods – Gender Sensitivity.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

Text book :

1. Human Resource Management By MIRZA – S – Saiyadain Tata Mcgraw Hill Co. Email: mark_pani@mcgrawhill.com
2. Human Resource Management by Chitra Atmavam Naik, ANE books PVT Ltd., Chennai.
3. Human Resource Management By P. Jothi and D.N. Venkatesh, Oxford University Press, Chennai.
4. Human Resource Management By K. Aswathappa – Tata Mcgraw Hill Co.
5. Human Resource Management By Biswajeet Pattanayak, PHI learning India PVT Ltd.,

DC MACHINES

	L	T	P	C
Semester – III				
22KBVT302	4	0	0	4

OBJECTIVES

- To study the working principle of electrical machines and derive expressions for torque developed in electrical machines.
- To study the working principles of DC machines and DC Generator
- To study the maintenance of DC machines

LEARNING OUTCOME

- ✓ The student will have the knowledge on the working DC machines and DC motors

UNIT-I - ELECTRICAL MACHINES:
Introduction to Electrical Machines - Definition of motor and generator - Torque development due to alignment of two fields and the concept of torque angle - Electro-magnetically induced emf - Elementary concept of an electrical machine -Comparison of generator and motor

UNIT-II - DC GENERATORS:
Principle of operation of D.C. generators – Construction of D.C. generators –Types of armature windings - EMF equation – Types of D.C. generators — No load and load characteristics of Shunt generator–Applications

UNIT-III- DC MOTORS:
Principle of operation of D.C. Motors – Fleming's left hand rule – Construction – Back emf – Torque equation - Speed control of DC motors – Necessity of Starters– 3 Point and 4 Point starters – losses in D.C. Machines – Testing of D.C. machines - Predetermination of efficiency of motor and generator by Swinburne's test –Applications of D.C. Motors.

UNIT-IV – DC MACHINES WINDING:
Terminology used in winding like pole pitch, coil pitch back and front pitch progressive and Retrogressive winding etc. - Record the winding data- DC winding - Lap and Wave winding - Introduction to armature winding - Method of dismantling the burnt winding wire.

UNIT-V – MAINTENANCE OF DC MACHINES:
Causes of Sparking in Commutator - Defects in Commutator and Remedies - Resurfacing of Commutators and Brushes - Function & Requirements - Brush Holder – Formation & Different Types - Staggering of Brushes - Brush Pressure - Defects in DC Armature Winding - Growler.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Nagrath I. J and Kothari D. P. 2010 “Electrical machines” Fourth Edition, Tata McGraw Hill Publishing Company Ltd,
2. SK Sahdev, “Electrical machines” Unique International Publications, Jalandhar
3. Nagrath and Kothari, 2010 “Electrical machines””TataMcGraw Hill, New Delhi.
4. SB Gupta,2013“Electrical machines”SKKataria and Sons, New Delhi.
5. Fitzgerald, A.E.Charles Kingsley Jr.StephenD.Umans, 2003 ‘Electric Machinery’, McGraw Hill Book Company, Sixth Edition.New Delhi
6. Nagrath, I.J. and Kothari.D.P., Electric Machines’, 2010 T.M.H. publishing Co. Ltd., Fourth Edition, New Delhi.

SENSORS AND TRANSDUCERS

Semester – III	L	T	P	C
22KBVT303	4	0	0	4

OBJECTIVES

- To understand the necessity, advantages and applications of sensors and transducer.
- To understand the concept of Digital encoding transducers.
- To know the characteristics and applications of OpAmp
- To understand the usage of signal conditioners in Industrial Instrumentation.

OUTCOMES

The students will be familiarized with the concepts and applications of

- Sensors and transducer.
- Digital encoding transducers.
- OpAmp
- Industrial Instrumentation.

UNIT- I: CLASSIFICATION AND SENSING ELEMENTS:

General – Definition - Necessity - Types - classification based on the principle of operation - Active and passive - Primary and Secondary - Examples in each - Advantages - Primary sensing elements - Bourdon tubes. Bellows – Load cells – Thermistors –Types – construction and operation of Metal Resistance thermometer – Digital encoding transducer

UNIT - II: PASSIVE TRANSDUCERS:

Resistive Transducer - Strain Gauge - construction and working of Strain gauge - Strain gauge in measurement of displacement - Capacitive transducer and its applications – Liquid level measurement using capacitive transducers – Inductive transducer - Basic structure - proximity sensor - Measurement of pressure using inductive transducer - Construction and operation of LVDT, RVDT.

UNIT - III: ACTIVE TRANSDUCERS:
Thermocouple - construction and principle - Measurement of angular velocity using Tachogenerator - Piezoelectric transducers - principle - measurement of pressure and vibrations - Hall effect Transducer - photo voltaic transducers (solar cell) - photo conductive transducer Measurement of radiation using Geiger Muller tube.

UNIT - IV: OPERATIONAL AMPLIFIERS:
Block diagram - DC, AC signal conditioning – operational amplifiers IC 741 – Pin details – Important terms – characteristics of Ideal op amp - inverting and Non inverting mode –Gain – Applications of op. amps - Adders, Subtractor, Scale charger, integrator, Differentiator, Voltage to current converter - current to voltage converters - Differential amplifiers - Comparators (inverting and noninverting).

UNIT - V: SIGNAL CONDITIONERS IN INDUSTRIAL INSTRUMENTATION:
Operational amplifier with capacitive transducer – Operational amplifier as Instrumentation amplifiers – Bridge amplifier – active filters using op.amp - LPF, HPF – LPF as integrator - HPF as differentiator - Clipper, Clamper using op.amp. Successive approximation ADC - R - 2R ladder network DAC - wein bridge oscillator using op.amp - op. amp as Zero crossing Detector

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES:

1. A.K Sawhney, Electrical and electronic measurements and instrumentation, 2015
2. G.S.Rangan, G.R.Sharma and V.S.V.Mani, Instrumentation Devices and Systems, McGraw Hill, 2006
3. E. O. Deoblin, Measurement Systems, Tata McGraw Hill 2006
4. D. Patranabis, Principles of Industrial Instruemntation, Tata McGraw Hill 2008
5. B.G Liptak, Instrumentation and Process Control Handbook, Vol. I and II, Butterworthheinemann Ltd, 2005
6. C.D. Johnson, Process Control Instrumentation Terchnology, Dorling Kindersley India, 2007

ELECTRICAL ESTIMATION

Semester – III	L	T	P	C
22KBVT304	4	0	0	4

OBJECTIVES:
- Draw conventional symbols for various electrical installations.
- Familiarize the types of wiring, selection of wiring
- Differentiate between neutral and earth wire.
- Estimate the quantity of materials required for domestic and industrial wiring.
- Explain the concept and types of Energy of energy audit.
- Explain the energy saving opportunities in Transformer, Induction motor, DG system.
- Explain the roll of power factor controller in energy saving system.

OUTCOMES

The students will be familiarized with the

- Concepts of selecting the wire for domestic and industrial wiring.
- Prepare estimate for electrical connections
- Understandings of energy audit.

UNIT-I - SYSTEMS OF INTERNAL WIRING:

Need of electrical symbols – List of symbols – Brief study of important Indian Electricity Rules 1956 - Methods of representation for wiring diagrams – Looping back system and Joint box system and tree system of wiring - Types of internal wiring – Service connection (Overhead and Underground) - Protection of electrical installation against overload, short circuit and earth fault – protection against electric shock – Effects of electric shock – Recommended first aid for electric shock - Treatment for electric shock - Construction and working of ELCB – Overview of Bus bar Trucking and Cable tray.

UNIT-II – DOMESTIC AND INDUSTRIAL ESTIMATE:

General requirements of electrical installations for Residential, Commercial and Industrial – Lighting and power sub circuits – Diversity factor for sub circuits - Location of outlets, control switches, main board and distribution boards – Permissible voltage drops and size of wires - Steps to be followed in preparing electrical estimate.

Estimate the quantity of material required in Electrical Installation for

1. Small residential building/Flat
2. Factory Lighting scheme
3. Computer center having 10 computers, a/c unit, UPS, light and fan.
4. Street Light service having 12 lamp light fitting
5. Workshop with one number of 3Φ, 15hp induction motor.
6. Small Workshop with 3 or 4 Machines.

UNIT – III – ENERGY MANAGEMENT:

Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-Understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit Instruments.

UNIT-IV - ELECTRIC MOTORS & DIESEL GENERATING SYSTEM:

Electric Motors:

Types, Losses in motors, Motor efficiency, Factors affecting motor performance, Rewinding and motor replacement issues, Energy saving opportunities with energy efficient motors.

Diesel Generating system :

Factors affecting selection, Energy performance assessment of diesel conservation avenues.

UNIT-V – ENERGY EFFICIENT TECHNOLOGIES IN ELECTRICAL SYSTEMS:
Maximum demand controllers, Automatic power factor controllers, Energy efficient motors, Soft starters with energy saver, Variable speed drives, Energy efficient transformers, Electronic ballast, Occupancy sensors, Energy efficient lighting controls, Energy saving potential of each technology.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. K.B.Raina& S.K.Battacharya- Electrical Design Estimating And Costing- New age International Ltd Reprint – 2011
2. Dr.S.L.Uppal G.C. Garg- Electrical Wiring, Estimating and Costing- Khanna publishers. Sixth2011
3. Surjit Singh- Electrical Estimation and Costing- Khanna publishers.
4. Rajiv Shankar- Energy Auditing in Electrical Utilities- Viva Books – 2010
5. Amlan Chakrabarti- Energy engineering and Management- PHI Learning Pvt Ltd - 2011

TELECOMMUNICATION SYSTEMS

Semester – III	L	T	P	C
22KBVT305	4	0	0	4

OBJECTIVES:

- To understand the working operation of Optocouplers
- To understand the analysis and design of LC and RC oscillators, and crystal oscillators.
- To study the working of LED, LCD TV's and DTH services

LEARNING OUTCOME

The students will be able to

- Design LC and RC oscillators, and crystal oscillators
- Fault Diagnosis and Error Remover Techniques and Practices of LED, LCD
- Installation and maintenance of DTH services

UNIT-I - OPTO ELECTRONICS DEVICES AND OSCILLATORS:

Classification of opto electronic devices – symbols, Characteristics, working of LDR, LED– opto coupler - Photo transistor. Clipper, Clamper Circuits and waveforms only

Oscillators: Barkhausen criterion - RC oscillators; Weinbridge, Phase Shift – LC Oscillators - Hartley and colpitts oscillators - Crystal controlled oscillators (Analysis of oscillators using BJTs only) - Stability of oscillators.

