INSTITUTE:

Vision:

To emerge as a comprehensive Institute that provides quality technical education and research thereby building up a precious human resource for the industry and society.

Mission:

- To provide a learner-centered environment that challenges individuals to actively participate in the education process.
- To empower the faculty to excel in teaching while engaging in research, creativity and public service.
- To develop effective learning skills enabling students pick up critical thinking thus crafting them professionally fit and ethically strong.
- To reach out industries, schools and public agencies to partner and share human and academic resources.

Vision and Mission of the Department

Vision:
To impart quality education and research with professional values & ethics to cater the industrial and societal needs.

Mission:

- To enhance student's skills by implementing modern curriculum through collaborative industry institute interaction.
- To provide with modern tools to enhance innovative research.
- To create human resources in electrical engineering to contribute to the nations development and improve the quality of life.
- Imbibe values and ethics for a holistic engineering professional practice.

PROGRAM EDUCATIONAL OBJECTIVES

PEO1: To inculcate basic knowledge in Humanities and Sciences, Fundamentals of Computer Programming besides essential knowledge of electrical and electronics engineering.

PEO2: To apply the principles, concepts and skills of Electrical and Electronics Engineering for research and development.

PEO3: To imbibe professional values, ethics, leadership, teamwork through co-curricular and extracurricular activities for personality development and for effective engineering practice.

PEO4: Engage in continuing professional growth through higher education or professional activity.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

PO1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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

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

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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

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

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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

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

REGULATIONS FOR

FOUR YEAR BACHELOR OF TECHNOLOGY (B.Tech.) DEGREE PROGRAM

(With effect from the batches admitted in the academic year 2013 – 14)
&
B.Tech. (Lateral Entry Scheme)
(For the batches admitted from the academic year 2014-15)

1. Minimum Qualifications for Admission :

A candidate seeking admission into first year B.Tech. Degree program should have passed the Intermediate Examination of the Board of Intermediate Education, Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by JNTUA, Anantapur).

A candidate seeking admission into second year of the four year B.Tech Degree program in engineering should have passed Diploma in Engineering conducted by the Board of Technical Education, Andhra Pradesh (or equivalent examination recognized by JNTUA, Anantapur).

Any other admission, authorized by the University and the Government of Andhra Pradesh, will be as per the eligibility criterion and procedure laid down by the said authorities.

2. Branches of Study :

2.1 The branches of study in B.Tech. Degree Program offered by the Institute are

(a) Civil Engineering
(b) Electrical & Electronics Engineering
(c) Electronics & Communication Engineering
(d) Mechanical Engineering
(e) Computer Science & Engineering

2.2 A student is required to choose the course of study (branch) at the time of admission. No change of branch shall be permitted after the closure of admissions by the competent authority, nominated by the Government of Andhra Pradesh.

2.3 The duration of the program is of four academic years. The first year of study will be of annual pattern. Semester pattern shall be followed for the Second, Third and Fourth years of study with two semesters in each academic year.

3.0 Instruction Days:

First year of B.Tech. program consists of a minimum of 180 days, including the days allotted for tests.

Each semester shall consist of a minimum of 90 days, including the days allotted for tests.

4.0 Credits:

Credit defines the quantum of contents/syllabus prescribed for a course and the number of instruction hours per week. The norms for assigning credits to a course for

duration of one semester shall be as follows :

I One credit for every one hour lecture per week/semester.

II Two credits for every three hours of drawing or practical per week/semester.

Similarly,

I Two credits for every one hour lecture per week/year.

II Four credits for every three hours of drawing or practical work per week/year.

5.0 Evaluation:

5.1 The performance of the students in first year /each semester shall be evaluated subject-wise. The distribution of marks between Sessional marks and end examination is as follows :

5.2 Sessional Marks

5.2.1 For the award of sessional marks in I year in theory courses, each test for 40 marks shall be conducted. Each test shall be of two hours duration and three tests will be evenly distributed during the year. The final sessional marks shall be taken giving a weightage of 0.40 each for the better two tests and 0.20 for the other mid examination marks.

5.2.2 For award of sessional marks for theory courses in each semester two tests each for 40 marks shall be conducted. Each test shall be of two hours duration and the test shall be evenly distributed during the semester. The final sessional marks shall be taken giving a weightage of 0.80 for the better of the two tests and 0.20 for the other mid examination marks.

5.2.3 In case of practical subjects the sessional marks will be awarded based on day-to-day class work and one test at the end of I year / semester.

5.2.4 For the subject having design and / or drawing, such as Engineering Drawing, Machine Drawing and estimation etc., the distribution shall be 40 marks for internal evaluation and 60 Marks for end examination. The Internal evaluation for sessionals will be 20 marks for day- to-day work in the class that shall be evaluated by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm exams in a Semester for a duration of 2 hrs each, evenly distributed over the syllabi, for 40 marks each and the sessional marks shall be taken as enunciated in clause 5.2.2. However, in the I year class there shall be three midterm exams and the midterm examination component of the sessional marks shall be taken as enunciated in clause 5.2.1. The sum of day-to-day evaluation for 20 marks and the half of the midterm examinations marks will be the final sessional marks for the subject.

5.2.5 The Department concerned shall constitute a three-member committee, consisting of the Head of the Department concerned, one senior faculty member and the concerned guide to assess uniformly the performance of the students by way of seminars on the project work turned out by the students. The sessional marks shall be awarded by the concerned guide for 50% and the committee for the balance 50% based on the work turned out and submitted in the form of a project report.

6.0 End Examinations

6.1 For each of the theory, practical and design/drawing courses, there shall be an end Examination of three hours duration at the end of first year/ each semester, except where stated otherwise explicitly in the detailed scheme of instruction.

6.2 Recounting

Students shall be permitted to request only for recounting of the end theory examination answer scripts within a stipulated period after payment of the requisite fee. After recounting, records are updated with changes if any, and the student shall be issued a revised memorandum of marks. If there are no changes, the student shall be intimated the same.

In the recounting process, the valued answer script will be scrutinized jointly by the HOD concerned and a faculty nominated by the Director/Principal.

6.3 Instant examinations

Instant examinations may be conducted in the theory subjects of the final year second semester only for the benefit of those outgoing students who failed in or who are absent for only one theory subject of final year second semester and who do not have any other back logs. The instant exams will be conducted normally within one month of the announcement of the final semester results.

6.4 Conduct of Examinations

Question paper setting shall be undertaken by the Institute, choosing external examiners from the panels recommended by the respective Board of Studies. Evaluation of answer scripts shall also be undertaken by the Institute by choosing external/internal examiners from the panels recommended by the respective Board of Studies.

For each practical examination, the end examination will be conducted jointly by the laboratory teacher and another examiner nominated by the Director/Principal.

Project Viva-voce examination shall be conducted by two internal examiners and one external examiner. The appointment of internal and external examiners for the conduct Viva-voce examinations shall be made by the panels recommended by the respective Board of Studies. Panel of Examiners must consist of one internal and six external examiners.

7.0 Grading, Grade Point Average (GPA), Cumulative Grade Point Average (CGPA) and Grade sheet

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below depending on the range in which the marks obtained by the student falls.

Conversion into grades and grade points assigned

Range in which the marks in the subject fall	Grade	Grade points assigned	Performance
≥ 95	A^{++}	10	Out Standing
85 – 94	A^{+}	9.0	Excellent
75 – 84	A	8.0	Very Good
65 – 74	B^{+}	7.0	Good
55 - 64	B	6.0	Fair
45 – 54	C	5.0	Average
0 – 44	D	4.0	Satisfactory
< 40	F	0	Fail

7.1 Grade Point Average (GPA)

The grade point average for each semester/year is calculated as follows:

$$GPA = \frac{\sum_1^n (C_i)(GP_i)}{TC}$$

where n = number of subjects in the year/semester

for each subject, i

C_i = credits for the subject

GP_i = the grade point for the subject

TC = Total number of credits in the year / semester

7.2 Cumulative Grade Point Average (CGPA)

The CGPA is computed for every student at the end of each semester. The CGPA would give the cumulative performance of a student from the first year up to the end of the semester to which it refers and is calculated as follows:

$$CGPA = \frac{\sum_1^m (GPA_j)(TC_j)}{\sum_1^m TC_j}$$

where m = number of year/semesters under consideration

for each year / semester, j

TC_j = Total number of credits for a particular year/semester

GPA_j = the grade point average of that year/semester

Both GPA and CGPA will be rounded off to the second place after decimal and recorded as such.

While computing GPA/CGPA, the course in which the candidate is awarded zero grade points will also be included.

7.3 Grade Sheet

The grade sheet (memorandum) will be issued to each student indicating his performance in all the courses taken in that semester in the form of grades, also indicating the GPA of that semester and CGPA up to that semester.

7.4 With holding of results

If the student has not paid the dues, if any, to the Institute or if any case of indiscipline is pending against him/her, the result of the student will be withheld and he/she will not be allowed into the next semester and his/her degree will be withheld in such cases.

8.0 Attendance Requirements

8.1 A student shall be eligible to appear for end Examinations if he acquires a minimum of 75% of attendance in aggregate of all subjects in a semester / I year

.

8.2 However, a student has to put in a minimum of 50% attendance in each course/subject, in addition to the condition laid down in clause 8.1.

8.3 Condonation of shortage of attendance may be recommended provided a student puts in at least 65% attendance in all the subjects put together as calculated in clause 8.1 above, along with a minimum of 50% attendance in each course as stated in clause 8.2. For condonation of shortage of attendance, the student shall pay the prescribed fee and submit an application in writing clearly stating the reason for shortage of attendance along with necessary documentary evidence. The final decision for condonation of attendance shall be taken by the college academic committee considering the merits of the case.

8.4 Shortage of attendance below 65% in aggregate shall in <u>NO</u> case be condoned.

8.5 Students whose shortage of attendance is not condoned in any semester/ I year are not eligible to take their end examination of that class and their registration for end examinations shall stand cancelled**.**

8.6 A student, who could not satisfy these requirements of attendance, as given in clauses 8.1 through 8.5 in first year or in any semester, shall have to repeat the first year or the semester as the case may be.

8.7 A student shall not be permitted to study first year or any semester for more than three times during the course of his / her study.

Further, a student is required to complete the course of study of B.Tech. program, satisfying all the attendance requirements in all the four years of the program within a period of eight academic years from the year of admission, failing which he/she shall forfeit his/her admission.

8.8 A student, who has satisfied the minimum attendance requirements in the first year or in any semester may repeat the first year or that semester with the permission of the Principal/Director and cancelling the previous record of attendance and sessional marks of the first year or that semester. [However, the facility may be availed of by the student not more than twice during the entire course of his/her studies and the entire course of study shall be within eight academic years, as stipulated in clause 8.7].

9.0 Minimum Academic Requirements

9.1 A candidate shall be declared to have passed in each theory, design/drawing, practical and project work, if he / she secures not less than 35% marks in the end examination and the sum total marks of 40% in the end examination plus the sessional marks secured by the student in that theory/design/drawing/practical.

9.2 A student eligible for the end examination in a subject, but absent at it or has failed in the end Examination may appear for that subject at the next examination as and when it is held.

10.0 Conditions for Promotion

10.1 A student shall be eligible for promotion to the I semester of II year B.Tech. if he/she satisfies the minimum attendance requirements for I B.Tech. as stipulated in clause 8.

10.2 A student shall be eligible for promotion to the next semester if he/she satisfies the minimum attendance requirement in the immediately preceding semester as given in clause 8.

11.0 Award of B.Tech. Degree

The degree of B.Tech. shall be conferred on a candidate, who has satisfied the following:

(i) The candidate must have after admission to the regular B.Tech. programme of the Institute, pursued a course of study for not less than four academic years.

(ii) The candidate must have satisfied the minimum academic requirements as in clause 9 in all the courses prescribed for the four-year programme.

12.0 Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B.Tech. Degree he shall be placed in one of the following four classes :

Class Awarded	CGPA
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 and < 7.5
Second Class	≥ 5.5 and < 6.5
Pass Class	< 5.5

13.0 Award of Rank

13.1 Ranks shall be awarded in each branch of specialization for the top three students.

13.2 Only such candidate who completes the B.Tech. program within four academic years from the year of their admission are eligible for the award of rank.

13.3 For the purpose of awarding rank in each branch, total marks, i.e. end examination and sessional marks put together of all the semesters of II, III and IV B.Tech. Secured in the first attempt only shall be taken into account. Candidates who have failed in

any course in I year/semester are not eligible for the award of Rank.