UNIT-II – TV FUNDAMENTALS AND PICTURE TUBES:

Basic block diagram of Monochrome TV transmitter and Receiver - Color T.V. Fundamentals: mixing of colors –Luminance, Hue Saturation and Chrominance - Picture Tube: construction and working principle - Introduction to High definition TV (HDTV) - Remote control IR transmitter and receiver

UNIT – III – COMMUNICATION SYSTEMS:

Mobile Communication: Evolution, Examples of Wireless Communication Systems: Paging system, Cordless telephones systems, Cellular telephone Systems, Trends in Cellular Radio and personal Communications

Cellular Concept: Frequency reuse, Channel Assignment strategies, Interference and system capacity, improving coverage

UNIT-IV - LCD-LED TV AND MONITOR:

Basic Principle, Working and Operation of LCD - LED TV and Monitor, Installation, Repair Maintenance and Serving and Practice, Fault Diagnosis and Error Remover Techniques and Practices

UNIT-V – CABLE TV AND DTH SERVICES:

Basic Principle, Working and Operation of Cable TV and DTH Services, Installation and Checking, Repair Maintenance, Serving and Practice, Fault Diagnosis and Error Remover Techniques and Practices.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Jacob Millman, Christos C. Halkias and Chetan Parikh,2009 Integrated Electronics, TMH, Second Edition New Delhi.

2. Modern Television Practice – Transmission, Reception, Applications R.R.Gulati New age international 5th Edition 2015

3. TV and Video Engg. By A.M.Dhake – Second Edition TMH -2003

DC MACHINES LAB

Semester – III	L	T	P	C
22KBVT306	0	0	6	6

OBJECTIVES

- To study the load characteristics of DC machines
- To determine the performance characteristics of DC machines
- To study the different speed control methods of DC shunt motor.

LEARNING OUTCOME:

- Complete performance characteristics of DC machines are studied.
- Speed control of DC shunt motor above and below rated speed is studied.

LIST OF EXPERIMENTS

1. Load characteristics of separately excited and DC Shunt Generators
2. Load characteristics of self-excited and DC Shunt Generators
3. Load characteristics of DC Compound generator
4. Performance characteristics of DC Series Motor
5. Performance characteristics of DC shunt motor
6. Performance characteristics of DC Compound motor
7. Separation of iron and friction losses and estimation of parameters in DC machines.
8. Speed control of DC shunt motor by shunt field control and armature resistance control
9. Swinbum's Test
10. Maintenance of DC motors
11. Troubleshooting of DC motors
12. Study Of Starters
13. Measuring a enameled winding wire with Standard wire gauge
14. Winding of DC machines.

TELECOMMUNICATION SYSTEMS LAB

Semester – III	L	T	P	C
22KBVT307	0	0	6	6

OBJECTIVES:

- To gain hands on experience in designing electronic circuits like clipping and clamping
- To learn the fundamental principles of amplifier circuits
- To differentiate feedback amplifiers and oscillators.
- To study the operation of LCD, LED TV
- Fault identification and troubleshooting of LCD and LED TV.
- DTH installation, maintenance and service.

LEARNING OUTCOME

- The student will gain knowledge in designing electronic circuits and operation of LED and LCD TV

LIST OF EXPERIMENTS

1. Diode Clipping Circuits
2. Clamping Circuits
3. R.C. Phase Shift Oscillator
4. Voltage Series Feedback Amplifier
5. Class ‘B’ Push-Pull Amplifier Crystal Oscillator
6. Hartley Oscillator
7. Colpitts oscillator
8. LCD TV service
9. LED TV service
10. DTH installation
11. DTH service and maintenance.

TOTAL QUALITY MANAGEMENT

Semester – IV	L	T	P	C
22KBVT401	2	0	0	2

Objectives:

- ✓ To enable the students to understand the principles, practices and application in Total Quality Management and Concepts.

Learning Outcomes:

- ✓ Enable the students to understand the principles, practices and application in Total Quality Management and Concepts.

Unit I INTRODUCTION TO QUALITY:

Meaning of Quality – Definitions and other key concepts – Dimensions of Product Quality – Dimensions of Service Quality – What is Total Quality Management (TQM)- Definition of Quality – Characteristics of TQM – Principles of TQM- Barriers to TQM Implementation- Potential benefits of TQM

Unit II CONTRIBUTIONS OF QUALITY GURUS:

Walter A.Shewhart – W. Edwards Deming – Joseph M.Juran – Philip Crosby – Armand V.Feigenbaum –Genichi Taguchi

Unit III CONTINUOUS PROCESS IMPROVEMENT TOOLS PDSA:

Cycle – 5S House Keeping –kaizen–Old QC Tools – Seven New Management tools -Basic Concepts in Six Sigma

Unit IV BENCH MARKING AND QUALITY FUNCTION DEPLOYMENT:

What is Bench Marking – Types – Benchmarking Process – benefits – Pit falls – Quality Function deployment – Concepts – Process –House of Quality – QFD Methodology Process

Unit V QUALITY CIRCLES AND INTRODUCTION TO QUALITY MANAGEMENT SYSTEM :

Introduction – Characteristics- Structure – Process – Benefits of Quality Circles – Need for ISO 9000 – ISO family of Standards – Steps in ISO 9000 Certifications – Quality Audits

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES :

1. Dr.V.Jayakumar,Dr.R.Raju, Total Quality Management, Lakshmi Publications,2005.
2. Poornima M Charantimath, “Total Quality Management”, Pearson Education, 2003.
3. KanishkaBedi, “Quality Management”, Oxford University Press, 2006.

TRANSFORMER AND AC MACHINES

Semester – IV	L	T	P	C
22KBVT402	4	0	0	4

OBJECTIVES

The Student will acquire knowledge on

- Construction and performance of transformers, alternators, synchronous motor and Induction motors
- Starting and speed control of three-phase induction motors.
- Construction, principle of operation and performance of single phase induction motors and special machines.

LEARNING OUTCOME

- The student will be able operate the AC machines which include synchronous motor, induction machines (single phase and three phase) and special machines.

UNIT - I –TRANSFORMERS:

Construction – principle of operation – equivalent circuit – losses – testing – efficiency and voltage regulation – auto transformer – three phase connections – parallel operation of transformers – tap changing.

UNIT - II -ALTERNATOR PRINCIPLES AND CONSTRUCTION:

Basic principle of alternators – Types of alternators –Construction details of alternator – Salient pole rotor – Cylindrical type rotor – Types of A.C. armature windings – Types of slots – Full pitch and short pitched windings – pitch factor – relation between frequency, speed and number of poles – EMF equation.

UNIT - III - SYNCHRONOUS MOTOR:

Synchronous Motor - Principle of operation – Torque equation – Operation on infinite bus bars - V-curves – Power input and power developed equations – Starting methods

UNIT - IV - THREE PHASES INDUCTION MOTOR:

Three Phase Induction Motor- Constructional details – Types of rotors – Principle of operation – Slip – Equivalent circuit – Slip- torque characteristics - Condition for maximum torque – Losses and efficiency – Load test - No load and blocked rotor tests - Double cage rotors – Induction generator – Synchronous induction motor.

UNIT - V - SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES:

Constructional details of single phase induction motor – Double revolving field theory and operation – Equivalent circuit – No load and blocked rotor test – Performance analysis – Starting methods of single-phase induction motors - Shaded pole induction motor - Linear reluctance motor - Repulsion motor - Hysteresis motor - AC series motor –BLDC & Stepper motor

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. D.P. Kothari and I.J. Nagrath, 2002 'Electric Machines', Tata McGraw Hill Publishing Company Ltd. New Delhi.
2. P.S. Bhimbhra,2003 'Electrical Machinery', Khanna Publishers, New Delhi.
3. A.E. Fitzgerald, Charles Kingsley, 2003 Stephen.D.Umans, 'Electric Machinery', TataMcGraw Hill publishing Company Ltd, New Delhi
4. J.B. Gupta, 2002'Theory and Performance of Electrical Machines', S.K.Kataria and Sons, New delhi.

DIGITAL ELECTRONICS

Semester – IV	L	T	P	C
22KBVT403	4	0	0	4

OBJECTIVES:

- To understand various Number System, Boolean postulates and laws. Karnaugh Map, digital logic families.
- To learn arithmetic circuits-adder/subtractor, BCD adder.
- To understand the encoder/decoder & MUX / DEMUX.
- To understand the concept of parity Generator, and checkers
- To understand various types of flip-flops, counters and registers.

OUTCOMES

The student will be familiarized with the concepts

- Number Systems
- Logic gates
- Multiplexer and De- multiplexer
- Flip-flops , Counters and Registers

UNIT I – NUMBER SYSTEM:

Binary, Octal, Decimal, Hexadecimal - Conversion from one to another. Binary codes – BCD code, Gray code, Excess 3 code. Boolean Algebra- Boolean postulates and laws- De-Morgan's theorem - Simplification of Boolean expressions using Karnaugh map (up to 4 variables-pairs, quad, octets)- Constructing the logic circuits for the Boolean expressions.

UNIT – II – LOGIC GATES AND DIGITAL LOGIC FAMILIES:

Gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR - Implementation of logic functions using gates - Realization of gates using universal gates Simplification of expression using Boolean techniques- Boolean expression for outputs. Digital logic families –Fan in, Fan out, Propagation delay - TTL, CMOS Logics and their characteristics - comparison and applications -Tristate logic

UNIT – III - COMBINATIONAL CIRCUITS:

Arithmetic circuits - Binary – Addition, subtraction, 1's and 2's complement - Signed binary numbers- Half Adder- Full Adder- Half Subtractor - Full Subtractor- Parallel and serial Adders- BCD adder.