14.0 Transitory Regulations

14.1 Candidates who studied the four year B.Tech. Degree course under Old Regulations but who could not satisfy the minimum attendance requirements in any year may join the first year/appropriate semester in the New Regulations applicable for the batch for the remaining part of the course and be governed by the Regulations of that batch from then on. Any candidate, admitted under Old Regulations, who wished to join in any particular year in the New Regulations under any other circumstances shall also be governed by the New Regulations from that year onwards.

14.2 Candidates who satisfy the minimum attendance requirements in any year under Old Regulations but who are yet to pass some subjects of that year even after three chances shall appear for the equivalent subjects specified by the Board of Studies of the concerned branch.

15.0 Amendment of Regulations

N.B.K.R. Institute of Science & Technology reserves the right to amend these regulations at any time in future without any notice. Further, the interpretation of any of the clauses of these regulations entirely rests with the College Academic Committee.

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY: VIDYANAGAR (AUTONOMOUS)
(AFFILIATED TO JNTU ANANTAPUR:NELLORE)
SPSR NELLORE DIST

I B.TECH(yearly pattern) Scheme of Instruction and Evaluation
(Common to all branches)
(With effect from the Academic Year 2013-2014)

Course Code	Course Title	Instruction			Credits	Evaluation									Maximum Total Marks
		Hours/Week				Sessional Test-I		Sessional Test-II		Sessional Test-III		Total Sessional Marks (Max. 40)	End Semester Examination		
		L	T	D/P		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	100
13SH1001	English	2	-	-	4	2	40	2	40	2	40	0.4*first Best + 0.4*second best + 0.2*Least	3	60	100
13SH1002	Engineering Mathematics-I	3	1	-	8	2	40	2	40	2	40		3	60	100
13SH1003	Engineering Mathematics-II	3	1	-	8	2	40	2	40	2	40		3	60	100
13SH1004	Engineering Physics	2	-	-	4	2	40	2	40	2	40		3	60	100
13SH1005	Engineering Chemistry	2	-	-	4	2	40	2	40	2	40		3	60	100
13CS1001	Computer Programming & Data Structures	3	1	-	8	2	40	2	40	2	40		3	60	100
13EE1001	Basic Electrical Sciences	3	1	-	6	2	40	2	40	2	40		3	60	100
13SH10P1	English Language Laboratory			3	4	-	-	-	-	-	-	Day to Day Evaluation and a test (40 Marks)	3	60	100
13ME101P	Workshop			3	4	-	-	-	-	-	-		3	60	100
13CS10P1	Programming Laboratory			3	4	-	-	-	-	-	-		3	60	100
	TOTAL	18	4	9	54									600	1000

13SH1001 – ENGLISH

Course Category:	Humanities	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	2-0-0
Pre-requisite:	• Comprehending the basic level of comprehensions • Intermediate level of error analysis • Ability to use appropriate language in informal situations	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To develop their basic communication skills in English 2. To achieve specific linguistic and communicative competence 3. To acquire relevant skills and function efficiently in a realistic working context 4. To inculcate the habit of reading	
Course Outcomes:	**CO1**	Correct the error of the sentence; improve language proficiency and face competitive exams; GATE, GRE, TOEFL, GMAT etc
	CO2	Comprehend the advanced level of reading comprehensions
	CO3	Write clear and coherent passages for social and professional contexts
	CO4	Write proposals, business letters
	CO5	Acquire considerable flair in using broad range of vocabulary.
Course Content:	**UNIT-I** **'Humour' from 'Using English' Biography –(Homi Jehangir Bhabha) from "New Horizons"** R- Reading Strategies- Skimming and Scanning. G- Parts of Speech- Noun-number, pronoun-personal pronoun, -Subject verb& Pronoun agreement. **UNIT-II** **'Inspiration' from "Using English" 'Biography-(My Struggle for an Education)' form "New Horizons"** R- Note making strategies W- Paragraph-types- topic sentences, unity, coherence, length, linking devices G- Articles-Prepositions-Tenses- Present tense, Past tense and Future tense **UNIT-III** **'Sustainable Development' from 'Using English' Short Story- (The Happy Prince) from "New Horizons"** G .Non-finite verbs, Auxiliary verbs and question tags V- Word formation and One-Word Substitutes **UNIT-IV** W- Writing Strategies- Sentence structures-Letter Writing-Dialogue Writing-Public Speaking G- Transformation of Sentences (Direct and Indirect/ Active and Passive) V- Affixes-prefix and suffix, root words, derivatives	

	UNIT-V W- Technical Report writing-strategies, formats-types-technical report writing G- Conditional clauses, Transformation of Sentences (Degrees of Comparison/Connectives) V- Collocations and Technical Vocabulary and using words appropriately- Synonyms- antonyms, homonyms, homophones, homographs, words often confused.
Text Books & Reference Books:	**Text Books:** 1.Using English published by Orient Black Swan 2.New Horizons published by Pearson **Reference Books:** 1. Raymond Murphy's English Grammar with CD, Murphy, Cambridge University Press, 2012. 2. English Conversation Practice- Grant Taylor, Tata McGraw Hill, 2009. 3. Communication skills, Sanjay Kumar & Pushpalatha Oxford University Press, 2012. 4. Techniques of Teaching English: A.L. Kohli 5. A Textbook of English Phonetics: For Indian Students: T Balasubramanian., MacMillan India Limited
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13SH1002 – ENGINEERING MATHEMATICS-I

Course Category:	Mathematics	**Credits:**	8
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-1-0
Pre-requisite:	• Trigonometric , Differentiation and integration Formulas • Equation Simplifications	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	• To develop the basic mathematical knowledge and computational skills of the students in the areas of applied mathematics. • To develop the skills of the students in the areas of Differential calculus Integral calculus, Vector calculus, Curvature and Matrices. • To serve as a pre-requisite mathematics course for post graduate courses, specialized studies and research.	
Course Outcomes:	**CO1**	Understand the concepts of rank of the matrices, linear and non-linear system of equations, eigen-values and eigen-vectors, apply Caley-Hamilton theorem, diagonalizable of symmetric matrices and demonstrate the nature of quadratic forms.
	CO2	Understanding effectively the mean value theorems and Maxima and Minima of a function of two variables – Lagrange's method of multipliers.
	CO3	Understanding effectively the geometrical aspects of curvature, involutes and evolutes of plane curves, essential concepts for an engineer, as elegant applications of differential calculus.
	CO4	Demonstrate knowledge and understanding the evaluate of double integration and triple integration using Cartesian, polar co-ordinates and also understand effectively areas and volumes.
	CO5	Apply Green's theorem, Gauss' theorem and Stokes' theorem.
Course Content:	**UNIT- I** **MATRICES:**Rank of Matrix**:-**Echelon Form and Normal Form - Consistency of system of linear equations- Eigen values and Eigen vectors- Cayley – Hamilton's theorem- Diagonalization of matrix- Quadratic forms. **UNIT- II** **DIFFERENTIAL CALCULUS:** Rolle's, Lagranges and Cauchy's mean value theorems (without proofs) - Taylor's and Maclaurin's series (only one variable) - Maxima and Minima of a function of two variables – Lagrange's method of multipliers. **UNIT- III** Radius of curvature, involutes and evolutes. Beta and Gamma functions. Curve tracing (only Cartesian form) **UNIT- IV** **INTEGRAL CALCULUS**:Double and Triple Integrals- Change of order of integration- Change of variables- Simple applications to areas and volumes. **UNIT- V** **VECTOR CALCULUS**:Gradient, Divergence, Curl - Laplacian and Second Order Operators- Line, Surface and Volume integrals- Potential function- Green's theorem, Stoke's theorem and Gauss Divergence theorem (without proof)- Verification of Green's , Stoke's and Gauss Divergence theorem.	

Text Books & Reference Books:	**Text Books:** 1. Higher Engineering Mathematics – B S Grewal 2. Engineering Mathematics- B V Ramana 3. Elementary Engineering Mathematics – B S Grewal **Reference Books:** 1. Higher Engineering Mathematics- H K Das et al 2. Advanced Engineering Mathematics- N P Bali & M Goya 3. Engineering Mathematics-I S. Chand & Co.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13SH1003 – ENGINEERING MATHEMATICS-II

Course Category:	Mathematics	**Credits:**	8
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-1-0
Pre-requisite:	• Trigonometric , Differentiation and integration Formulas • Equation Simplifications • Roots finding and partial fractions	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	• To develop the basic mathematical knowledge and computational skills of the students in the areas of applied mathematics. • To develop the skills of the students in the areas of Differential Equations, Laplace Transform, Fourier series and Fourier Transfers. • To serve as a pre-requisite mathematics course for post graduate courses, specialized studies and research.	
Course Outcomes:	**CO1**	Students will be able to understand the basic theories and methods of differential equations, and to apply the fundamental techniques of differential equations to perform analysis and computation of solutions to various differential equations.
	CO2	Understanding effectively the Laplace Transformations of standard functions and their properties.
	CO3	Understanding effectively the unit step function, Dirac's delta function, convolution theorem and also the applications of Laplace transforms to differential equations.
	CO4	Understanding effectively Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
	CO5	Understand Fourier transform and how to compute it for standard examples and also understand effectively the Fourier integral in complex form, finite and infinite Fourier transforms, Fourier sine and cosine transforms.
Course Content:	**UNIT – I** **Ordinary Differential Equations:** Linear Differential Equations of second and higher order with constant coefficients- Method of variation of parameters- Equations reducible to linear equations with constant Coefficients- Cauchy's linear equations –Legendre's linear equation. **UNIT – II** **Laplace Transformation:** Laplace Transformations of standard functions- Properties of Laplace Transformation- Transformation of derivatives and integrals- Initial and Final value theorems-Transforms of unit step function and impulse function – Transform of periodic functions. **UNIT – III** **Inverse Laplace Transformation:** Inverse transforms- Unit step function- Dirac's delta function-Convolution theorem- Transforms of periodic functions- Application to solutions of Ordinary Differential Equations. **UNIT-1V** **Fourier series:** Determination of Fourier coefficients- Fourier series- Even and Odd functions-Change of intervals- Half Range Sine and Cosine Series- Complex form of Fourier series- Parseval's formula.	

	UNIT-V **Fourier Transforms:** Fourier Integral Theorem- Fourier Sine and Cosine integral- Fourier integral in complex form – Finite and Infinite Fourier Transforms- Fourier Sine and Cosine transforms properties- Inverse transforms.
Text Books & Reference Books:	**Text Books** 1**.**Higher Engineering Mathematics –B S Grewal 2.Engineering Mathematics- B V Ramana **Reference Books** 1.Higher Engineering Mathematics- H K Das et al 2.Advanced Engineering Mathematics- N P Bali and M Goyal.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13SH1004– ENGINEERING PHYSICS

Course Category:	Sciences	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	2-0-0
Pre-requisite:	• Electromagnetism and optics • Electromagnetic field and Waves	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	• Describe the concept of wave particle duality , Schrodinger wave equation and behaviour of electrons in metals. • Explain and provide the knowledge about semiconductors and their use in electronic devices. • Basic properties of magnetic Materials and the uses in Science &Technology. • Describe the characteristics of lasers , their construction and applications in Science & Technology • Describe basic idea about optical fibers, their construction and uses in communication field. • Explain the fundamental idea about semiconductor and their limited uses.	
Course Outcomes:	**CO1**	Understanding the wave particle behaviour of matter Schrodinger wave equation and electronic behaviour in metals.
	CO2	Understand the structure of crystalline solids and their applications in X-ray diffraction
	CO3	Know the properties of semiconductor materials by projecting the view of energy bands and know the concept of magnetization and applications of magnets in various disciplines.
	CO4	Understand the utilization of laser technology in various disciplines. Basic Understands of Acoustics.
	CO5	Understand the concept of optical fiber and its applications. Basic ideas about super conductor and their uses in different fields.
Course Content:	**UNIT – I** **QUANTUM MECHANICS AND FREE ELECTRON THEORY :** **Quantum Mechanics** : Wave – Particle duality - de'Broglie hypothesis of Matter waves –Properties of matter waves Heisenberg's uncertainty principle and its applications–Schrodinger's time independent and time dependent wave equation –Significance of wave function –Particle in a one dimensional infinite potential well. **Free Electron Theory**: Classical free electron theory- Sources of electrical resistance –Equation for electrical conductivity – Quantum free electron theory- Fermi level and Fermi –Dirac distribution– Bloch theorem -Kronig – Penny model (qualitative) Origin of bands in solids –Classification of solids into conductors, semiconductors and insulators. **UNIT – II** **SEMI CONDUCTORS AND MAGNETIC MATERIALS :** **Semiconductor Physics**: Introduction – Intrinsic and extrinsic semiconductors carrier concentration in intrinsic and extrinsic semi conductors - Drift and diffusion currents Einstein's equation–Continuity equation-Hall effect-direct and indirect bandgap semiconductors. **Magnetic Materials** : Introduction and basic definitions –Origin of magnetic moments –Bohr magneton –Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials –Hysteresis –Soft and hard magnetic materials and applications	

	UNIT – III **CRYSTALLOGRAPHY AND X-RAY DIFFRACTION AND DEFECTS IN CRYSTALS:** **Crystallography** : Introduction–Space lattice–Unit cell–Lattice parameters–Bravias lattice crystal systems–Packing fractions of SC,BCC and FCC structures–Structures of NaCl and Diamond –Directions and planes in crystals–Miller indices –interplanar spacing in cubic crystals **X-ray diffraction and defects in crystals** : X-ray diffraction–Bragg's law–Laue and Powder methods –Defects in solids : point defects, line defects (qualitative)-screw and edge dislocation, burgers vector. **UNIT – IV** **LASERS AND ULTRASONICS** **Lasers** : Introduction – Characteristics of laser –Spontaneous and simulated emission of radiation-Einstein's coefficients–Population inversion–Excitation mechanisms and optical resonator–Ruby laser –He Ne laser–Semi conductor laser-Applications of lasers. **Ultrasonics** : Introduction Production of ultrasonics by piezoelectric method and magneto striction method – Detection and Applications of Ultrasonics . **UNIT – V** **FIBER OPTICS AND SUPERCONDUCTIVITY** **Fiber Optics :** Introduction-Construction and working principle of optical fiber–Numerical aperture and acceptance angle–Types of optical fibers–Attenuation and losses in fibers–Optical fiber communication system–Applications of optical fibers in communications, sensors and medicine **Superconductivity**: Introduction–Meissner effect–properties of superconductors–Type I and II superconductors–Flux quantization–London penetration depth–ac and dc Josephson effects–BCS theory (qualitative)–-Applications of superconductors
Text Books & Reference Books:	**Text Books:** 1.P. K. Palaniswamy ,Scietech Publications 2.V.Rajendran and K.Tyagarajan,Tata Mc Graw Hill Publications – III Edition 3.R.K. Gaur and G.L.Guptha,Danapati Rai Publications **Reference Books** 1.A.J.Dekkar ,Mcmillan Publications –Latest Edition 2012 2.M.Arumugam,Anuradha Publications II Edition 3.Rama Chandra B & Subramanyam SV ,Hitech Publications 4.S.O.Pillai ,New age International Publications 5.Puri RK and Babbar VK ,Chand & Co Publications 6.M.N.Aaravindhanulu and P.G.Krishi sagar ,Chand & CO Publications Revised Edition 2013
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13SH1005 – ENGINEERING CHEMISTRY

Course Category:	Sciences	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	2-0-0
Pre-requisite:	fundamentals chemistry	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	• To strengthen the fundamentals of Chemistry and then build an interface of theoretical concepts with their industrial/engineering applications. • The extension of fundamentals Electrochemistry to energy storage devices such as batteries and fuel cells is one such example. • To design engineering materials and solve problems related to them. • To understand the chemistry involved in the fuels. • To understand water chemistry and polymers and their application	
Course Outcomes:	**CO1**	Understand the electrochemical sources of energy
	CO2	Understand industrially based engineering materials
	CO3	Differentiate between soft and hard water
	CO4	Understand the disadvantages of using hard water and apply suitable treatments
	CO5	Understand the basics of polymers and their uses in engineering field
Course Content:	**UNIT – I** **ELECTRO CHEMISTRY** Single electrode potential – explanation and measurement-Reference electrodes: Hydrogen gas electrode-calomel electrode-glass electrode Electrochemical cells-Numerical calculations-Batteries: Rechargeable cells and batteries (Lead-Acid storage cells, Al-Air Batteries)-Fuel Cells : Hydrogen - Oxygen fuel cell Corrosion: Definition-classification-Factors affecting the corrosion-Prevention methods of corrosion – metallic coatings (Electroplating) and cathodic protection. **UNIT-II** **CHEMISTRY OF ENGINEERING MATERIALS** Electrical insulators: Definition-classification-Characteristics-Application of electrical insulating materials (solid, liquid and gaseous insulators) Refractories: Classification-properties and applications Lubricants: Lubricant -Lubrication-Theory of lubrication-Properties and applications of lubricants. **UNIT – III** **FUEL TECHNOLOGY** Classifications of Fuels -Characteristics of fuels -Calorific value – determination – Bomb calorimeter - Boys gas calorimeter - Theoretical calculation of calorific value. Solid fuels-coal-analysis of coal - metallurgical coke Liquid fuels: Petroleum – refining of petroleum - Synthetic petrol – Fischer Tropch's synthesis Gaseous fuel – Flue gas analysis by Orsat's apparatus **UNIT – IV** **WATER TREATMENT** Impurities in water-Hardness of water-disadvantages of water-Estimation of hardness by EDTA method-Estimation of dissolved oxygen-alkalinity-chlorides in water Industrial use of water: For steam generation-troubles of boilers-scale and	

	sludge-priming and foaming-caustic embrittlement-boiler corrosion Softening methods of hard water: Lime-soda process- Zeolite process-Ion exchange method **UNIT - V** **POLYMERS** Introduction to polymers-Polymerization process-types of polymerization Elastomers: natural rubber – volcanization of rubber – compounding of rubber-Synthetic rubbers: preparation, properties and engineering applications of Buna – N, Neoprene, Thiokol and silicon rubbers Plastomers: Thermosetting and thermoplastics-Moulding constituents of plastics-Preparation, properties and engineering applications of PVC, Bakelite, Nylons and Urea-Formaldehyde
Text Books & Reference Books:	**Text Books:** **1.**Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi 2.A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi **Reference Books**: 1.A Text Book of Enigneering Chemistry, Jain and Jain, DhanapathiRai Publications, New Delhi 2. Engineering Chemistry by K.B.ChandraSekhar, UN.Das and Sujatha Mishra, SCITECH Publications India Pvt Limited. 3.Concepts of Engineering Chemistry- AshimaSrivastavaf and N.N. Janhavi 4.Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu 5.Chemistry of Engineering Materials, C.V.Agarwal ,C.Parameswaramurthy and Andranaidu 6.Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13CS1001 – C PROGRAMMING & DATA STRUCTURES

Course Category:	Computing	**Credits:**	8
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-1-0
Pre-requisite:	• knowledge of computer operation • MS-office • Text editor	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To describe fundamentals of C programming such as variables, conditional and iterative execution, methods, etc. 2. Arrays, Strings, Functions 3. Storage classes, pointers, structures 4. Data structures, stacks and queues 5. Graphics and trees, searching and sorting	
Course Outcomes:	**CO1**	Describe fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
	CO2	Analyze and solve programming problems using a procedural and algorithmic approach with functional decomposition.
	CO3	Apply knowledge of computing and mathematics using simple data structures.
	CO4	Develop skill to use pointers, memory allocation and data handling through files in 'C'.
	CO5	Understand the process of compiling, linking, and running a program using a computing tool.
Course Content:	**UNIT – I** Algorithms, flow charts, Program Development Steps, Introduction To C Language: Basic Structure of C Program, Identifiers, Basic data types, Variables, Operators. Operator Precedence and Associativity, Expression Evaluation, Type conversions. **Selection Statements**: Various forms of if statements, switch statement, **Iteration**: while, do-while, for statements, other control altering statements– break, continue, goto and exit. **UNIT – II** **Arrays**: Declaration, initialization, accessing elements, storing elements, two-dimensional and multi-dimensional arrays, applications of arrays. **Strings**– Declaration, initialization, Built-in and user-defined String handling Functions **Functions**: Basics, call by value and reference, recursive functions, Scope rules. **UNIT – III** **Storage Classes**: auto, register, static, extern. Type qualifiers, Pre-processor Directives. **Pointers**: Initialization of pointers, Address Arithmetic, Dynamic memory allocation functions, array of pointers, pointers to functions, command–line arguments. **Structures**: Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, pointers to structures, self-referential structures, unions, bitfields. **UNIT – IV** **Data Structures**: Overview of Data Structures, Linked lists – implementation of Operations in singly linked list, **Stacks & Queues**: Basic Operations, representations of stacks and queues using arrays and linked lists, Applications.	

	UNIT –V **Graphs And Trees**: Representation and Traversals. **Searching And Sorting**: Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort. Searching – linear and binary search methods.
Text Books & Reference Books:	**Text Books:** 1.C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning. 2.Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Ed. **Reference Books:** 1.The C programming language: Kernighan B W and Ritchie D M. 2.An Introduction to Data structures with applications: Tremblay J P and Sorenson P G.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE1001 – BASIC ELECTRICAL SCIENCES

Course Category:	Professional core	**Credits:**	6
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-1-0
Pre-requisite:	Concept of e.m.f, potential difference, current, ohm's law, resistance, resistivity, series and parallel connections, power dissipation in resistance, effect of temperature on resistance Capacitors, with uniform and composite medium, energy stored in capacitor, R-C time constant. Magnetic field, Faraday's laws of Electromagnetic induction, Hysteresis and eddy current losses, energy stored in an inductor, time constant in R-L circuit.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	• To understand the basic concepts of circuit analysis. • To understand Single Phase A.C Circuits • To understand Resonance concept. • To understand the concepts of Network topology. • The course intends to provide an overview of the principles, operation and application of the analog building blocks like diodes, BJT, FET etc.	
Course Outcomes:	**CO1**	Able to understand the basic concepts of D.C circuits, Coupled coils and Network topology.
	CO2	Able to fundamental concepts of single phase A.C circuits.
	CO3	Able to understand the basic concepts of Resonance and perform Steady state analysis of A.C circuits.
	CO4	Able to understand the basic properties of semi-conductor materials..
	CO5	Able to understand the characteristics of semi-conductor devices.
Course Content:	**UNIT – I** **Concept of Electric Circuits**: Active and passive elements, Ideal & Practical Sources, Source Transformation, V-I Characteristics of R, L and C elements, Kirchhoff's laws , Network reduction techniques, Star-Delta transformation, Mesh & Nodal analysis, Concept of Super mesh and Super node. **Graph theory:** Network topology, Cut set and Tie set matrices. Duality & Dual circuits-Concept of mutual inductance, Concept of coupling and dot convention. **UNIT – II** **Fundamentals of AC circuits:** Periodic wave forms – average and effective values of different wave forms, Form factor and crest factor, Phase and phase difference – phase notation, Concept of reactance, impedance, susceptance and admittance, Active & re-active power, Power factor-power triangle, Response of R, L and C elements for sinusoidal excitation.	

	UNIT – III **Steady state analysis**: RL, RC and RLC circuits for sinusoidal excitation, Phasor diagrams. **Resonance:** Series and parallel Resonance, Half power frequencies, Bandwidth and Q factor, Relation between half power frequencies- Bandwidth – Quality factor. **UNIT-IV** **Junction diode:** Band structure of PN- junction – current components- Volt ampere characteristics and its temperature dependence – diode resistance and capacitance- Zener diode and tunnel diode. **Opto Electronic Devices:** Photo emission, principle of operation of photo conductors, photo diodes, transistors, LED and LCD. **UNIT-V** **Bipolar Junction Transistor:** Transistor action- PNP and NPN transistors. CB, CE, CC configurations and their characteristics analytical expressions for transistor characteristics- Specifications of BJT- Determination of h- Parameters from BJT characteristics. **Field Effect Transistor:** Construction and operation -- Characteristics and applications of JFET.
Text Books & Reference Books:	**Text Books:** 1. Circuits & Networks:A.Sudhakar and Shyam Mohan – TMH 2. Circuit Theory: A.Chakarabarti - Dhanpat Rai 3. Electronic devices and circuits by Boylestad, Louis Nashelsky, 9ed..,2008 PE 4. Engineering Circuit Analysis:William Hayt & Kemmerly, TMH 5. FLOYD - "Electronic devices ", Pearson education. **Reference Books:** 1.Network Analysis: Vanvalkenberg 3ed, PHI 2.Mottershed, "Electronic devices and circuits", Prentice Hall of India. 3. Millman and Halkias, "Integrated Electronics" MC Graw Hill & Co., 4.David.A.Bell. "Electronic Devices and circuits", PHI. 5.Adel S.Sedra,Kenneth C.Smith, "Micro Electronic Circuits", Holt Sander's Japan
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13SH10P1 – ENGLISH LANGUAGE LABORATORY