UNIT - IV– MULTIPLEXER & DEMULTIPLEXER

Multiplexer- basic 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX - applications of the MUX – Demultiplexer - 1 to 2 demultiplexer, 1 to 4 demultiplexer, 1 to 8 demultiplexer - Parity Checker and generator

UNITS – V – FLIP FLOPS, COUNTER & REGISTERS:

SR, JK, T, D FF, JK- MS FF - Triggering of FF – edge & level , Counters – 4 bit Up - Down Asynchronous / ripple counter - Decade counter- Mod 3, Mod 7 counter. 4 bit Synchronous Up - Down counter - Johnson counter, Ring counter 4-bit shift register- Serial IN Serial OUT- Serial IN Parallel OUT - Parallel IN Serial OUT- Parallel IN Parallel OUT.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Ramesh S. Gaonkar,- Microprocessor architecture programming and application- Wiley Eastern Limited.
2. Roger L.Tokheim Macmillan- Digital Electronics- McGraw hill -1994
3. Albert Paul Malvino & Donald P.Leach- Digital principles & Applications- TMH - 4 th Edition 2002
4. K.Meena- Principles of Digital Electronics- PHI – 2011
5. R.P.Jains- Modern Digital Electronics- TMH -2003

ELECTRONIC SECURITY SYSTEMS

Semester – IV	L	T	P	C
22BVT404	4	0	0	4

OBJECTIVES:

- Study the installation set up of CCTV, IDS, FAS and ACS
- Study the security threats in cyber network

LEARNING OUTCOME

Students will be able to:

- Setup the installation of CCTV, IDS, FAS and ACS
- Gain knowledge on the security threats.

UNIT I – CLOSE CIRCUIT TELEVISION (CCTV):

Basics of CCTV System - Image Capturing System - Recording System - Transmission System - Display System - Pan, Tilt and Zoom Controlling

UNIT – II INTRUSION DETECTION SYSTEMS (IDS):

Basics of IDS - Exterior System - Interior System - Wired Interior System - Wireless Interior System

UNIT – III FIRE ALARM SYSTEMS (FAS):

Basics of FAS - Conventional FAS - Addressable FAS - Semi Addressable FAS - Suppression System

UNIT – IV – ACCESS CONTROL SYSTEMS (ACS):

Basics of ACS – Controllers - Cards & Readers – Biometric – Software - Time Attendance System - Visitor Management Systems (VMS)

UNIT – V SECURITY THREATS AND VULNERABILITIES

Overview of Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability. Vulnerability and Threats

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Nelson V P, Nagle H T, 1996 Carroll B D, and Irwin J D, "Digital Logic Circuit Analysis and Design", Prentice Hall International Inc., New Jersey.
2. Philip Walker,2013 "Electronic Security Systems: Better Ways to Crime Prevention"
3. G. Honey, 2000, "Electronic Access control" – Elsevier Edition

TRANSFORMER AND AC MACHINES LAB

	L	T	P	C
Semester – IV				
22KBVT405	0	0	6	6

OBJECTIVES:

- To study the performance characteristics of induction motors (Single phase and three phase)
- To study the predetermination of voltage regulation of Alternator
- To study the speed control of three phase induction motor.
- To study the performance of Transformer

LEARNING OUTCOME:

- Characteristics of induction and synchronous machines are studied using direct and in direct methods.
- Regulation of alternator is predetermined using different tests.
- Performance of transformer, single-phase and three phase induction motor is obtained.

LIST OF EXPERIMENTS:

1. Load test on 3-phase Induction motor
2. No-load test blocked rotor test on 3-phase Induction motor.
3. Performance characteristics of Single phase Induction motor.
4. No-load test blocked rotor test on single-phase Induction motor.
5. Determination of V curves and inverted V curves of synchronous motor.
6. Power angle characteristics of a synchronous motor.
7. Load characteristics of Induction Generator.
8. P.F Improvement of Induction motor using capacitors.
9. Load test on a Single Phase transformer
10. Open circuit and short circuit tests on a Single Phase transformer
11. Sumpner's test on two identical transformers
12. Estimation of efficiency of DC Machine by Hopkinson test.
13. Transformer oil testing
14. Maintenance of AC motors
15. Study of AC Starters
16. Types Of Armature Winding

INDUSTRIAL TRAINING LEVEL - II

Semester – IV	L	T	P	C
22KBVT406	0	0	10	10

Level – II

Students will be provided an implant industrial training at appropriate industry/industries for a minimum of 3 weeks and a maximum of 4 weeks

Technical part of the curriculum will be dealt with practical part of the curriculum to the students in order to get ready for industrial demands.

OBJECTIVE

- ✓ Students will be exposed to gain hands-on-experience in Trouble Shooting and Maintenance of **DC Generator and Motor**

LEARNING OUTCOME

- ✓ The student shall become a commercial electrician in the maintenance and servicing of motors and generators.

SOFT SKILLS DEVELOPMENT

Semester – V	L	T	P	C
22KHSC501	2	0	0	2

OBJECTIVE:

Today's world is all about relationship, communication and presenting oneself, one's ideas and the company in the most positive and impactful way. This course intends to enable students to achieve excellence in both personal and professional life.

UNIT - I - KNOW THYSELF/ UNDERSTANDING SELF:

Introduction to Soft skills-Self-discovery-Developing positive attitude-Improving perceptions-Forming values.

UNIT - II - INTERPERSONAL SKILLS/ UNDERSTANDING OTHERS:

Developing interpersonal relationship-Team building-group dynamics-Networking Improved work relationship.

UNIT - III - COMMUNICATION SKILLS / COMMUNICATION WITH OTHERS:

Art of listening-Art of reading-Art of speaking-Art of writing-Art of writing e-mails-e mail etiquette.

UNIT - IV - CORPORATE SKILLS / WORKING WITH OTHERS :

Oral Presentation – Memos- Note taking - Note making and preparing Minutes- Reports, Proposals, Abstracts - Technical Writing.

UNIT - V - SELLING SELF / JOB HUNTING:

Writing resume/cv-interview skills-Group discussion- Mock interview-Mock GD – Goal setting - Career planning.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

TEXT BOOKS:

1. Meena.K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills: A RoadMap to Success), P.R. Publishers & Distributors, No, B-20 & 21, V.M.M. Complex, Chatiram Bus Stand, Tiruchirappalli- 620 002. (Phone No: 0431-2702824: Mobile No: 94433 70597, 98430 74472)
2. Alex K. (2012) Soft Skills – Know Yourself & Know the World, S.Chand & Company LTD,Ram Nagar, New Delhi- 110 055. Mobile No : 94425 14814 (Dr.K.Alex)

REFERENCE BOOKS:

(i) Developing the leader within you John c Maxwell
(ii) Good to Great by Jim Collins
(iii) The seven habits of highly effective people Stephen Covey
(iv) Emotional Intelligence Daniel Goleman
(v) You can win Shive Khera
(vi) Principle centred leadership Stephen Covey

INDUSTRIAL ELECTRONICS

Semester – V	L	T	P	C
22KBVT501	4	0	0	4

OBJECTIVE:

- The objective of this subject is to make the student the study the working of power devices and its applications.

LEARNING OUTCOME:

This subject will make the student to

- Understand the operation and triggering of SCR
- Operation of Choppers and inverters
- Knowledge on Numerically controlled systems

UNIT – I POWER DEVICES AND TRIGGER CIRCUITS:

Thyristor family –Working principle ,VI characteristics, Applications of SCR – Definitions for holding current, latching current, Symbol - principle of working ,VI characteristics, applications of Insulated gate bipolar transistor (IGBT), MOSFET and GTO. Triggering of SCR - Gate triggering –Types – Concepts of DC triggering, AC triggering, Pulse gate triggering

UNIT – II CONVERTERS:

Definition – Single phase Half controlled bridge converter with resistive load and resistive inductive load importance of flywheel diode – Single phase fully controlled bridge converter with resistive load – voltage and current waveforms – Single phase fully controlled bridge converter with RL load – voltage and current waveforms. Commutation- Natural commutation – Forced commutation – Types of forced commutation

UNIT – III CHOPPERS:

Introduction – applications -principle of chopper-control strategies (time ratio and current limit control)-types of chopper type A, B, C, D, and E - step up chopper –Jones chopper – Morgan chopper-chopper using MOSFET – PWM control circuit for driving MOSFET in chopper. DC Transmission- principle – advantages – drawbacks

UNIT – IV INVERTERS & APPLICATIONS:

Definition - Requirement of an inverter –Single phase inverter with resistive load – Single phase inverter with RL load – output voltage control in inverters - McMurray inverter – advantages Basic 3 phase bridge inverter with 120 conduction mode – circuit, trigger sequence, waveform UPS – Need for UPS –ON Line UPS -OFF Line UPS - Comparison of ON line and OFF line UPS

UNIT – V NUMERICALLY CONTROLLED SYSTEMS:

Block diagram of numerical control system– Advantages, disadvantages , applications of numerical control system – Driving devices – Stepper motor - Programming systems – Data processing unit – Data reading – Part programming – steps - Post processor

Introduction to CNC / DNC – Basic concepts of CNC , DNC and AC system - Types of AC system - -Block diagram of ACO , ACC – Comparison between NC & CNC – Typical CNC system – Block diagram - Advantages of CNC system

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Industrial & Power Electronics By Harish C.Rai, Umesh Publication, 5th Edition 1994
2. Power Electronics by Dr.P.S.Bimbhra, Khanna publishers -2 nd Edition-1998
3. Power Electronics by M.H.Rashid-PHI Publication-3 rd Edition-2005
4. Programmable Logic Controller –Pradeep Kumar& Srivashtava-BPB Publications
5. Numerical control of Machines – Yoram Korean &Joseph Ben
6. Industrial Electronics and control by Biswanath Paul –PHI publications-2nd Edition -2010

MEDICAL ELECTRONICS

Semester – V	L	T	P	C
22KBVT502	4	0	0	4

OBJECTIVES:

- To Introduce Fundamentals of Biomedical Engineering
- To understand the basic principles in imaging techniques
- To have a basic knowledge in life assisting and therapeutic device

LEARNING OUTCOME

- Ability to understand and analyze Instrumentation systems and their applications to various industries

UNIT - I ANATOMY AND PHYSIOLOGY:

Elementary ideas of cell structure, heart and circulatory system central nervous system, muscle action, respiratory system, cardio vascular system.

UNIT – II MEDICAL ELECTRONICS EQUIPMENTS:

Classification, application and specification of diagnostic, therapeutic and clinical laboratory equipment, method of operation of these Equipments

UNIT – III X- RAY MACHINE:

Basic X-Ray components and circuits, types of X-ray machines e.g. general purpose, dental image intensifier system, trouble shooting and maintenance of X- Ray machine – Precautions using X-Ray machine

UNIT – IV - ELECTRODES AND PRESSURE TRANSDUCERS:

Bioelectric signal, bio electrodes, electrodes, tissue interface, electrodes uses for ECG, EEG Transducers Typical signal from physiological parameters, pressure transducers

UNIT – V BIO MEDICAL RECORDERS:

Biomedical recorders Block diagram description and application of following instruments ECG machines EEG machine EMG machine, Dialyzers and ventilators, Electro physiotherapy equipments.

UNIT - VI: CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1.R.S.Khandpur,2003 'Hand Book of Bio-Medical instrumentation', McGraw Hill Publishing Co Ltd. New Delhi.
2.Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer,2002 'Bio-Medical Instrumentation and Measurements', II edition, Pearson Education, New Delhi
3. M.Arumugam, 2003 'Bio-Medical Instrumentation', Anuradha Agencies, Chennai
4.L.A. Geddes and L.E.Baker, 1975 'Principles of Applied Bio-Medical Instrumentation', JohnWiley & Sons, Californai USA
5.J.Webster, 1995 'Medical Instrumentation', John Wiley & Sons, Califonia USA

ELECTRONIC PRODUCT TESTING LAB

Semester – V	L	T	P	C
22KBVT503	0	0	6	6

OBJECTIVE

To provide hands on experience with power electronic converter design and testing

LEARNING OUTCOME

The student will be able to work using power electronic devices and converters.

LIST OF EXPERIMENTS

1. S.C.R, BJT MOSFET and IGBT Characteristics.
2. Gate Triggering circuits for SCR.BJT, MOSFET and IGBT using R,RC, UJT and IC's
3. Single Phase step down cyclo-converter with R and RL loads
4. A.C Voltage controllers with R and RL loads
5. Study of forced commutation techniques.
6. Bridge rectifiers-half control and full control with R and RL loads.
7. Buck and Boost choppers
8. Study of 1 KVA UPS and SMPS for variable voltage with constant load, Constant voltage with variable load.
9. Single phase inverter with R & RL load.
10. Thyristor and IGBT testing pin configuration
11. SMPS safety testing
12. Inverter - High Voltage Test, Insulation Resistance Test, No –Load Test, Output Test

DIGITAL SECURITY SYSTEMS LAB

Semester – V	L	T	P	C
22KBVT504	0	0	6	6

OBJECTIVES:

- To design Code Converters
- To design digital logic circuits like adders, comparators, parity checker, registers and counters.

LEARNING OUTCOME

- ✓ The student will gain knowledge in designing digital logic design.

LIST OF EXPERIMENTS

1. Design and implementation of code converters using logic gates
   (i) BCD to excess-3 code and vice versa
   (ii) Binary to gray and vice-versa
2. Design and implementation of 4 bit binary Adder
3. Design and implementation of 4 bit binary Subtractor
4. Design and implementation of 2 bit Magnitude Comparator using logic gates
5. Design and implementation of Multiplexer using logic gates.
6. Design and implementation of De-multiplexer using logic gates.
7. Design and implementation of encoder using logic gates
8. Design and implementation of decoder using logic gates
9. Design and implementation of 3-bit synchronous up counter
10. Design and implementation of 3-bit synchronous down counter
11. Design and implementation of 3-bit synchronous up/down counter
12. Implementation of shift registers using Flip- flops

GENDER STUDIES

Semester – VI	L	T	P	C
22KHSC601	2	0	0	2

Objectives

- To make boys and girls aware of each other's strengths and Weakness.
- To develop sensitivity towards both genders in order to lead an ethically enriched life.
- To promote attitudinal change towards a gender balanced ambience and women empowerment.

Learning Outcomes:

- Make boys and girls aware of each other's strengths and Weakness.
- Develop sensitivity towards both genders in order to lead an ethically enriched life.
- Promote attitudinal change towards a gender balanced ambience and women empowerment.

UNIT I INTRODUCTION TO GENDER STUDIES CONCEPTS:

Gender Spectrum.-Sex – Gender distinction – Biological Determinism – Patriarchy – Feminism –Gender Socialization and Stereotyping-Gender Discrimination – Gender Division of labour and roles– Gender Sensitivity and awareness – Gender Equity – Equality – Gender Main streaming and Gender Analysis..

UNIT II UGC INITIATIVES ON WOMEN'S STUDIES:

Definition of Women's Studies –Gender Studies –UGC Initiatives and guidelines on Women's Studies - Beijing Conference, UN Initiatives – Convention on Elimination of All forms of Discrimination Against Women (CEDAW)- Sustainable Development Goals on Gender Equality (SDG 5) and targets.

UNIT III AREAS OF GENDER DISCRIMINATION:

Gender Socialization- Sex Ratio– Health and Nutrition– – Literacy and Education - Employment- Governance – participation in decision making- politics- property rights and access to credit- gender based violence- Social institutions –Family, Caste, Class, religion, gender, State. Market – Media – Politics – Judiciary.

UNIT IV WOMEN DEVELOPMENT AND GENDER EMPOWERMENT:

Towards Equality Report of Status of Women in India 1974 – International Women's Decade – International Women's Year – National Policy for Empowerment of Women 2001

UNIT V WOMEN'S MOVEMENTS AND SAFEGUARDING MECHANISM:

In India National /State Commission for Women(NCW) – All Women Police Station – Family Court Legislations safeguarding women –Transgender Policy—Constitutional amendments for women's political participation.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

Tamil Nadu State Policy for Women 2021- National Policy for Women 2015 – Prevention of Sexual Harassment at Work places Act 2013- Protection of Children from Sexual Offences Act, 2012 - Analysis of regressive and progressive High court and Supreme Court judgments-women proactive policies, programmes, interventions.

REFERENCES

1. Bhasin Kamala, Understanding Gender : Gender Basics , New Delhi : Women Unlimited ,2004
2. Bhasin Kamala, Exploring Masculinity: Gender Basics , New Delhi: Women Unlimited,2004
3. BhasinKamala , What is Patriarchy? : Gender Basics, New Delhi :Women Unlimited ,1993
4. PernauMargrit, Ahmad Imtiaz, ReifeldHermut (ed.,)Family and Gender : Changing Values in Germany and India ,New Delhi :Sage Publications,2003
5. AgarwalBina, Humphries Jane and Robeyns Ingrid(ed.,) Capabilities , Freedom , and Equality: AmartyaSen's Work from a Gender Perspective,New Delhi : Oxford University Press ,2006
6. Rajadurai. S.V,Geetha.V,Themes in Caste Gender and Religion, Tiruchirappalli :
7. Bharathidasan University ,2007
8. MisraGeetanjali, ChandiramaniRadhika (ed.,) Sexuality , Gender and Rights: Exploring Theory and Practice in South and Southeast Asia, New Delhi : Sage Publication ,2005
9. RaoAnupama (ed.,) Gender &Caste : Issues in Contemporary Indian Feminism, New Delhi : Kali for Women, 2003
10. SahaChandana , Gender Equity and Gender Equality : Study of Girl Child in Rajasthan , Jaipur: Rawat Publication ,2003.
11. Krishna Sumi, (ed.,),Livelihood and Gender : Equity in Community Resource Management, New Delhi : Sage Publication ,2004
12. Pludi.A Michele(ed.,) praeger Guide to the Psychology of Gender ,London : Praeger Publisher ,2004
13. Wharton .S Amy , The Sociology of Gender : An Introduction to Theory and Research , USA : Blackwell Publishing ,2005
14. MohantyManoranjan(ed.,) Class ,Caste ,Gender : Readings in Indian Government and Politics – 5,New Delhi : Sage Publications ,2004.
15. AryaSadhna Women ,Gender Equality and the State ,New Delhi :Deep &Deep Publication, 2000
16. Mishra .O.P,Law Relating to Women &Child ,Allahabad :Central Law Agency ,2001
17. Chari Leelavathi ,Know Your Rights ,Madras; Tamilnadu Social Welfare Board,1987
18. Bhattacharya Malini , Sexual Violence and Law ,Kolkata; West Bengala Commission for Women ,2002
19. Sexual Harassment at the Workplace – A Guide , New Delhi ;Sakshi,1999

ENTREPRENEURIAL DEVELOPMENT AND BUSINESS PLAN

Semester – VI	L	T	P	C
22KHSC602	4	0	0	4

OBJECTIVES

- To provide a basic frame-work to start a small / medium scale business / Industrial Unit.
- Preparation of Project profile / Report on a line of manufacture / business / service unit of actual interest to the participant – bankable project report taking into account technical feasibility, financial viability, requirements of financial institutions / commercial banks etc.,

OUTCOME

This subject will provide a space and platform for discovery, both self-discovery and opportunity discovery. Students will discover their strengths in terms of an entrepreneurial skill founding team and learn basics such as opportunity discovery, prototyping, competition analysis, and early customer insights and participate in on-line and campus activities and events such as idea competitions, business plan challenges, etc.

UNIT-I:

Introduction to Entrepreneurship Meaning and concept of entrepreneurship, the history of entrepreneurship development, role of entrepreneurship in economic development, Myths about entrepreneurs, agencies in entrepreneurship management and future of entrepreneurship types of entrepreneurs.

UNIT-II:

The Entrepreneur Why to become entrepreneur, the skills/ traits required to be an entrepreneur, Creative and Design Thinking, the entrepreneurial decision process, skill gap analysis, and role models, mentors and support system, entrepreneurial success stories.