Course Category:	Humanities	**Credits:**	4
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	• Ability to understand English language • Ability to use language in informal situations • Minimum ability to perceive things around	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	• To equip with listening to comprehend the speech of people of different backgrounds • To enable to express fluently and appropriately in social and professional contexts • To help to overcome inhibitions and self- consciousness while speaking in English and to build confidence • Write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical and analytical writing. • Read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation	
Course Outcomes:	**CO1**	Comprehends confidently and respond appropriately to the speech of multiple speakers
	CO2	Express ideas and views without any hesitation
	CO3	Communicate and converse with general clarity using proper pronunciation which allow for overall intelligibility.
	CO4	Narrate with ease logically and gracefully
	CO5	Comprehend information in data and represent in pictorial format and graphs
Course Content:	I. Listening Skills: • Listening for Pleasure • Listening for Details • Listening for Information II. Speaking Skills: • Introducing Themselves • Phonetics 1. Introduction of Sounds- Vowels & Consonants 2. Syllables 3. Inflections 4. Stress & Intonation • Jam • Extempore • Role Plays/ Situational Dialogues & Telephonic Conversations • Presentations	

	• Debates III. Reading Skills: • News Paper Reading IV. Writing Skills: • Story Writing • Description 1. Object 2. Place 3. Person 4. Situation • Information Transfer • Giving Directions & Instructions • Email Writing

13ME101P – WORKSHOP

Course Category:	Sciences	**Credits:**	4
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	• Physical strength • General knowledge • Knowledge on dimensions	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	• Types of carpentry, fitting tools & types of joints. • Sheet metal – definition, working tools, operations - forming & bending. • Types of foundry tools and their usage in moulding process. • Types of welding tools, machine tools, cutting tools (Lathe, Drilling). • To impart knowledge in various AC & DC circuit parts. • To impart the basic knowledge of desk top computers& power point presentation.	
Course Outcomes:	**CO1**	Able to explain the different tools of usage in carpentry and fitting sections.
	CO2	Able to gain the basic knowledge in the manufacturing process of metal forming ,casting process & usage of tools in their respective sections.
	CO3	Able to make the circuits of household wiring.
	CO4	Able to explain the different tools which are using in machine shop, welding shop and black smithy.
	CO5	Students are able to learn the physical recognition of different electrical components like Resistances, Inductances, Capacitances and their ratings. And, gain the knowledge of computer peripherals working, sharing& power point presentation.
Course Content:	**LIST OF EXPERIMENTS** CARPENTRY 1. Planning sawing and grooving 2. Half lap joint 3. Half Lap Dovetail Joint 4. Mitre Faced Bridle Joint 5. Mortise and Tenon Joint FITTING Straight fitting 1. V-fitting 2. Square fitting 3. Semi-circular fitting 4. Dovetail fitting FOUNDRY 1. Stepped block 2. Dumb bell 3. Flanged pipe TINSMITHY 1. Square tin 2. Circular tin 3. Funnel DEMO	

	(a) Metal cutting (b) Welding (c) Black smithy ELECTRICAL WIRING 1. (a) One lamp controlled by one switch (b) Two lamps controlled by one switch in Series and Parallel (c) Two lamps controlled by one switch in Series and Parallel combinedly 2. (a) Two lamps controlled by two switches independently (b) One lamp controlled by two two-way switched (staircase connection) IT WORK SHOP 1. Assembling a desk top computer 2. Connecting two computers using wire and without wire 3. Preparation of a power point presentation ELECTRONICS 1. (a) Identification of components (b) Calculation of values of components like (i) Resistance (ii) Capacitance (iii) Inductance 2. Soldering Practice 3. Operation of CRO (a) Measurements of Parameters (b) Lijjajous Figure

13CS10P1 – PROGRAMMING LABORATORY

Course Category:	Computing	**Credits:**	4
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	• knowledge of computer operation • MS-office • Text editor	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	• To describe fundamentals of C programming such as variables, conditional and iterative execution, methods, etc. • Arrays, Strings, Functions • Storage classes, pointers, structures • Data structures, stacks and queues • Graphics and trees, searching and sorting	
Course Outcomes:	**CO1**	Plan a solution for a problem by writing a program.
	CO2	Develop searching and sorting algorithms using loop statements
	CO3	Write telephone directory program using files concepts.
	CO4	Develop stacks and queues programs using structures and pointers concepts.
	CO5	Develop trees programs using structures and pointers concepts.
Course Content:	**LIST OF EXPERIMENTS** 1) Write a C program to implement the following i) Convert Centigrade to Fahrenheit and vice versa (f=(9/5)*c+32) ii) Sum of the n natural numbers ((n(n+1))/2) iii) Sum of the squares of the n natural numbers ((n(n+1)(2n+1))/6) iv) Slope and midpoint of line using its end points (slope = (y2-y1)/(x2-x1),midpoint -> x=x1+x2/2, y=y1+y2/2) v) Quotient and remainder based on two integers i and j. (q = i/j, r = i-q*j) vi) Area and circumference of a circle (πr2& 2πr) 2) Compute all possible roots of a quadratic equation of the form ax2+bx+c=0. 3) Write a C program to arrange three numbers in ascending order using i) Ternary operator ii) if statement . 4) Write a C program to i) Find the grade of a student by reading marks ii) Convert the given digit into word. 5) Write a C program to implement the arithmetic operations (+,-,*, %) using switch case statement. 6) Write a C program to find the i) Factorial of a number ii) G.C.D of two numbers. 7) Write a C program to i) To find the sum of individual digits of a given number ii) Reduce the number to a single digit. 8) Write a C program to print i) Prime numbers from 1 to n ii) Pascal triangle.	

	9) Write a C program to find i) The largest and smallest number in a list of integers ii) Sum of 1! +2! +3! +-----+n! using while loop. 10) Write a C program to evaluate 1-1/2! +1/3!-1/4! +-----+1/n! using for loop. 11) Write a C program to implement Fibonacci series using do while loop. 12) Write a C program to evaluate the sum of series $1+x/1! +x^2/2! +x^3/3!...n!$. 13) Write a C program to implement the following i) Length of the given string ii) Reverse of the given string iii) Copy one string into another iv) Comparison of two strings v) Concatenation of strings vi) String handling functions (any five) 14) Write a C program to check whether the given string is a palindrome or not. 15) Write a C program to implement i) Matrix addition ii) Matrix multiplication. 16) Write a C program to implement factorial of a given number using recursion. 17) Write a C program to implement i) Employ salary calculation ii) Student percentage Calculation. 18) Write a function that returns a union with values of say Basic, DA, HRA etc. at different times based on the argument passed. Compute the salary of the employee in main function after calling the above function repeatedly. 19) Write a C program to implement pointer arithmetic. 20) Write a C program for i) Call by value ii) Call by reference. 21) Write a C program to find minimum and maximum values in a given array using pointers. 22) Write a C program to display i) Five arguments from command line arguments ii) Addition of two numbers using command line arguments. 23) Write a C program to implement stacks using arrays. 24) Write a C program to implement Single Liked List operations. 25) Write a C program to i) Convert infix to postfix expression. ii) Evaluate Postfix expression. 26) Write a C program to implement i) Linear search ii) Binary search. 27) Write a C program to implement i) Bubble sort ii) Selection sort. 28) Write a C program to implement Single Liked List operations.

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY:: VIDYANAGAR (AUTONOMOUS)
(AFFILIATED TO JNTU ANANTAPUR:NELLORE)
SPSR NELLORE DIST
II YEAR OF FOUR YEAR B.TECH DEGREE COURSE – I SEMISTER
ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EVALUATION
(With effect from the academic year 2014-2015)
(For the batch admitted in the academic year 2013-2014)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	100
1	13SH2101	Engineering Mathematics – III * #	4	-	-	4	2	40	2	40	0.8*Best of two+0.2*least of two	3	60	100
2	13EC2101	Signals & Systems*#	4	-	-	4	2	40	2	40		3	60	100
3	13EC2102	Electronic Devices & Circuits*#	4	-	-	4	2	40	2	40		3	60	100
4	13EE2101	Electromagnetic Fields	4	-	-	4	2	40	2	40		3	60	100
5	13EE2102	Circuits & Networks * #	4	-	-	4	2	40	2	40		3	60	100
6	13EE2103	Electro Mechanical Energy Conversion-I	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
7	13EE21P1	Circuits & Networks Lab			3	2	-	-	-	-	Day to Day Evaluation and a test (40 Marks)	3	60	100
8	13EC21P1	Electronic Devices Lab			3	2	-	-	-	-		3	60	100
		TOTAL	24	-	06	28	-	-	-	-		-	480	800

***ECE, # EEE**

13SH2101 – ENGINEERING MATHEMATICS-III
(Common to EEE and ECE)

Course Category:	Mathematics	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Engineering maths	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To solve partial differential equations. 2. To understand special mathematical functions and their application. 3. Apply analytical functions to solve flow problems. 4. To learn about residue theorem and evaluate definite integrals. 5. To understand and apply Z transforms to indefinite integrals.	
Course Outcomes:	**CO1**	Understand the applications to the solution of partial differential equations, one dimensional wave equation, one dimensional heat equation and two dimensional Laplace equation to solve initial and boundary value problems in a physical situations satisfying the conditions
	CO2	Understand the solutions of differential equation, linear differential variable coefficients, Bessel functions and Legendre functions.
	CO3	Understand the complex analytical, Cauchy-Riemann equations & Elementary complex functions
	CO4	Understand the complex integration, Cauchy's integral theorem, Taylor's and Laurent's equations..
	CO5	Understand the Z-Transformations of standard functions and their properties, Convolution theorem and the applications of Z- transforms to difference equations.
Course Content:	**UNIT-I** **APPLICATION OF PARTIAL DIFFERENTIAL EQUATIONS**: Methods of Separation of Variables – One dimensional Wave equation – One dimensional Heat flow equation – Two dimensional Laplace equations. **UNIT-II** **SPECIAL FUNCTIONS:** Bessel functions – Properties– Recurrence formulae for Bessel function – Generating function for Jn(x) – Orthogonally of Bessel Functions. Legendre functions – Rodrique's formula – Recurrence relation for Pn(x) – Generating function for Pn(x) – Orthogonality of Legender polynomials. **UNIT-III** **COMPLEX ANALYSIS-I:** Analytical functions, Cauchy - Riemann equations, Construction of Analytic function, Applications to flow problems. Conformal mapping–Bilinear transformations. **UNIT-IV** **COMPLEX ANALYSIS-II:** Complex integration – Line integral – Cauchy's theorem – Cauchy's integral formula – Taylor's theorem and Laurent's theorem (without proof) – Singularities – Poles – Residues – Residue theorem – Evaluation of real definite integrals. **UNIT-V** **Z-TRANSFORMS AND DIFFERENCE EQUATIONS:** Z – Transform of some standard functions- Properties of Z-Transforms – Shifting properties – Initial value theorem and final value theorem – Inverse Z- Transform – Convolution theorem – Inversion by partial fractions – Region of Convergence – Applications to difference equations.	

Text Books & Reference Books:	**Text Books :** 1. Higher Engineering Mathematics-B.S.Grewal, Khanna Publishers. 2. Engineering Mathematics – B.V.Ramana-TMH. 3. Advanced Engineering Mathematics-Erwin kreyszing. **Reference Books:** 1. Higher Engineering Mathematics- H K Das et al. 2. Engineering Mathematics-III –TKV Iyengar, S.Chand. 3. Engineering Mathematics-III - M K.Venkataraman.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EC2101 – SIGNALS & SYSTEMS
(Common to EEE and ECE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Electronic Devices, Electrical Circuits and Fundamentals of Mathematics	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To learn about various types signals. 2. To understand Fourier series applicable to engineering signals. 3. To gain knowledge about linear time invariant systems. 4. To analyse discrete time signals. 5. To learn MATLAB for mathematical analysis.	
Course Outcomes:	**CO1**	Define the signals and systems with examples.
	CO2	Define the Fourier Transform and its properties.
	CO3	Explain the inter connections of LTI systems.
	CO4	Explain the operations on discrete time signals.
	CO5	Know the predefined key words and some control flow statements in MATLAB.
Course Content:	**UNIT – I** **Continuous Time Signals:** Signal classification – Dirac delta-types of signals unit sep, ramp, sign and exponential functions – Operations on signals- Analogy between vectors and signals – Orthogonality – Mean square error – Computation of moments, energy power, periodicity - power and energy spectral densities – Auto and cross correlation signals. **UNIT – II** **Fourier series:** Definition-Dirichlet's conditions –classification of Fourier Series-properties of Fourier Series. Fourier transform: Existence of Fourier Transform- Properties of Fourier Transform-Inverse Fourier transform. Parseval's Theorem of Energy and Power signals. **UNIT – III** **Continuous Time Systems:** Classification of systems – Linearity and time invariance – Transmission of signals through LTI systems – Convolution – Impulse response – Frequency response – Ideal filters – Distortion less transmission – Band Width – Rise time – Hilbert transform – Pre and complex envelopes – Band pass signals through band pass systems. **UNIT – IV** **Discrete Time Signals and Systems:** Unit impulse, step, ramp, and exponential signals – Periodicity of signals – Operations of signals – Linear Shift Invariant(LSI) system – Stability – Causality – Convolution and Correlation – Linear constant coefficient difference equation – Impulse response – Discrete time Fourier transform – Properties – Transfer function – System analysis using DTFT. **UNIT-V** **MATLAB**: Introduction –Basic operations on Matlab –generation of signals – correlation-Convolution-Computation of Fourier Transform-Solving difference equations. Computation of Z-Transform.	
Text Books & Reference Books:	**Text Books:** 1.Oppenheim. A.V, Wilekey, A.S.and Young, I.T. "Signals and Systems, PHI 2.Simon Haykin. " Communication System", Wiley Eastern Ltd., New Delhi. 3.Sanjithk.Mithra Digital Signal Processing with MATLAB, TMH Publications.	