UNIT-III:

E-Cell Meaning and concept of E-cells, advantages to join E-cell, significance of E-cell, various activities conducted by E-cell

UNIT-IV:

Communication Importance of communication, barriers and gateways to communication, listening to people, the power of talk, personal selling, risk taking & resilience, negotiation.

UNIT-V:

Introduction to various form of business organization (sole proprietorship, partnership, corporations, Limited Liability company), mission, vision and strategy formulation.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1) For Unit I and III Entrepreneurship ByRajee Roy Oxford University press – Chennai. Email : v.anand@oup.com

2) For Unit II, IV, V Entrepreneurship Text and cases By P. Narayana Reddy – cengage learning. Email : sriram.b@cengage.com

3) For preparation of Project Report and Filling in Unit V Management and Entrepreneurship ByKanishkaBedi Oxford University press.

RENEWABLE ENERGY SOURCES

Semester – VI	L	T	P	C
22KBVT601	4	0	0	4

OBJECTIVES

The student will

- Know the statistics on Conventional Energy Sources and Supply.
- Learn the concepts of solar energy, wind energy
- Learn the concepts of energy management and Audit.

LEARNING OUTCOME

The student will be able to understand the

- Power production using various renewable energy sources.

UNIT-I–ENERGY SOURCES:

Introduction, Importance of Energy Consumption as Measure of Prosperity, Per Capita Energy Consumption, Classification of Energy Resources; Conventional Energy Resources - Availability and their limitations; Non-Conventional Energy Resources – Classification, Advantages, Limitations; Comparison of Conventional and Non-Conventional Energy Resources; Indian Energy Scenario

UNIT-II - SOLAR ENERGY:

Definition, Energy available from Sun, Solar radiation data, solar energy conversion into heat, Flat plate and Concentrating collectors, Principle of natural and forced convection, Solar Engines: Stirling, Brayton engines, Photo voltaic: p-n junctions. Solar cells, PV systems, Standalone, Calculation of energy through photovoltaic power generation.

UNIT-III SOLAR RATE:

Solar central receiver system Cost of electric Energy- Fixed and operating costs-Energy rates-Types tariffs.

UNIT-IV – WIND ENERGY:

Energy available from wind, General formula, Lift and drag. Basis of Wind energy conversion, Effect of density, Frequency variances, Angle of attack, Wind speed, Windmill rotors, Horizontal axis and Vertical axis rotors, Determination of torque coefficient, Induction type generators, Working principle of wind power plant.

UNIT-V - ENERGY MANAGEMENT & AUDIT:
Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit instruments

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Ashok Desai V, 1990 Non-Conventional Energy, Wiley Eastern Ltd. New Delhi
2. Mittal K.M, 1997 Non-Conventional Energy Systems, Wheeler Publishing Co. Ltd. Delhi.
3.Ramesh R, Kurnar K.U,1997 Renewable Energy Technologies, Narosa Publishing House, New Delhi.
4. Boyle, Godfrey. 2004. Renewable Energy (2nd edition). Oxford University Press, New Delhi.
5. Boyle, Godfrey, Bob Everett, and Janet Ramage (eds.) 2004. Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press, New Delhi

PROJECTWORK

Semester – VI	L	T	P	C
22KBVT602	0	0	12	12

- Each Student has to do a separate project in his/her field of study
- Each Student has to prepare a mini project report containing his/her project work details
- Each student has to present his/her project to the panel of subject expert for assessment

OBJECTIVES:

1. To develop the ability to solve a specific problem right from its identification till the successful solution of the same.
2. To prepare the students in making project reports and to face viva voce examination.

LEARNING OUTCOMES:

- ✓ On Completion of the project work students will be able to match themselves to the industrial demands.

ELECTIVE – I
POWER PLANT ENGINEERING

Semester – V	L	T	P	C
22KBVTE11	4	0	0	4

OBJECTIVE

To provide an overview of the different power plants, their operation and maintenance.

LEARNING OUTCOME

- ✓ The Students can able to understand different types of power plant, and its functions and their flow lines and issues related to them.
- ✓ Analyze and solve energy and economic related issues in power sectors.

UNIT - I - POWER PLANTS AND BOILERS:

Introduction to Power Plants and Boilers - Layout of Steam , Hydel , Diesel , MHD, Nuclear and Gas turbine Power Plants Combined Power cycles – comparison and selection , Load duration Curves Steam boilers and cycles – High pressure and Super Critical Boilers – Fluidized Bed Boilers

UNIT - II - STEAM POWER PLANT:

Steam Power Plant - Fuel and ash handling, Combustion Equipment for burning coal, Mechanical Stokers. Pulveriser, Electrostatic Precipitator, Draught- Different Types, Surface condenser types, cooling Towers.

UNIT - III -NUCLEAR AND HYDEL POWER PLANTS:

Nuclear and Hydel Power Plants - Nuclear Energy-Fission, Fusion Reaction, Types of Reactors, Pressurized water reactor, Boiling water reactor, Waste disposal and safety Hydel Power plant- Essential elements, Selection of turbines, governing of Turbines- Microhydel developments- Pumped storage.

UNIT - IV - DIESEL AND GAS TURBINE POWER PLANT:

Diesel and Gas Turbine Power Plant - Types of diesel plants, components , Selection of Engine type, applications-Gas turbine power plant- Fuels- Gas turbine material – open and closed cycles- reheating – Regeneration and intercooling – combines cycle

UNIT - V - ENERGY MANAGEMENT & AUDIT:

Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit instruments

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES
1.Arora S.C and Domkundwar S, 2001 "A Course in Power Plant Engineering", New Delhi.
2.Nag P.K , 2007 "Power Plant Engineering". Third edition Tata McGraw- Hill, New Delhi.
3.EI-WakilM.M ,Power 1984 "Plant Technology," Tata McGraw-Hill, New Delhi.
4.K.K.Ramalingam , 2002 " Power Plant Engineering ", Scitech Publications, Chennai.

ELECTIVE – I
PRINCIPLES OF MANAGEMENT

Semester – V	L	T	P	C
22KBVTE12	4	0	0	4

OBJECTIVE
Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling. Students will also gain basic knowledge on international aspect of management.

LEARNING OUTCOMES
- Describe and discuss the evolution of management thinking.
- Practice the process of management's four functions: planning, organizing, leading, and controlling.
- Complete self-assessments for developing managerial skills.
- Gather and analyze both qualitative and quantitative information to isolate issues and formulate best control methods.

UNIT I OVERVIEW TO MANAGEMENT:
Definition - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors – Trends and Challenges of Management in Global Scenario.

UNIT II PLANNING :
Nature and purpose of planning - Planning process - Types of plans – Objectives - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making

UNIT III ORGANISING:
Nature and purpose of organizing - Organization structure - Formal and informal groups organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - Performance Appraisal.

UNIT IV DIRECTING:
Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.

UNIT V CONTROLLING:
Process of controlling - Types of control - Budgetary and non-budgetary control Q techniques - Managing Productivity - Cost Control - Purchase Control – Maintenance Control - Quality Control - Planning operations.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES:
1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.
2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.
3.Hellriegel, Slocum & Jackson, ' Management - A Competency Based Approach', Thomson South Western, 10th edition, 2007.

ELECTIVE – I
CONTROL OF ELECTRICAL MACHINES

Semester – V	L	T	P	C
22KBVTE13	4	0	0	4

OBJECTIVES:

- Electrical control circuit elements including various types of industrial switches, relays, timers, solenoids, contactors and interlocking arrangement. AC motor control circuits for acceleration control, speed control, direction control, braking control and jogging using contactors. Different control circuits for industrial applications.

OUTCOME
The student will be familiarized with the
- Operations of relay, timers, solenoids, contactors and interlocking arrangement
- Operation of PLC

UNIT – I- CONTROL CIRCUIT COMPONENTS:
Switches – Push button, selector, drum, limit, pressure, temperature (Thermostat), float, zero speed and proximity switches. Relays – Voltage relay, DC series current relay, frequency response relay, latching relay and phase failure relay (single phasing preventer). Over current relay – Bimetallic thermal over load relay and Magnetic dash pot oil filled relay. Timer – Thermal Pneumatic and Electronic timer. Solenoid Valve, Solenoid type contactor (Air break contactor), Solid state relay, Simple ON-OFF motor control circuit, Remote control operation and interlocking of drives.

UNIT – II- AC MOTOR CONTROL CIRCUITS:
Motor current at start and during acceleration – No load speed and final speed of motor – DOL starter – Automatic auto transformer starter (open circuit and closed circuit transition) – Star/Delta starter (semi-automatic and automatic) – Starter for two speed two winding motor – Reversing the direction of rotation of induction motor – Dynamic

Braking – Three step rotor resistance starter for wound induction motor – Secondary frequency acceleration starter.

UNIT-III- INDUSTRIAL CONTROL CIRCUITS:

Planner machine control – Skip hoist control – Automatic control of a water pump – Control of electric oven – Control of air compressor – Control of overhead crane – control of conveyor system – Control of elevator – Trouble spots in control circuits – General procedure for trouble shooting.

UNIT-IV- PROGRAMMABLE LOGIC CONTROLLER:

Automation – Types of automation (manufacturing and non- manufacturing) – advantages of automation –PLC Introduction – Block diagram of PLC – principle of operation – modes of operation – PLC scan – memory organization – input module (schematic and wiring diagram) – output module (schematic and wiring diagram) – Types of Programming Devices – Comparison between hardwire control system and PLC System – PLC Types (Fixed and Modular) – Input Types – Output Types – Criteria for selection of suitable PLC – List of various PLCs available.

UNIT- V- PLC PROGRAMMING:

Different programming languages – ladder diagram – Relay type instruction – Timer instruction – ON delay and OFF delay Timer – Retentive Timer Instruction – Cascading Timers – Counter Instruction – UP Counter – Down Counter – UP/DOWN Counter - ladder logic diagram for DOL Starter, Automatic STAR-DELTA Starter –rotor resistance starter and EB to Generator changeover system.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. S.K. Bhattacharya Control of Electrical Machines. New Age International Publishers, New Delhi
2. Pradeep Kumar Srivastava. Explosing Programmable Logic controllers with Application BPB Publications
3. Stephen Herman Industrial motor control. 6th Edition, Cengage Learning.