	Reference Books: 1. Ashok Ambardar, "Analog and Digital Signal Processing", Thomson Learning Inc. 2.B.P. Lathi, "Signals, Systems and Communications", B.S. Publications.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EC2102 – ELECTRONIC DEVICES & CIRCUITS
(Common to EEE and ECE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Electronic Devices, Electrical Circuits and Fundamentals of Mathematics	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1.Understand different semiconductor devices construction and operation. 2.Identify and model a BJT and understand its characteristics. 3.Analyse the working of various types of amplifiers. 4.Design and analyse FET amplifiers. 5.Differentiate feedback amplifiers and understand the working of oscillators.	
Course Outcomes:	**CO1**	Understand the operation and sketch the characteristics of SCR, DIAC and UJT.
	CO2	Define small signal single stage BJT amplifier.
	CO3	Define hybrid- π model of BJT amplifier with their typical values.
	CO4	Design different methods to bias FET amplifier.
	CO5	Explain the concept of feedback.
Course Content:	**UNIT-I** **Opto Electronic Devices:** Photo emission, principle of operation of photo conductors – photo diodes, transistors, LED and LCD. **Special semiconductor devices:** operation of SCR, DIAC, TRIAC and UJT. **Rectifiers:** Diode equivalent circuit, Half-wave, Full-wave and Bridge rectifiers, Analysis of filters with full wave rectifier. **UNIT-II** **BJT Amplifiers :** BJT biasing schemes, Stability(Ico,V_{BE} and β), Hybrid model, Small signal analysis of signal stage BJT amplifiers, Comparison of CE, CB and CC amplifiers, Approximate model analysis, Effects of coupling and bypass capacitors on low frequency response, **UNIT-III** **BJT High frequency analysis:** Hybrid-π model at high frequencies, Parameters f_{β} and $f_{T.}$ **Multistage Amplifiers:** Types of coupling, Analysis of multistage amplifiers, overall voltage gain and Bandwidth of n-stage amplifier, Darlington and Bootstrap circuits. **UNIT-IV** **FET Amplifiers:** FET biasing scheme, Small signal model, Analysis of CS &CD amplifiers, High frequency response. **UNIT-V** **Feedback amplifiers:** Feedback concept, Classification, Effect of negative feedback on gain, Stability, Noise, Distortion, Bandwidth, Input and Output resistance. Different types of feedback circuits without analysis. **Sinusoidal Oscillators:** Barkhausen criterion, RC phase shift, Wien Bridge, Hartley, Colpitts and Crystal oscillator.	
Text Books & Reference Books:	**Text Books :** 1.Mottershed, "Electronic devices and circuits", PHI. 2.Millman and Halkias, "Integrated Electronics", McGraw- Hill Co. **Reference Books:** 1.Electronic devices and circuits by Boylestad, Louis Nashelsky, 9ed..,2008PE 2.DavidA.Bell. "Electronic Devices and circuits", PHI.	

	3.AdelS.Sedra,KennethC.Smith, "Micro Electronic Circuits", Holt Sander's Japan.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE2101 – ELECTROMAGNETIC FIELDS
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Knowledge of vector analysis, co-ordinate system, vector calculus, differentiation of scalars and vectors.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. Develop knowledge of key facts as outlined during the course. 2. Develop a suitable knowledge of fundamentals of static and time changing electric and magnetic fields. 3. Able to explain Maxwell's equations and their applications. 4. Able to explain wave propagation in transmission lines.	
Course Outcomes:	**CO1**	Ability to calculate electric field and potential using gauss's law.
	CO2	Ability to calculate capacitance, energy stored in dielectrics.
	CO3	Ability to find magnetic field intensity due to current, the application of ampere's law and the Maxwell's second and third equations.
	CO4	Ability to calculate the magnetic forces and torque produced by currents in magnetic field.
	CO5	Students will gain knowledge on time varying fields and get ability to calculate Induced EMF.
Course Content:	**UNIT – I** **ELECTRO STATIC FIELDS:** Coulomb's law, Electric field Intensity, Electric flux density and Gauss's law, Gauss's law in point form, Electrostatic potential, Potential gradient, Energy stored in Electric field. **UNIT – II** **CONDUCTORS AND DIELECTRICS:** Current and current density, Continuity equation, Conductors – Ohm's Law, Resistance Power dissipation and Joule's Law, Dielectrics, Dipole Moment, Polarization, Bound change densities, Boundary conditions, Capacitance. **UNIT – III** **MAGNETO STATIC FIELDS:** Lorentz force law, Ampere's circuital law, Ampere's force Law, Biot Savart law, Ampere's circuital law in point form, Magnetic vector potential. **UNIT – IV** **MAGNETIC FIELD IN MATERIALS:** Dipole moment, Magnetization, Bound current densities, Boundary conditions, Magnetic circuits, Inductance, Energy stored in Magnetic field. **UNIT –V** **MAXWELL'S EQUATIONS:** Faraday's law-Motional and transformer induced E.M.F., Maxwell's equations, Faraday's law, Faraday's law in point form, Displacement current, Wave equation and its general solution for free space conditions.	
Text Books & Reference Books:	**Text Books:** 1. "Engineering Electromagnetics" by William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006 . 2. "Electromagnetic Fields" by Sadiku, Oxford Publications. **Reference Books:** 1. "Electromagnetics" by Joseph A.Edminister, McGraw-Hill 2nd Edition. 2." Electromagnetic waves and radiating system" byEdward C.Jordan and keith	

	G.Balmain, prentics-hall of inndia pvt.Ltd. 3. "Electromagnetics" by J P Tewari, Khanna Publishers. 4. "Field Theory" by K.A.Gangadhar & PM Ramanathan Khanna Publishers New Delhi, 2005, 5th Edition.
E-Resources	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE2102 – CIRCUITS & NETWORKS
(Common to EEE and ECE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Basic concepts of Ohm's Law, Kirchhoff's Laws. Basic knowledge of calculus and trigonometric principles are required.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1.To provide fundamentals of Electrical circuits. 2.To understand concepts of Network theorems. 3.To understand concepts of locus diagrams for electric circuits. 4. To understand concepts of Three phase circuits and calculations. 5.To learn the concepts of electrical transients.	
Course Outcomes:	**CO1**	Understand operating principles of circuits by various theorems, possess knowledge to draw the locus diagrams of series and parallel circuits.
	CO2	Ability to analyze the basic features of three phase circuits, phase-line values for balanced & unbalanced systems and measurement of three phase power.
	CO3	They can understand how to find the hybrid and transmission network parameters from Z & Y parameters by inter-relationships.
	CO4	Ability to determine the network parameters, symmetry and reciprocity conditions of networks, complex frequencies, pole – zero plots.
	CO5	Able to Understand about transient response of circuits for different excitations using time domain and Laplace transform methods.
Course Content:	**UNIT –I** **Network theorems:** Superposition, Reciprocity, Thevenin's and Norton's theorems, Maximum power transfer theorem, Millman's theorem, Application of these theorems to DC and AC networks. Locus diagrams of RL & RC series circuits, Locus diagrams of two branch parallel circuits. **UNIT-II** **Three phase circuits:** Advantages of three phase systems - Phase sequence - Star - Delta transformation - Balanced & unbalanced three phase systems - Magnitude & phasor relationships between phase and line voltages & current in balanced star and delta circuits - Analysis of balanced and unbalanced three phase circuits- measurement of three phase power. **UNIT-III** **Two port Network Parameters** - Open circuit parameters – Short circuit parameters – Transmission parameters - inverse transmission parameters - Hybrid parameters – Inverse hybrid parameters - Inter-relationships of different parameters –Condition for reciprocity and symmetry of networks with different two port parameters - Terminated two port networks – Image parameters. **UNIT-IV** **Network functions :** Single port & multi port networks - Immitance functions of two port networks – Necessary conditions for driving point functions & transfer function – Complex frequencies – Poles and zeros – Time domain	

	response from pole zero plots – Restrictions on pole-zero locations. **UNIT-V** **Transients:** Transient response of RL , RC & RLC circuits for DC & AC excitations using time domain & Laplace transform techniques - Determination of initial conditions - Concept of time constant – Transformed circuits -Transient response of RL , RC & RLC circuits for other types of signals using Laplace transform methods.
Text Books & Reference Books:	**Text Books :** 1. "Circuits & Networks" by A.Sudhakar and Shyam mohan – TMH publishers. 2. "Circuit Theory" by A.Chakarabarti - Dhanpat Rai publishers. 3. "Circuits & Systems" by K.M.Soni – Kataria Publishers. **Reference Books:** 1. "Network Analysis" by Vanvalkenberg 3rded, PHI publishers. 2. "Engineering Circuit Analysis" by Hayt & Kemmerly, TMH publishers.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE2103 – ELECTRO MECHANICAL ENERGY CONVERSION-I
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	The knowledge of principal of Electro Mechanical Energy Conversion , Fundamental concepts of magnetically coupled electric circuits	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To clearly understand the basic concepts of the Electrical Machines working in the modern Power System. 2. To understand the characteristics, operation and underlying theories of DC Machines. 3. To understand the characteristics, operation and underlying theories of Transformers.	
Course Outcomes:	**CO1**	Able to understand the constructional details and principle of operation of DC machines
	CO2	Able to identify the DC machines to meet various requirements by analyzing the load characteristics of different types of DC machines
	CO3	Able to understand starting and speed control methods of DC Motors
	CO4	Able to evaluate the performance of DC machine by calculating losses and efficiency
	CO5	Able to understand the construction, principle of operation and analyze the performance of Single phase transformers.
Course Content:	**UNIT – I** **DC generators:** Constructional details of DC machine -principle of operation - Armature windings -types of armature windings and its terminologies -EMF equation - wave shape of induced EMF -Armature reaction - its effects and compensating methods. **UNIT – II** **Types of DC generators:** Characteristics of different types of generators – critical field resistance and critical speed- commutation - methods of improving commutation -Compensating windings. **UNIT – III** **DC Motors:** working principle–types of DC motors -Torque and Power developed by armature - Speed control of DC motors -Starting of DC motors - Constructional details of 3 point and 4 point starters -Load characteristics of DC motors -Losses in DC machine - condition for maximum efficiency. **UNIT – IV** **Parallel operation of DC generators:** Parallel operation of DC shunt, series and compound generators. **Testing of DC machines:** Brake test -Swinburne's test - Hopkinson's test - Fields test -Retardation test -Separation of iron and friction losses. **UNIT – V** **Single Phase Transformers:** Constructional details - Principle of operation – EMF equation - Ideal transformer - Leakage flux -Phasor diagram of ideal and practical transformer on no load and loaded condition -Equivalent circuit - determination of parameters of equivalent circuit –Losses, efficiency and regulation.	