ELECTIVE – I
TELEVISION ENGINEERING

Semester – V	L	T	P	C
22KBVTE14	4	0	0	4

OBJECTIVES:

- To study about the scanning and various types of camera tubes
- To understand the principles of monochrome and colour TV transmitter and receiver systems.
- To learn various colour television standards.
- To gain knowledge on recent television systems

OUTCOME

The student will be familiarized with the

- Scanning Process and various camera tubes, TV standards and the latest technology.

UNIT 1-TELEVISION FUNDAMENTALS:

Monochrome TV: Basic block diagram of Monochrome TV transmitter and Receiver – Scanning process – horizontal, vertical and sequential scanning – flicker – interlaced scanning (qualitative treatment only) – need for synchronization – blanking pulses – Aspect ratio– Resolution – Types – vertical and horizontal resolution –video bandwidth – composite video signal (CVS)– CVS for one horizontal line – Definitions for Vertical sync pulse, Serrated vertical pulse, Equalizing pulse – Positive & Negative modulation - TV Standards – List of Types of TV standards. Color T.V. Fundamentals: Additive mixing of colors –Types – color perception – Chromaticity diagram – Definition for Luminance, Hue Saturation and Chrominance Formation of chrominance signal in PAL system with weighting factors.

UNIT 2-CAMERA AND PICTURE TUBES:

CAMERA TUBE: Characteristics – Types of camera tube – working principle of Vidicon and Plumbicon camera tube, CCD camera – Video processing of camera pick up signal – Block diagram and Principle of working of color TV camera tube.

PICTURE TUBE : Construction and working of Monochrome picture tube – screen phosphor – screen burn – Screen Persistence - Aluminized screen – Types of color picture tubes - construction and working principle of Delta gun and Trinitron Color picture tubes – Automatic degaussing

UNIT 3-TELEVISION TRANSMITTER:

Types –Comparison - Principle – Block diagram of Low level IF Modulated TV transmitter – Visual Exciter – Aural Exciter – principle of working of CIN Diplexer –Block diagram of color TV transmitter – color compatibility – PAL color coder –functional blocks and working of each block – Merits and demerits of PAL system.

UNIT 4- TELEVISION RECEIVER:

Block diagram of Monochrome Receiver – functions of each block – Need for AGC – Advantages of AGC – Video amplifier requirements –High frequency & Low frequency compensation – Block diagram of PAL color Receiver – Need for sync separator – Basic sync separator circuits– Vertical sync separation & Horizontal sync separation – AFC – Need for AFC – Horizontal AFC – Hunting in AFC – Anti Hunt network.

UNIT 5-ADVANCED TELEVISION SYSTEMS:

Block diagram of a digital color TV receiver – Remote control IR transmitter and receiver – Closed Circuit TV system–Applications of CCTV – scrambler – necessity - basic principle-types Descrambler block diagram - Telecine equipment – Digital CCD Telecine system - Introduction to High definition TV (HDTV) and 3DTV. Blue Ray Disc(BD)- The DVD player – Block diagram- Desirable Features & outputs of DVD players-DVD player Models - USB flash drive(pen drive).

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Modern Television Practice – Transmission, Reception, Applications R.R.Gulati New ageinternational 5th Edition 2015
2. TV and Video Engg. By A.M.Dhake – Second Edition TMH -2003
3. Monochrome & Color TV by R.R.Gulati - New Age publishers -2003.
4. Color TV, Theory and practice – by S.P.Bali-TMH – 1994.
5. Modern VCD-Video CD Player Introduction, servicing and troubleshooting By Manohar Lotia &Pradeep Nair BPB Publications 2002.

ELECTIVE – II

ELECTRICAL PRINCIPLES IN GROUND WATER INVESTIGATION

Semester – V	L	T	P	C
22KBVTE21	4	0	0	4

OBJECTIVE

The subject with the ground water investigation methods using the principles of electricity and electromagnetic

LEARNING OUTCOME

The student will have the knowledge on methods of ground water investigation.

UNIT – I ELECTRICAL PROPERTIES OF ROCKS:

Electrical properties of rocks - Mechanism of electrical conduction in materials - Representative resistivity values - Conductivity mechanism

UNIT – II FUNDAMENTALS OF CURRENT FLOW:

Fundamentals of the current flow in the earth -Potential distribution in a Homogeneous Medium - Apparent and true resistivity - Potential and current distribution across boundary

UNIT – III D.C. RESISTIVITY METHOD:

Electrode configurations - Electric sounding & Electric profiling field procedures - Applications & Ambiguities Qualitative & Quantitative Interpretation - Mise – A- la- Masse Method

UNIT – IV ELECTROMAGNETIC METHODS- I:

Classification of electromagnetic systems - Principles of electromagnetic - Magneto telluric Methods - Vertical loop (VLEM) - Slingram& Turam Systems

UNIT – V ELECTROMAGNETIC METHODS- II:

Very Low Frequency (VLF) - Audio Frequency Magnetics (AFMAG)-Time-Domain systems (TDEM) - Airborne Method - Ground Penetrating Radar

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Robinson & Coruh (1988) . Basic Exploration Geophysics. John Wiley & Sons
2. Lowrie, W. (1997). Fundamentals of Geophysics. Cambridge University Press.

ELECTIVE – II

BUSINESS ETHICS AND BUSINESS ENVIRONMENT

Semester – V	L	T	P	C
22KBVTE22	4	0	0	4

Objectives

- To provide the contemporary issues in the Business Environment and to facilitate a better-informed Economic System

Learning Outcomes

The expected outcome after learning this course is that the student will be able to:

- Understand the various environment, culture and society.
- To know the differences between the business and Government.
- Contextualize the concepts of public sector in India.

UNIT - I BUSINESS SOCIETY AND RESPONSIBILITY:

Business and society - Social responsibility - Environmental Pollution and control.Business and culture - Business and Government - Political system and its influence on business - Business Ethics – Population – Demographic pattern changes – Standard of living – Urbanization –Migration.

UNIT – II ORGANIZATIONAL ETHICS AND THEORIES:

Managing Ethics - Frame work of organizational ethic theories and sources, ethics across cultures, factors influencing business ethics, ethical decision making, ethical values and stakeholders, ethics and profit, Corporate governance Structure of boards, reforms in boards, compensation issues, ethical leadership for improved Corporate governance and better business education.

UNIT III ABOUT BUSINESS ENVIRONMENT:

Business Environment: Meaning – Various environments affecting business – Social Economic; Political and Legal; Culture; Competitive Demographic; Technological and International environments.

UNIT IV BUSINESS CULTURE:

Business and culture: Culture – Elements of culture – Impact of foreign culture – Traditional values and its impact – Change and resistance to change – Caste and communities – Linguistic and Religious groups – Joint Family system.

UNIT V ABOUT SHAREHOLDERS:

Business and Society: Social responsibilities of Business – Responsibilities to shareholders; Responsibility to employees; Responsibility to customer; Responsibility to the community; Responsibility to the Government –Business and Government: State Regulations of business Industrial Licensing policy – Technology – Indigenous Technology – Import of Technology – Import of Technological changes of business.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Francis Cherunilum, 2003, Business Environment, Himalaya Publishing House, New Delhi.
2. Aswathappa K.,2004 "Essentials of Business Environment", Himalya Publishing House, New Delhi

ELECTIVE – III

TRANSMISSION AND DISTRIBUTION

Semester – VI	L	T	P	C
22KBVTE31	4	0	0	4

OBJECTIVES:

- To study the structure of electric power system and to develop expressions for the computation of transmission line parameters.
- To obtain the equivalent circuits for the transmission lines based on distance and to determine voltage regulation and efficiency.
- To understand the mechanical design of transmission lines and to analyse the voltage distribution in insulator strings to improve the efficiency.
- To study the types, construction of cables and methods to improve the efficiency.

.**OUTCOME**

The student will gain knowledge on

- The transmission and distribution of Power
- The mechanical design of the electrical post
- Cables and UG cables
- Insulators

UNIT-I- A.C. TRANSMISSION:

Introduction-Typical Layout of A.C. Power supply scheme various system of power Transmission-Advantages and Disadvantages of A.C Transmission- High Transmission Voltage- Advantages- Elements of a Transmission Line- Economic choice of conductor size-Kelvin's Law- Its limitation-over Head Line-Conductor materials and their properties-Line supports-its properties-Types of supports and their applications-spacing between conductors-length of span-Sag in overhead lines -When the supports are at equal and unequal levels-Effect of wind and ice loading over the line conductor- constants of a Transmission line-Transposition of Transmission lines-Skin Effect- Ferranti Effect-Corona formation and corona loss-Factors affecting corona-Advantages and Disadvantages.

UNIT-II-H.V.D.C TRANSMISSION:

Advantages and Disadvantages of D.C Transmission- Layout Scheme and principle of High Voltage D.C Transmission-D.C link configurations (monopolar, Bipolar and Homopolar)-HVDC convertor Station.

UNIT-III- LINE INSULATORS:

Introduction - Line Insulator materials-Properties of Insulators- Types & causes of failure of Insulators-Testing of Insulators-Potential Distribution over suspension Insulator string-String Efficiency - Methods of improving string efficiency.

UNIT-IV- UNDERGROUND CABLES:

Introduction-Advantages and requirement of cables-construction- of a three core cable-Insulating materials for cables- properties of Insulating materials used in cables-classification of cables- cables for three phase service-construction of Belted cable, screened cable, Pressure cables-Laying of underground cables-Direct laying, Drawing system, Advantages and Disadvantages-Grading of cables- capacitance grading, Inter sheath grading -cable faults-O.C, S.C and Earth faults

UNIT-V- DISTRIBUTION:

Layout 110/11KV Substation and 11KV/400V Distribution Substation-substation equipment's-Bus bar- Types of bus bar arrangement -Advantages and Disadvantages. Classification of Distribution Systems- Connection schemes of Distribution system- Systems of A.C. Distribution.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Fifth Edition,2008.
2. Luces M.Fualken berry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 2007.
3. Arun Ingole, "power transmission and distribution" Pearson Education, 2017
4. J.Brian, Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes; Fourth Edition, 2012.
5. G.Ramamurthy, "Handbook of Electrical power Distribution," Universities Press, 2013.