Text Books & Reference Books:	**Text Books:** 1."Theory and performance of Electrical machines" by J.B Gupta, SK Kataria publishers. 2."Electrical Machines" by Ashfaq Hussain ,Dhanpatrai& co. 3. "Electrical Machinery" by Dr. P.S Bimbhra, khanna publishers. **Reference Books:** 1. "Performance of DC Machines" by M.G.Say, Second edition,CBS publishers 2."Electrical machines" byI.J.Nagarath and D.P.Kothari second edition, Tata McGraw-Hill.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE21P1 – CIRCUITS AND NETWORKS LAB

Course Category:	Professional core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Basic concepts of Ohm's Law, Kirchhoff's Laws. Basic knowledge of Network Theorems is required.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	Able to understand analysis and design of electrical circuits	
Course Outcomes:	**CO1**	Students will able to analyse and design electrical circuits using circuit elements.
	CO2	Students able to understand the concept of different electrical theorems practically.
	CO3	Students will able to analyse Two port networks and to understand the concepts of resonance in R-L-C circuits.
	CO4	Students will able to analyse and calculate mutual inductance of coupled coils.
	CO5	Students will able to understand power and power factor concepts practically.
Course Content:	**LIST OF EXPERIMENTS** 1. Verification of Kirchhoff's Laws 2. Verification of Superposition Theorem 3. Verification of Reciprocity Theorem 4. Verification of Maximum Power Transfer Theorem 5. Determination of Two-Port Network Parameters 6. Measurement of Mutual Inductance 7. Locus Diagram of RC Series Circuit 8. Measurement of Power Using Wattmeter 9. Verification of Thevenin's Theorem 10. Resonance In RLC Series Circuit 11. Measurement of Time Constant & Rise Time in a RC Series Circuit 12. Measurement of Power Using 3-Ammeter Method 3-Voltmeter Method	

13EC2102 – ELECTRONIC DEVICES LAB

Course Category:	Professional core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Basic knowledge of Electronic Devices, Electrical Circuits and Fundamentals of Mathematics	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. Understand the characteristics of various Electronic Devices. 2. Demonstrates the uses and applications of semiconductor devices. 3. Determine the typical values of various electronic devices. 4. Plot the characteristics of various devices in terms of V & I. 5. Draw their equivalent circuits used in Electronic Circuits.	
Course Outcomes:	**CO1**	Understand the concepts of semiconductor devices.
	CO2	Use the devices for various switching applications.
	CO3	Design various electronic circuits using these devices.
	CO4	Apply the equivalent circuits to evaluate the typical parameters.
	CO5	Justify whether the devices are used in different commercial applications or not.
Course Content:	**LIST OF EXPERIMENTS** 1. P-N Junction diode characteristics (Ge& Si) . 2. Zener Diode Characteristics. 3. Bi-Polar Junction Transistor Characteristics (CE configuration). 4. Junction Field Effect Transistor characteristics. 5. Uni-Junction Transistor Characteristics. 6. Light Emitting Diode Characteristics. 7. Light Dependent Resistor Characteristics. 8. Photo Transistor Characteristics. 9. Thermistor Characteristics. 10. DIAC Characteristics.	

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY:: VIDYANAGAR (AUTONOMOUS)
(AFFILIATED TO JNTU ANANTAPUR:NELLORE)
SPSR NELLORE DIST
II YEAR OF FOUR YEAR B.TECH DEGREE COURSE – II SEMISTER
ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EVALUATION
(With effect from the academic year 2014-2015)
(For the batch admitted in the academic year 2013-2014)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	100
1	13SH2201	Engineering Mathematics - IV * #	4	-	-	4	2	40	2	40	0.8*Best of two+0.2*least of two	3	60	100
2	13EC2201	Switching Theory & Logic Design* #	4	-	-	4	2	40	2	40		3	60	100
3	13EE2204	Electro Mechanical Energy Conversion-II	4	-	-	4	2	40	2	40		3	60	100
4	13EE2205	Generation of Electric Power	4	-	-	4	2	40	2	40		3	60	100
5	13EC2204	Pulse & Analog Circuits*#	4	-	-	4	2	40	2	40		3	60	100
6	13SH2202	Economics & Accountancy*#	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
7	13EE22P2	Electro Mechanical Energy Conversion-I Lab			3	2	-	-	-	-	Day to Day Evaluation and a test (40 Marks)	3	60	100
8	13EC31P1	Pulse & digital Circuits Lab			3	2	-	-	-	-		3	60	100
		TOTAL	24	-	06	28	-	-	-	-		-	480	800

***ECE, # EEE**

13SH2201 – ENGINEERING MATHEMATICS-IV
(Common to EEE and ECE)

Course Category:	Mathematics	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Knowledge of linear and non-linear algebraic equations, differential equations and probability.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	This course aims to equip the student with a basic understanding of concepts of determination of roots of non-linear equations, curve fitting, solution of linear and non-linear algebraic equations, solution of ordinary differential equations. Describes the numerical interpolation, differentiation and integration, probability and statistics.	
Course Outcomes:	**CO1**	Students will be able to understand the basic theories and methods of solving of non linear equations differential equations, and to apply the fundamental techniques of solving iterative methods .Bisection and Newton Raphson methods. Understanding effectively fitting of a curve by the method of least squares method. And also understand the rank correlation and Regression of lines.
	CO2	Understanding effectively Iterative methods Gauss Jordan Gauss Elimination with Pivotal condensation Triangular factorization methods Gauss- Seidel and also understand Newton – Raphson iterative methods.
	CO3	Understanding effectively Taylor's and Euler's methods of first order differential equations. To obtain more desired accuracy and also understand R-K Grill method, Miles Predictor and corrector methods. which plays an important role in engineering subjects.
	CO4	To know the definitions of Newton's forward and backward interpolation formulae. also to understand Lagrange's interpolation formula. Understand effectively by Romberg method of integration
	CO5	Students will be able to understand the discrete and continuous Random variables .Understand effectively three important theoretical distributions Binomial, Poisson and Normal distribution.
Course Content:	**UNIT-I** **DETERMINATION OF ROOTS OF NON-LINEAR EQUATIONS:** Bisection Method - Iterative methods - Falsi position method – Newton Raphson method. **CURVE FITTING**: Fitting a straight line – Second degree curve by the method of least Squares – Power Curve by the method of least Squares. Correlation: Coefficient of correlation – Rank correlation – Regression of lines. **UNIT-II** **SOLUTION OF LINEAR AND NON-LINEAR ALGEBRAIC EQUATIONS:** Iterative methods – Gaus Jordan– Gauss Elimination with Pivotal condensation –Triangular factorization methods – Gauss- Seidel and Newton – Raphson iterative methods. **UNIT-III** **SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS:** Taylor's Series method – Euler's method –Euler's modified method — Runge-Kutta Second and Fourth order methods - Runge-Kutta Grill method – Milne's Predictor and Corrector methods for first order equations.	

	UNIT-IV **NUMERICAL INTERPOLATION, DIFFERENTIATION AND INTEGRATION:** Newton's forward and backward interpolation formula – Lagrange's interpolation formula - Numerical Differentiation by Richardson's extrapolation—Numerical integration by Romberg method. **UNIT-V** **PROBABILITY AND STATISTICS:** Introduction – Random variables – Discrete and Continuous distributions – Binomial, Poisson's and Normal distributions.
Text Books & Reference Books:	**Text Books :** 1.Higher Engineering Mathematics by Dr. B.S.Grewal. 2.Higher Engineering Mathematics by H.K Das et al. 3.Numerical Methods by Balagurusamy, Tata McGraw- Hill **Reference Books:** 1.Numerical methods by S.Armugam etal, Scitech 2.Engineering Mathematical Methods by B.V.Ramana ,TMH
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EC2201 – SWITCHING THEORY & LOGIC DESIGN
(Common to EEE and ECE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Basics of electronic devices and circuits, knowledge of iterative methods.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	This course aims to equip the student with a basic understanding of concepts of the number systems and codes, Boolean algebra, logic gates, combinational logic circuits, presents the design of combinational circuits, sequential circuits. Describes the memory devices.	
Course Outcomes:	**CO1**	Understanding of the fundamental concepts and techniques used in digital electronics, understand and examine the structure of various number systems and its application in digital design.
	CO2	Ability to identify basic requirements for a design, application and propose a cost effective solution.
	CO3	The ability to understand, analyse and design various combinational circuits.
	CO4	The ability to understand, analyze and design various sequential circuits and the ability to identify and prevent various hazards and timing problems in a digital design.
	CO5	The ability to understand digital Memory circuits.
Course Content:	**UNIT – I** **Number Systems and codes:** Number systems, conversions, complements, arithmetic operations, signed binary numbers, BCD, Grey, ASCII, Parity bit and hamming code. **Boolean algebra and Logic Gates**: NOT, OR, AND operations, Boolean theorems, De-Morgan's theorem, logic gates, Universal gates and IEEE standard logic symbols. **UNIT – II** **Combinational logic circuits:** Standard forms of logical functions, Min-term and max-term specifications, Simplification by K-maps, Incompletely specified functions, prime implicants, essential prime implicants, Realization of logical functions using gates. **UNIT –III** **Design of combinational circuits:** Design procedure, Binary adders and sub-tractor,Serial and parallel adders, IC parallel adder, Decoders, encoders, Multiplexers, De-multiplexers and Digital magnitude comparator. **UNIT – IV** **Sequential circuits:** Latch, flip-flops (SR, JK, D & T), Timing problems, master-slave flip-flop and Shift registers. **Design of sequential circuits:** Asynchronous, synchronous counters, Ring and Johnson counters. **UNIT-V** **Memory Devices:** Terminology, ROM, PROM, EPROM, EEPROM, Semiconductor RAM (SRAM & DRAM) and its architecture, Memory expansion.	

Text Books & Reference Books:	**Text Books** 1.Digital design by Morris Mano 2.Fundamentals of logic design by Roth & Charles 3.Ronald J.Tocci, Neal S.Widmer, "Digital systems — Principles and applications".8th edition, Pearson Education Asia, 2001. **Reference Books:** 1.Fundamentals of logic circuits by A.Anand Kumar 2.Jon M, Yarbrough, "Digital logic — applications and de sign", Thomson — Brooks India edition.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE2204 – ELECTROMECHANICAL ENERGY CONVERSION-II

(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Fundamental laws of electrical & magnetic circuits, Transformer action and motor principles.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	This course aims to equip the student with a basic understanding of concepts of the electrical machines working in the modern power system. Furthermore, modelling and analysis of various types of motors is carried out. Describe the construction and principle of operation of three phase transformers, autotransformers and three phase induction motors.	
Course Outcomes:	**CO1**	Able to test the single phase transformers and principle of autotransformer including its copper savings.
	CO2	Able to analyze the performance of poly-phase transformers and their testing.
	CO3	Able to analyze constructional details, types and performance of three phase induction motors.
	CO4	Able to conduct various tests on three phase induction motor and analyze their starting methods.
	CO5	Able to control the speed of induction motors by various methods and analyze double cage induction motor.
Course Content:	**UNIT-I** **Testing of 1-ϕtransformers:** Predetermination of performance from OC and SC tests - Sumpner's test - separation of hysteresis and eddy current losses - Parallel operation of transformers - load sharing. **Autotransformer:** principle-saving of copper - realization of two winding transformer as autotransformer. **UNIT-II** **Poly-phase transformers:** Poly-phase connections – Star/Delta, Delta/Star, Star/Star, Delta/Delta, Star/zigzag Star, Delta/zigzag Star connections and their Phasor diagrams - Scott connection - Open Delta connection - Testing of three phase transformers. **UNIT-III** **3-ϕ induction motor:** Constructional details – types-production of rotating magnetic field-principle of operation-phasor diagram-Equivalent circuit-Torque equation-Starting and maximum torques -Maximum output-Slip for maximum output- Torque-slip characteristic - losses and efficiency-no load and blocked rotor tests-determination of equivalent circuit parameters. **UNIT-IV** **Testing of 3-ϕ induction motor:** Brake test - Pre-determination of performance from no load and blocked rotor tests - circle diagram. **Methods of starting:** Auto transformer, star delta and rotor resistance starters. **UNIT-V** **Speed control of induction motors:** Pole changing - cascade connection-injection of e.m.f. into rotor circuit - introduction to V/f control of three phase induction motor. Double cage induction motor-Construction theory - equivalent circuit-characteristics and applications- Induction generator - Theory, construction, operation, equivalent circuit and applications.	