ELECTIVE – III

POWER MANAGEMENT

Semester – VI	L	T	P	C
22KBVTE32	4	0	0	4

OBJECTIVE

The importance of energy conservation in electrical energy and its management for the better utilization of resources.

OUTCOME

This subject will make the student to

(i) Understand and analyze the plant energy data
(ii) Energy audit and suggest methodologies for energy savings
(iii)Energy accounting and balance
(iv) Able to utilize the available resources in optimal way

UNIT I IMPORTANCE OF ENERGY CONSERVATION AND MANAGEMENT:

World, national Energy consumption – environmental aspects – Energy prices, policies – Energy auditing: methodology, analysis, energy accounting – Measurements – Thermal and Electrical.

UNIT II ELECTRICAL SYSTEMS:

AC / DC current systems, Demand control, power factor correction, load management, Motor drives : motor efficiency testing, energy efficient motors, motor speed control – Lighting : lighting levels, efficient options, day lighting, timers, Energy efficient windows – electrical distribution systems – Transformers – Power quality – harmonic distortion.

UNIT III ENERGY CONSERVATION:

Energy conservation in Pumps, Fans (flow control) and blowers, Compressed Air Systems, Refrigeration and air conditioning systems – Waste heat recovery recuperators, heat sheets, heat pipes, heat pumps.

UNIT IV PROCUREMENT MANAGEMENT:

Statutory requirements, trained manpower as per Indian Electricity Rules, Apprising of Act, Factories Act, Contract Labour Act, Environmental regulations etc.,

Working capital Management, Cost Management Strategies, Human Resources Management, Management Information system

UNIT V ENERGY MANAGEMENT, ECONOMICS:

Energy resource management – Energy Management information systems – Computerized energy management – Energy economics – discount rate, payback period, internal rate of Return, life cycle costing – Financing energy conservation Projects.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES :

1. L.C. Witte, P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilisation" Hemisphere Publ, Washington, 1988.
2. O. Callaghn, P.W. "Design and Management for Energy Conservation", Pergamon Press, Oxford, 1981.
3. I.G.C. Dryden, "The Efficient Use of Energy" Butterworths, London, 1982
4. W.C. turner, "Energy Management Hand book" Wiley, New York, 1982.

ELECTIVE – III

MODERN POWER CONVERTERS

Semester – VI	L	T	P	C
22KBVTE33	4	0	0	4

OBJECTIVES:

- Switched mode power supplies
- Matrix Converter
- Soft switched converters

OUTCOMES:

- Ability to suggest converters for AC-DC conversion and SMPS

UNIT I - SWITCHED MODE POWER SUPPLIES (SMPS) :

DC Power supplies and Classification; Switched mode dc power supplies - with and without isolation, single and multiple outputs; Closed loop control and regulation; Design examples on converter and closed loop performance.

UNIT II -AC-DC CONVERTERS :

Switched mode AC-DC converters. synchronous rectification - single and three phase topologies - switching techniques - high input power factor . reduced input current harmonic distortion. improved efficiency. with and without input-output isolation. performance indices design examples.

UNIT III - DC-AC CONVERTERS :

Multi-level Inversion - concept, classification of multilevel inverters, Principle of operation, main features and analysis of Diode clamped, Flying capacitor and cascaded multilevel inverters; Modulation schemes.

UNIT IV -AC-AC CONVERTERS WITH AND WITHOUT DC LINK :

Matrix converters. Basic topology of matrix converter; Commutation – current path; Modulation techniques - scalar modulation, indirect modulation; Matrix converter as only AC-DC converter; AC-AC converter with DC link - topologies and operation - with and without resonance link - converter with dc link converter; Performance comparison with matrix converter with DC link converters.

UNIT V - SOFT-SWITCHING POWER CONVERTERS:

Soft switching techniques. ZVS, ZCS, quasi resonance operation; Performance comparison hard switched and soft switched converters.AC-DC converter, DC-DC converter, DC-AC converter. Resonant DC power supplies.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Power Electronics Handbook, M.H.Rashid, Academic press, New york, 2000.
2. Advanced DC/DC Converters, Fang Lin Luo and Fang Lin Luo, CRC Press, NewYork, 2004.
3. Control in Power Electronics- Selected Problem, Marian P.Kazmierkowski, R.Krishnan and Frede Blaabjerg, Academic Press (Elsevier Science), 2002.
4. Power Electronic Circuits, Issa Batarseh, John Wiley and Sons, Inc.2004
5. Power Electronics for Modern Wind Turbines, Frede Blaabjerg and Zhe Chen, Morgan & Claypool Publishers series, United States of America, 2006.
6. Krein Philip T, Elements of Power Electronics,Oxford University press, 2008

ELECTIVE – III

ELECTRICAL MACHINE DESGIN

Semester – VI	L	T	P	C
22KBVTE33	4	0	0	4

OBJECTIVES:

- Static and Rotating Electrical Machine specifications, materials, losses and effects of
- temperature rise.
- Magnetic force, magnetic force gap, teeth and leakage flux in static and rotating
- electrical machines.
- Designing of single phase, three phase transformer, core and coil.
- Designing of dc machines.
- Designing of 3phase induction motor and 3phase synchronous machines

UNIT-I- BASIC CONSIDERATION:

Design definition – Design consideration – limitation – constructional elements of Transformers and rotating machines – constructional materials of electrical machines – conducting magnetic and insulating materials standard specification – general design process – main dimensions of rotating machines – electrical and magnetic losses – temperature – rise – class of duty – limits of temperature rise.

UNIT-II- MAGNETIC CIRCUIT CALCULATIONS:

Magnetic circuits of DC machines, round rotation AC machines, salient poles AC machines and Transformer – Specific magnetic and electrical loading – Factor influencing the specific

and magnetic loading – Magnetic leakages – magnetizing curves – calculation of magnetizing force for the air gap of rotating machines and for teeth – leakage flux – leakage reactance – armature slot leakage reactance

UNIT- III- DESIGN OF TRANSFORMER:

Important considerations – core and shell types – distribution transformers and power transformers – core section – clearance – yoke section – main dimension – single phase core type transformers – three phase core type transformer – output coefficient - voltage per turn – specific magnetic and electric loading of transformer – Winding design – cross over, helix, disc helix

UNIT- IV - DESIGN OF DC MACHINES:

Important design consideration – number of poles – advantages of large number of poles - air gap – armature slot – current density – field system – commutator – design of large dc motor. Specific magnetic and electric loading of dc machines.

UNIT-V- DESIGN OF AC MACHINES:

AC machine design consideration – power equation – separation of diameter and length – problems. Three phase induction motor – important design consideration – standard frames and stampings – gap length – flux density – current density – power factor – efficiency – slot combination – winding - design of 3 phase induction motors. Three phase synchronous machines – important design consideration – radial gap length – stator slot – stator coil – rotor construction – design of 3 phase synchronous machines.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

OUTCOME

The student will acquire the knowledge of designing motor, generator, transformer and alternator

REFERENCES:

1. Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai& Sons, New Delhi, Fifth Edition, 1984.
2. M V Deshpande 'Design and Testing of Electrical Machines' PHI learning Pvt Lt,2011.
3. Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, Second Edition, 2009.

ELECTIVE – IV

SPECIAL ELECTRICAL MACHINES

Semester – VI	L	T	P	C
22BVTE41	4	0	0	4

OBJECTIVES:

- Construction, principle of operation, control and performance of stepping motors.
- Construction, principle of operation, control and performance of switched reluctance motors.
- Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors.
- Construction, principle of operation and performance of permanent magnet synchronous motors.
- Construction, principle of operation and performance of other special Machines.

OUTCOMES:

- Ability to analyse and design controllers for special Electrical Machines.
- Ability to acquire the knowledge on construction and operation of stepper motor.
- Ability to acquire the knowledge on construction and operation of stepper switched reluctance motors.
- Ability to construction, principle of operation, switched reluctance motors.
- Ability to acquire the knowledge on construction and operation of permanent magnet brushless D.C. motors.
- Ability to acquire the knowledge on construction and operation of permanent magnet synchronous motors.
- Ability to select a special Machine for a particular application.

UNIT I - STEPPER MOTORS:

Constructional features –Principle of operation –Types – Torque predictions – Linear Analysis – Characteristics – Drive circuits – Closed loop control – Concept of lead angle - Applications.

UNIT II- SWITCHED RELUCTANCE MOTORS (SRM) :

Constructional features –Principle of operation- Torque prediction–Characteristics Steady state performance prediction – Analytical Method – Power controllers – Control of SRM drive- Sensor less operation of SRM – Applications

.

UNIT III- PERMANENT MAGNET BRUSHLESS D.C. MOTORS:

Fundamentals of Permanent Magnets- Types- Principle of operation- Magnetic circuit analysis- EMF and Torque equations- Power Converter Circuits and their controllers - Characteristics and control- Applications.

UNIT IV - PERMANENT MAGNET SYNCHRONOUS MOTORS (PMSM) :

Constructional features -Principle of operation – EMF and Torque equations - Sine wave motor with practical windings - Phasor diagram - Power controllers – performance characteristics -Digital controllers – Applications.

UNIT V - OTHER SPECIAL MACHINES:

Constructional features – Principle of operation and Characteristics of Hysteresis motor Synchronous Reluctance Motor–Linear Induction motor-Repulsion motor- Applications.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

TEXT BOOKS:

1. K.Venkataratnam, 'Special Electrical Machines', Universities Press (India) Private Limited, 2008.
2. T. Kenjo, 'Stepping Motors and Their Microprocessor Controls', Clarendon Press London, 1984
3. E.G. Janardanan, 'Special electrical machines', PHI learning Private Limited, Delhi, 2014.

REFERENCES

1. R.Krishnan, 'Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application', CRC Press, New York, 2001.
2. T. Kenjo and S. Nagamori, 'Permanent Magnet and Brushless DC Motors', Clarendon Press, London, 1988.
3. T.J.E.Miller,'Brushless Permanent-Magnet and Reluctance Motor Drives', Oxford University Press, 1989.
4. R.Srinivasan, 'Special Electrical Machines', Lakshmi Publications, 2013.

ELECTIVE – IV

PROTECTION AND SWITCHGEAR

Semester – VI	L	T	P	C
22BVTE42	4	0	0	4

OBJECTIVES:

Causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system. Characteristics and functions of relays and protection schemes. Apparatus protection, static and numerical relays. Functioning of circuit breaker.

OUTCOME

The student will acquire the knowledge on the working of switching surges, dielectric heating and function of circuit breakers and relays.

UNIT I - ELECTRIC HEATING:

Electric Heating:

Introduction -Advantages of Electric heating-modes of heat transfer- classification of Electric Heating - Power frequency electric heating- Direct and Indirect resistance heating-Infrared heating-Arc heating –High frequency Electric heating- Induction heating-Induction Stove – Eddy current heating and Dielectric heating.

Electric furnaces:

Resistance furnace-Requirements of Heating elements-commonly used heating element materials-Resistance furnace for special purposes-Temperature control of resistance furnace-Arc furnace -Direct and Indirect Arc furnace- Temperature control of Arc furnace-Reasons for employing low voltage and high current supply - Induction furnace-Direct and Indirect

core type Induction furnace- coreless Induction furnace-Power supply for coreless Induction furnace

UNIT II - ELECTRIC WELDING:

Introduction-Types of Electric welding-Requirements of good weld- Preparation of work - Resistance welding- Butt welding, Spot welding, Seam welding, Projection welding and Flash welding-Arc welding-Carbon Arc welding, metal Arc welding, Atomic hydrogen Arc welding, Inert gas metal arc welding- Comparison between Resistance and Arc welding. Radiation welding – Ultrasonic welding, Electron beam welding, and LASER beam welding-Electric welding equipment (A.C. and D.C).

UNIT-III- PROTECTIVE RELAYS:

Basic principled-Fundamental requirements of protective relaying- Primary and back up Protection-relay characteristics-relay timing - Instantaneous relay -Inverse time relay and Definite time lag relay- Inverse definite minimum time relay classification of relays-Construction, Principle of operation and applications of Induction type over current relay Directional and Non directional), Distance relay, Differential relay, Negative sequence relay, Induction type reverse power relay, Earth leakage relay. Static relays- Basic elements of static relay.

UNIT-IV- CIRCUIT BREAKERS:

Basic principle of circuit Breaker -Arc Phenomenon- methods of Arc extinction-Arc voltage - Restriking voltage and recovery voltage-Rate of rise of restriking voltage-current chopping-Interruption of capacitive current -resistance switching-C.B ratings – Breaking capacity, making capacity, short time rating - Auto reclosing in circuit Breakers - Classification of Circuit Breakers – Construction and Working principle of Oil Circuit Breaker, Air blast Circuit Breaker, E.L.C.B, Miniature circuit breaker (M.C.B) , Residual current circuit breaker , SF6 and vacuum Circuit Breaker D.C breaking -Problems of D.C breaking-Schematic for HVDC CB producing current zero. Fuses-Desirable characteristics-Fuse Element materials-current rating of fuse elements-fusing current-Cut off current-L.V fuses-Rewirable fuse, HRC cartridge fuse, HRC fuse with tripping device - H.V. fuses & cartridge type, liquid type and metal clad-fuses-Comparison of fuse and circuit breaker.

UNIT-V- OVER VOLTAGE PROTECTION:

Voltage surge- causes of over voltage-Lightning-Types of lightning strokes -Direct stroke, indirect stroke-Harmful Effects of lightning - Protection against lightning- Earthing screen, overhead ground Wires, Lightning arresters- Expulsion type, Gapless arrester.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. BadriRam ,B.H. Vishwakarma, ‘Power System Protection and Switchgear’, New Age InternationalPvt Ltd Publishers, Second Edition 2011.
2. Y.G.Paithankar and S.R.Bhide, ‘Fundamentals of power system protection’, Second Edition,Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
3. C.L.Wadhwa, ‘Electrical Power Systems’, 6th Edition, New Age International (P) Ltd., 2010

4. RavindraP.Singh, 'Switchgear and Power System Protection', PHI Learning Private Ltd., NewDelhi, 2009.
5. VK Metha," Principles of Power Systems" S. Chand, 2005.
6. Bhavesh Bhalja, R.P. Maheshwari, Nilesh G. Chotani,'Protection and Switchgear' Oxford University Press, 2011

ELECTIVE – IV

SMPS AND UPS

Semester – VI	L	T	P	C
22KBVTE43	4	0	0	4

OBJECTIVES:

- Modern power electronic converters and its applications in electric power utility.
- Resonant converters and UPS

OUTCOMES:

- Ability to analyze the state space model for DC – DC converters
- Ability to acquire knowledge on switched mode power converters.
- Ability to understand the importance of Resonant Converters.
- Ability to analyze the PWM techniques for DC-AC converters
- Ability to acquire knowledge on modern power electronic converters and its applications in electric power utility.
- Ability to acquire knowledge on filters and UPS

UNIT- I -DC-DC CONVERTERS :
Principles of step down and step up converters – Analysis and state space modelling of Buck, Boost, Buck- Boost and Cuk converters.

UNIT- II- SWITCHED MODE POWER CONVERTERS:
Analysis and state space modelling of fly back, Forward, Push pull, Luo, Half bridge and full bridge converters- control circuits and PWM techniques.

UNIT -III- RESONANT CONVERTERS:
Introduction- classification- basic concepts- Resonant switch- Load Resonant converters ZVS , Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Series and parallel Resonant inverters- Voltage control.

UNIT- IV- DC-AC CONVERTERS:
Single phase and three phase inverters, control using various (sine PWM, SVPWM and PSPWM) techniques, various harmonic elimination techniques- Multilevel inverters Concepts - Types: Diode clamped- Flying capacitor- Cascaded types- Applications.

UNIT -V- POWER CONDITIONERS, UPS & FILTERS:
Introduction- Power line disturbances- Power conditioners –UPS: offline UPS, Online UPS, Applications – Filters: Voltage filters, Series-parallel resonant filters, filter without series capacitors, filter for PWM VSI, current filter, DC filters – Design of inductor and transformer for PE applications – Selection of capacitors.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES

1. Philip T Krein, " Elements of Power Electronics", Oxford University Press
2. Ned Mohan, Tore.M.Undeland, William.P.Robbins, Power Electronics converters, Applications and design- Third Edition- John Wiley and Sons- 2006 124
3. M.H. Rashid – Power Electronics circuits, devices and applications- third edition Prentice Hall of India New Delhi, 2007.
4. Erickson, Robert W, "Fundamentals of Power Electronics", Springer, second edition, 2010.

ELECTIVE – IV

ELECTRONICS MANUFACTURING TECHNOLOGY

Semester – VI	L	T	P	C
22KBVTE44	4	0	0	4

OBJECTIVE

To import knowledge on electronics manufacturing and packaging technology.

LEARNING OUTCOME

- ✓ Understand wafer preparation and PCB fabrication
- ✓ Know the types of Mounting Technologies and components for electronics
- ✓ Know various Defects, Inspection Equipments SMT assembly process.
- ✓ Learn repair, rework and quality aspects of Electronics assemblies.

UNIT I INTRODUCTION TO ELECTRONICS MANUFACTURING:

History, definition, wafer preparation by growing, machining, and polishing, diffusion, microlithography, etching and cleaning, Printed circuit boards, types- single sided, double sided, multi layer and flexible printed circuit board, design, materials, manufacturing, inspection.

UNIT II COMPONENTS AND PACKAGING:

Introduction to packaging, types-Through hole technology(THT) and Surface mount technology(SMT), Through hole components – axial, radial, multi leaded, odd form. Surface-mount components- active, passive. Interconnections - chip to lead interconnection, die bonding, wire bonding, TAB, flip chip, chip on board, multi-chip module, direct chip array module, leaded, leadless, area array and embedded packaging, miniaturization and trends.

UNIT III SURFACE MOUNT TECHNOLOGY PROCESS:

Introduction to the SMT Process, SMT equipment and material handling systems, handling of components and assemblies - moisture sensitivity and ESD, safety and precautions needed, IPC and other standards, stencil printing process - solder paste material, storage and handling, stencils and squeegees, process parameters, quality control.

UNIT IV INSPECTION AND TESTING:

Inspection techniques, equipment and principle - AOI, X-ray. Defects and Corrective action - stencil printing process, component placement process, reflow soldering process, underfill

and encapsulation process, electrical testing of PCB assemblies- In circuit test, functional testing, fixtures and jigs.

UNIT V REPAIR, REWORK, QUALITY AND RELIABILITY OF ELECTRONICS ASSEMBLIES:

Repair tools, methods, rework criteria and process, thermo-mechanical effects and thermal management, Reliability fundamentals, reliability testing, failure analysis, design for manufacturability, assembly, reworkability, testing, reliability, and environment.

UNIT - VI CURRENT CONTOURS: (presentation based on outcome based presentation based on outcome based for continuous internal assessment only)

REFERENCES:

1. Surface Mount Technology –Principles and practice by Ray Prasad – second edition, Chapman and Hall, 1997, New York.
2. Fundamentals of micro system packaging by Rao.R .Tummala, Mc -Graw Hill 2001
3. Failure Modes and Mechanisms in Electronic Packages, Puligandla Viswanadham and Pratap Singh, Chapman and Hall, New York, N.Y.
4. Area Array Interconnection Handbook, Paul Totta and Karl Puttlitz, and Kathleen Stalter , Kluwer Academic Publishers, Norwell, MA, USA, 2001.
5. Electronic Packaging and Interconnection Handbook, by C.A.Harper, Second Edition, McGraw Hill Inc., New York, N.Y., 1997.