Text Books & Reference Books:	**Text Books :** 1."Theory and performance of Electrical machines"-J.B Gupta, SK Kataria publishers. 2."Electrical Machines" by Ashfaq Hussain , Dhanpat rai & co. **Reference Books:** 1."Electrical Machinery"-Dr. P.S Bimbhra, khanna publishers. 2."Electrical machines" by I.J.Nagarath and D.P.Kothari second edition, Tata Mc Graw-Hill. 3."Performance and design of Aletrnating current machines" by M.G.Say,CBS Publishers
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE2205 – GENERATION OF ELECTRICAL POWER
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Fundamental knowledge of dc power generation, renewable and non renewable sources.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	This course aims to equip the student with a basic understanding of concepts of the electrical power generation by thermal, hydel, nuclear and nonconventional sources. Describes the Principle of MHD generation and economic aspects of power generation.	
Course Outcomes:	**CO1**	To Analyse the performance of various units involved in thermal power plant.
	CO2	Knowledge of the operation, construction and design of various components of hydro and nuclear power plant.
	CO3	To calculate renewable energy potentials and do financial analysis of renewable energy Projects.
	CO4	To analyse the MHD power generation in open and closed loop systems.
	CO5	Ability to calculate usage of electrical power and to plot the power/energy demand in the form of graph.
Course Content:	**UNIT-I** **Thermal Power Stations:** Introduction, Selection of site and description of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses.- Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Electronic precipitator, Chimney and Cooling towers. **UNIT-II** **Hydro-Electric Plants:** Introduction, Selection of site for Hydro – electric plants, classification of Hydro – electric plants, Hydel Station layout, Description of main components, types of turbines, pumped Storage plant. **Nuclear Power Stations:** Nuclear Fission and Chain reaction.- Nuclear fuels.- Principle of operation of Nuclear reactor.-Reactor Components: Moderators, Control rods, Reflectors and Coolants.- Radiation hazards: Shielding and Safety precautions.- Types of Nuclear reactors and brief description of PWR, BWR and FBR. **UNIT –III** **Non conventional sources of energy and plants:** Basics of Solar energy generation: Role and Potential of solar energy, solar Radiation, Solar energy collectors, Solar energy storage, solar applications. **Basics of wind energy generations:** Role and potential of wind energy option, wind mills, variation of power output with wind speed, Betz criterion, applications. **UNIT –IV** Principle of MHD generation, MHD Cycles and working fluids, open cycle MHD system, Closed Cycle MHD System, advantage of MHD generation, voltage and power output of MHD generator, parameters governing power output. Tidal power generation and Tidal plants, geothermal power, principle of operation.	

	UNIT –V **Economic Aspects of power generation:** Load curve ,load duration and integrated load duration curve, Mass curve, number and size of generator units, Demand factor, Diversity Factor, plant use factor, Plant Capacity Factor, Utilization Factor, Cost of generation and their division into fixed, semi fixed and running cost. Tariff Methods**:** Objectives of Tariff, Tariff methods.
Text Books & Reference Books:	**Text Books :** 1."Generation of Electrical Energy"- by B.R Gupta-S.Chand Publications. 2."A Text Book on Power System Engineering"by M.L Soni, P.V Gupta, O.S Bhatnagar- Dhanpat Rai & Co. 3."Principles of Power System" by V.K Mehta & Rohit Mehta- S.Chand Publications. **Reference Books:** 1. "Generation, Distribution and Utilization of Electrical Energy" by C.L Wadhwa-New age International 2. "Non Conventional Energy Sources" by G.D Roy- Khanna-Publishers.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EC2204 – PULSE AND ANALOG CIRCUITS
(Common to EEE & ECE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Knowledge of electronic devices and circuits, Laplace transformations and counter integrations.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	This course aims to equip the student with a basic understanding of concepts of the wave shaping circuits, multivibrators, Schmitt-trigger, time base circuits, MOS transistor. Describes the power amplifiers and tuned amplifiers.	
Course Outcomes:	**CO1**	Able to design the circuits for generating desired wave shapes(non-sinusoidal) for different applications like computers, control systems and counting and timing systems.
	CO2	Able to design the RC circuits for triggering.
	CO3	Able to design free running oscillators.
	CO4	Able to understand different types of Power Amplifiers.
	CO5	Ability to understand MOS Transistor & Tuned amplifiers.
Course Content:	**UNIT-I** **Wave shaping circuits**: Types of waveforms, RC low pass and high pass circuits, rise time, tilt, Diode as a switch, Diode clipper and clamper circuits. **UNIT-II** **Multivibrators:** BJT switch and switching times, Bistable & triggering methods, Schmitt-trigger, Mono-stable and Astable multi-vibrators using BJT. **UNIT-III** **Time Base circuits:** RC sweep circuits, constant current Miller and Bootstrap time base generators using BJT's, UJT relaxation oscillators, and sampling gates. **UNIT-IV** **MOS Transistor:** MOS and CMOS Structure, operation (enhancement and depletion mode), I/V Characteristics, Second Order effects - MOS Device capacitance and Small signal model. **UNIT-V** **Power Amplifiers:** Class-A, Transformer coupled Class-A, Class-B Push-pull, Complementary Class-B push-pull amplifiers. **Tuned amplifiers:** Introduction, Q-factor, small signal tuned amplifiers, effect of cascading single tuned amplifier on bandwidth and stagger tuned amplifiers.	
Text Books & Reference Books:	**TEXT BOOKS:** 1. Milliman&Taub "Pulse & Digital switching waveforms", McGraw-Hill. 2. Pulse and Digital circuits by A.Anand Kumar,2005,PHI. 3. Design of analog CMOS Integrated circuits by Behadrazhavi. 4. Millman and Halkias, "Integrated Electronics", McGraw- Hill Co. 5.Electronic Circuit analysis by A.P Godse&Bakshi **References:** 1. David A. Bell, Solid state pulse circuits: ,PHI. 2.Electronic devices and circuits by Boylestad, Louis Nashelsky, 9ed..,2008PE	
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm	

13SH2202- ECONOMICS AND ACCOUNTANCY
(Common to EEE and ECE)

Course Category:	Humanities	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Knowledge of demand, utility, marketing and finance.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	This course aims to equip the student with a basic understanding of concepts of demand analysis, theory of production and banking, classification of markets, pricing under perfect competition, monopoly, price discrimination, types of business organizations. Describe the concepts and principles in financial accounting, journal and ledger, trail balance, final accounts, basic concepts in capital budgeting process.	
Course Outcomes:	**CO1**	Able to demonstrate an ability to define analyze and identify the appropriate solution to a business problem using sound economic and accounting principles.
	CO2	Able to know the role of various cost concepts in managerial decisions and also the managerial uses of production function.
	CO3	Able to understand to take price and output decisions under various market structures.
	CO4	Able to know in brief formalities to be fulfilled to start a business organization.
	CO5	Able to analyse the firm's financial position with the techniques of economic aspects as well as financial analysis.
Course Content:	**UNIT – I** **DEMAND ANALYSIS:** Definition and basic concepts of Economics – consumer's equilibrium: Marginal Utility Analysis - the concept of Demand - Law of Demand – Elasticity of Demand: Types, determinants and its importance. **UNIT – II** **THEORY OF PRODUCTION AND BANKING:** Production function – Cobb – Douglas production function and its properties – Law of variable proportions – Law of Returns to Scale – Cost concepts – Revenue curves – Break-Even Analysis. Money-functions of Money-Functions of Commercial Banks-Features of Indian Economy. **UNIT – III** **MARKETS:** Classification of markets – Pricing under perfect Competition – Pricing under Monopoly – Price discrimination – Monopolistic Competition. **UNIT – IV** **TYPES OF BUSINESS ORGANIZATIONS:** Sole tradership, partnership and Joint Stock Companies – Formation of companies - Shares and debentures. **UNIT – V** **FINANCIAL & MANAGEMENT ACCOUNTING:** Concepts and principles in Financial Accounting, Journal and Ledger, Trial Balance, Final Accounts: Trading Account, Profit and Loss account and Balance Sheet. Basic concepts in Capital Budgeting process and Methods – Working Capital: operating cycle, factors and sources.	

Text Books & Reference Books:	**Text Books:** 1. Managerial Economics and Financial Analysis: A R Aryasri 2. Management Accounting : S N Maheswari 3. Economic Analysis : K. Sankaran **Reference Books:** 1.Double entry book keeping : Battlibai 2.Cost Accounting : Jain and Narang 3.Managerial Economics : Maheswari and Varshaney
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE22P2-ELECTRO MECHANICAL ENERGY CONVERSION-I LAB

Course Category:	Professional core	**Credits:**	2
Course Type:	Laboratory	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Fundamentals of DC machines	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	This course aims to equip the student with a basic understanding of concepts of electrical machines and capable of operating them to determine the various characteristics and test data.	
Course Outcomes:	**CO1**	Able to determine the critical field resistance and critical speed of DC Generator
	CO2	To predetermine the efficiency of a given DC Shunt machine working as Motor and Generator.
	CO3	Able to obtain performance characteristics of DC Motors and Generators
	CO4	To determine the efficiencies of DC Series and Shunt generators
	CO5	To predetermine the efficiency and load test on single phase transformer.
Course Content:	**LIST OF EXPERIMENTS** 1. Excitation Charactersistics of a. Seperately Excited DC Generator b. Self Excited DC Shunt Generator 2. External Charactersistics of DC Shunt Generator 3. External Charactersistics of DC Compound Generator 4. Swineburne's Test 5. Brake Test on DC Shunt Motor 6. Brake Test on DC Series Motor 7. Speed Control of DC Shunt Motor 8. Hopkinsons Test 9. Seperartion of Losses of DC Shunt Motor 10. Open Circuit and Short Circuit Test on 1-Φ Transformer 11. Load Test on 1- Φ Transformer 12. Sumpner's Test 13. Parallel Operation of Two Transformers	

13EC31P1- PULSE AND DIGITAL CIRCUITS LAB

Course Category:	Professional core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Basic knowledge on logic circuits & gates, electronic devices.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	This course aims to equip the student with a basic understanding of concepts of electrical machines and capable of operating them to determine the various characteristics and test data.	
Course Outcomes:	**CO1**	Implement logic gates using diodes and transistors.
	CO2	Design various decoders and implement using multiplexers.
	CO3	Find out the uses and applications of synchronous and asynchronous counters.
	CO4	Analyze the importance of Pulse and Analog Circuits.
	CO5	Demonstrates how various multivibrators can be used to generate non sinusoidal waveforms.
Course Content:	**LIST OF EXPERIMENTS** 1. (A) Logic Circuits & Logic Gates (B) Realisation of all Gates Using NAND & NOR Gates 2. Full Adder & Full Subtractor 3. Decoder 4. Divided By N- Ripple Counter 5. Multiplexer 6. Divide By N-Synchronus Counter 7. RC Differentiator and RC Integrator 8. Diode Clippers and Clampers 9. Astable Multivibrator 10. Schmitt Trigger	

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY:: VIDYANAGAR (AUTONOMOUS)
(AFFILIATED TO JNTU ANANTAPUR:NELLORE)
SPSR NELLORE DIST
III YEAR OF FOUR YEAR B.TECH DEGREE COURSE – I SEMISTER
ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EVALUATION
(With effect from the academic year 2015-2016)
(For the batch admitted in the academic year 2013-2014)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	100
1	13EE3106	Linear Control Systems * #	4	-	-	4	2	40	2	40	0.8*Best of two+0.2*least of two	3	60	100
2	13EE3107	Electrical Measurements	4	-	-	4	2	40	2	40		3	60	100
3	13EE3108	Power Systems – I	4	-	-	4	2	40	2	40		3	60	100
4	13EC3103	Analog Circuits & Applications *#	4	-	-	4	2	40	2	40		3	60	100
5	13EE3109	Electromechanical Energy Conversion – III	4	-	-	4	2	40	2	40		3	60	100
6	13CE3107	Environmental studies*#	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
7	13EE31P3	Control Systems Lab			3	2	-	-	-	-	Day to Day Evaluation and a test (40 Marks)	3	60	100
8	13SH31P1	Advanced Communication Skills Lab			3	2	-	-	-	-		3	60	100
		TOTAL	24	-	06	28	-	-	-	-		-	480	800

***ECE, # EEE**

13EE3106 – LINEAR CONTROL SYSTEMS
(Common to EEE and ECE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Basic knowledge of differentiation, integration, Laplace and inverse Laplace transformation techniques required.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To teach the basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.. 2. To educate the students about types of system and how to control them and Can check the system to be stable, unstable or marginally stable 3. To educate the students to develop & design a system which may be useful for industry and public life. 4. To show how to use control theory to analyze and design advanced control systems for industrial problems such as trajectory tracking, disturbance rejection, and optimization	
Course Outcomes:	**CO1**	Understand various types of control systems and methods to obtain transfer function
	CO2	Develop mathematical models of physical systems
	CO3	Able to evaluate the stability of linear systems using different techniques
	CO4	Able to evaluate the response of linear systems using time domain and frequency techniques
	CO5	Able to design different types of compensators for linear systems
Course Content:	**UNIT –I** **Introduction to classical control systems:** Open loop and closed loop control systems- Types of feedback, Feedback and its effects- Transfer functions - block diagrams and their reduction- signal flow graphs - Mason's gain formula. **UNIT-II** **Mathematical modelling of physical systems:** Mathematical modeling and transfer functions of electrical, mechanical and electro-mechanical elements.- DC servo motors- two-phase A.C. servo motors – synchros. **UNIT-III** **Time domain analysis:** Introduction, Standard test signals, Time response specifications – steady state error constants. **Stability of control systems:** Routh Hurwitz criterion- Root Locus – rules for the construction of root loci- Introduction to proportional, derivative and integral controllers. **UNIT-IV** **Frequency domain Analysis:** introduction- Frequency domain specifications- Polar plots – Bode Plots- Nyquist stability criterion **UNIT-V** **Design of compensators:** Introduction - Need for compensators. Lag and lead compensators design in frequency domain.	

Text Books & Reference Books:	**Text Books:** 1. "Control system Engineering" by I.J.Nagrath and M.Gopal, Wiley Eastern Ltd. 2. "Control Systems" by A. Nagoor kani RBA publishers 3. "Control Systems" by A. Anand kumar PHI publishers **Reference Books:** 1 "Automatic Control systems" by B.C.Kuo, PHI publishers. 2"Discrete Time Control Systems" by K.Ogata, Pearson education. 3 "Control system Engineering" by NISE, Wiley, 2000.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE3107 – ELECTRICAL MEASUREMENTS
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Circuits and networks	**Sessional Evaluation:**	40
		Univ.Exam Evaluation:	60
		Total Marks:	100

Course Objectives:	1. To learn testing methods of energy meter and current transformer. 2. To learn measurement of low and medium resistance. 3. To learn the use of ac bridges for L and C measurement. 4. To learn the measurement of power and power factor. 5. To understand the basics of active and reactive power. 6. To understand the basics of current transformer and its applications	
Course Outcomes:	**CO1**	Analyze the characteristics of the instrument and understand the working and construction of various types of measuring instruments .
	CO2	Gain knowledge on construction and working of the measurement of power and energy
	CO3	Understand the working and construction of instrument transformers and gain the knowledge on measurement of frequency, power factor.
	CO4	Analyze the standardization, working and construction of D.C. Crompton's, polar and coordinate type Potentiometers.
	CO5	Get basic knowledge of bridge balance condition and can find unknown values of Resistances, Inductance, capacitance and frequency.
Course Content:	**UNIT-I** **General theory of instruments:** Accuracy, Precision, Resolution, sensitivity, Types of Errors. **Current and voltage measurement :**Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – deflecting torque and control torque – Errors and compensations, range extension–Ohmmeter, thermaltype meter -Electrostatic Voltmeters and their types. **UNIT –II** **Measurement of power and energy**:Single phase dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems. Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading. Three phase energy meter – trivector meter. **UNIT –III** **Instrument transformers**: CT and PT – Ratio and phase angle errors – design considerations –**P.F meters:** Type of P.F. Meters – dynamometer and moving iron type – 1-ph and 3-ph meters **Frequency meters:** resonance type and Weston type – synchroscopes. **UNIT-IV** **Potentiometers:**Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types standardization – applications	

	UNIT – V **Resistance measurement:**Ammeter voltmeter method – Wheatstone's bridge – Kelvin's double bridge – Megger – loss of charge method. **AC bridges**:Measurement of inductance - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance -Desauty bridge. Wien's bridge – Schering Bridge.
Text Books & Reference Books:	**Text Books:** 1."Electrical Measurements & Measuring Instruments", E.W. Golding &F.C.Widdis, A.H.Wheeler& Co, 2001. 2."Electrical & Electronic Measurements and Instrumentation", A.K. Sawhney, DhanpathRai& Co (P) Ltd, 2004. **References Books:** 1. "Electrical Measurements & Measuring Instruments", E.W. Golding &F.C.Widdis, A.H.Wheeler& Co, 2001. 2. "Industrial Instrumentation and control", S.K.Singh,Tata McGraw Hill, 2 edn.,2002. 3. "Electronic Instrumentation",H.S.Kalsi, Tata McGraw Hill, 2004. 4. "Electrical And Electronics Measurements",R.K.Rajput,S.Chand publications
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE3108 – POWER SYSTEMS-I
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Generation of electric power, Circuits and Networks	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To give an idea about the fundamental concepts of electrical power distribution, both AC & DC 2. To comprehend the different issues related to overhead lines and underground cables. 3. To train the students with a solid foundation in power system concepts required to solve engineering problems. 4. To provide the knowledge about the sag and various issues related to cables and transmission lines.	
Course Outcomes:	**CO1**	Design and evaluate the performance of D.C distribution and A.C distribution
	CO2	Calculate the various Transmission line parameters and have knowledge on different effects in transmission line.
	CO3	Have knowledge about the different types of insulators and corona effect in transmission line
	CO4	Have knowledge on calculation of sag for different cases.
	CO5	Have knowledge on underground cables and estimate the performance of underground cables with grading
Course Content:	**UNIT-I** **DC & AC distribution :** Comparison of single Phase , 3-phase 3 wire and 3 phase 4 wire system types of primary distribution system- types of Secondary distribution system-DC distribution fed at one end and at both ends -AC distribution fed at one end and at both ends – Kelvin's law –limitation of Kelvin's law **UNIT-II** **Line parameters:** Inductance and capacitance Calculation of Transmission line –Resistance, Inductance and Capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing – bundled conductor-effect of earth on capacitance. Skin and Proximity effects **UNIT-III** **Corona**-Description of phenomenon, factors affecting corona, critical voltage and critical power loss, radio interference. **Over head line insulators:** Introduction – Types of Insulators- potential distribution over a string of insulators – Methods of equalizing the potential, string efficiency **UNIT-IV** **Mechanical design of over head transmission line**-Calculation of sag for equal and unequal supports, loading on the conductors in an overhead line, variation of sag with load and temperature, string chart **UNIT-V** **Underground cables**-introduction – insulation types –insulating materials for EHV voltage cables –classification of cables-parameters of single core cable - grading of cables-capacitance of three core belted cable, break down of cables-cable installation-current rating of cables	

Text Books & Reference Books:	**Text Books:** 1."Electrical power system" by CL Wadhwa-New age International 2."Generation of electrical energy" by B.R. gupta S.chand publications 3."A Text book on Power System engineering" by M.L. Soni, P.V. Gupta, U.S. Bhatnagar-Dhanpatrai &Co. **References Books:** 1. "Power System Engineering" by I.J Nagarath & D.P Kothari, TMH Publications. 2. "Elements of power system analysis" by William D.Stevenson. Jr Mc GRAW-HILL International pub. 4th edition.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EC3103 – ANALOG IC APPLICATIONS
(Common to EEE and ECE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Electronic Devices, Electrical Circuits	**Sessional Evaluation:**	40
		Univ.Exam Evaluation:	60
		Total Marks:	100

Course Objectives:	1. To introduce the basic building blocks of linear integrated circuits. 2. To teach the linear and non-linear applications of operational amplifiers. 3. To introduce the theory and applications of analog multipliers and PLL. 4. To teach the theory of ADC and DAC. 5. To introduce the concepts of waveform generation and introduce some special function ICs.	
Course Outcomes:	**CO1**	To know the basics of the Integrated Circuits, and analyze the Performance of Integrated Circuits.
	CO2	To understand the classifications of Integrated Circuits, and can learn the various applications of the Integrated Circuits.
	CO3	To know the importance of Operational Amplifier, and to get the knowledge of various Logic families.
	CO4	To identify the differences between analog and Digital Integrated Circuits.
	CO5	Have good knowledge of analysing and design of circuits containing Op-Amps.
Course Content:	**UNIT-I** **Operational Amplifier:** Introduction to IC's, Op-amp ideal characteristics, internal circuit, differential amplifier and its transfer characteristic, derivation of CMRR & Improvement methods of Differential amplifier characteristics, DC and AC characteristics of Op-Amp, Inverting and non-inverting modes of operation, voltage follower and specifications of IC 741. **UNIT-II** **Op-Amp Application:** Summer, Integrator, Differentiator, Analog computation, Instrumentation amplifier, V to I and I to V converters, precision rectifiers, sample and hold circuit. **Comparators and Waveform generators:** Comparator , Regenerative comparator, Astable and monostable multivibrators using op-amp, Triangular Wave generator, Sine wave generators using op-amp(RC phase shift). **UNIT-III** **IC Timers:** 555 timer, Astable and Monostable modes. **Phase Locked Loops:** Basic Principles, Lock and capture range, voltage control oscillator(IC-566) IC PLL (565) and PLL applications. **UNIT-IV** **Active Filters:** Low pass, High pass and Band pass filters, state variable filters. **Voltage regulators:** series op-amp regulator, IC voltage regulators, 723 regulator, switching regulators. **UNIT-V** **ELECTRONIC DATA CONVERTERS:** Introduction, DACs- Weighted resister, R-2R and inverted R-2R.	

	Type of ADCs: Parallel comparator type, counter type, successive approximation and dual slope ADCs, Specifications of DAC and ADC.
Text Books & Reference Books:	**Text Books:** 1.D.RoyChoudary, ShailB.Jain, "Linear Integrated circuits", New Age International Publishers,2003. 2.Design of analog integrated circuits by Sergio Franco. **Reference Books:** 1. J. Michael Jacob,"Applications and design with analog Integrated circuits", PHI, EEE, 1997. 2. RamakantA.Gayakward, "Op-amps and linear Integrated circuits", LPE, 4th edition, pearson Education.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE3109 – ELECTROMECHANICAL ENERGY CONVERSION – III
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Basic electrical sciences, electromechanical energy conversion-I & II	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To Understand the theory of synchronous machines and its applications. 2. To Understand various types of electrical machines 3. To Understand the Comparison between the characteristics of different types of electrical machines and performing various tests on the machines.	
Course Outcomes:	**CO1**	Understand construction and working of different types of alternator.
	CO2	Determine the voltage regulation using different experimental methods and theoretical analysis.
	CO3	Understand the principles of synchronization and parallel operation with different operating conditions.
	CO4	Analyse the working and performance of Synchronous motor.
	CO5	Understand the construction, operation and starting methods of single phase induction motors and Stepper Motor.
Course Content:	**UNIT-I** **Synchronous generators**: Construction-types of alternators-armature windings-emf equation-armature reaction-leakage flux- synchronous reactance-equivalent circuit - phasor diagram-voltage regulation - pre-determination of regulation by synchronous impedance, ampere turn and potiertriangle methods-SCR andits importance. **UNIT-II** **Theory of salient pole machines:** Two reaction theory - phasor diagram - determination of Xd and Xq from Slip test- Expression for power output of cylindrical and salient pole alternators- power angle characteristics. **UNIT-III** **Parallel operation of alternators:** conditions for parallel operation-synchronization - load sharing - synchronizing power-operation on infinite bus bar-effect of change of excitation - effect of change of mechanical input - excitation systems.. **UNIT-IV** **Synchronous motor :**Theory of operation-phasor diagrams-variation of current and power factor with excitation - hunting and its suppression-Determination and predetermination of V and inverted V curves-methods of starting. **UNIT-V** **Single phase induction motors:**Principle of operation – double revolving field theory- cross field theory - equivalent circuit-determination of equivalent parameters. Starting methods - split phase motors, shaded pole motor - repulsion motor - universal motor and stepper motor.	

Text Books & Reference Books:	**Text Books:** 1. "Theory and performance of Electrical machines" by J.B Gupta, SK Kataria publishers. 2."Electrical Machines" by Ashfaq Hussain , Dhanpatrai& co. **Reference Books:** 1. "Electrical Machinery" by Dr. P.S Bimbhra, khanna publishers. 2. "Electrical machines" by I.J.Nagarath and D.P.Kothari second edition, Tata McGraw-Hill.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13CE3107 – ENVIRONMENTAL STUDIES
(Common to All branches)

Course Category:	Humanities	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Engineering Physics and Engineering Chemistry	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To give an idea of scope and importance of environmental studies and environmental components. 2. To describe and discuss the basic aspects associated with the structure and function of ecosystems and bio-diversity. 3. To understand the various natural resources environmental acts. 4. To analyze causes, effects and control of environmental pollution. 5. To apply apply the knowledge of environmental studies for certain case studies in India.	
Course Outcomes:	**CO1**	Able to understand the features of ecosystem and bio-diversity.
	CO2	Understand the management of major natural resources.
	CO3	Understand the causes, effects and remedial measures of environmental pollution.
	CO4	Able to understand effectives of elements on environment and disaster management
	CO5	Able to familiar with environmental acts and must be able to apply the knowledge of environmental studies to certain case studies.
Course Content:	**UNIT-I** Introduction: Definition, Scope and Importance of Environmental studies, Environmental Components. Ecosystem: Introduction, types, characteristics and functions of Ecosystems Bio-diversity and its conservation- Value of bio-diversity consumptive and productive use, social, ethical, aesthetic and option values. Threats to biodiversity-conservation of biodiversity. **UNIT-II** Environmental and natural resources management: a. Land resources and its importance, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer and pesticide problems. b. Forest Resources: Use and over-exploitation-Mining and dams-their effects on forest and tribal people. c. Water Resources: Use and over-utilization of surface and ground water, Floods and droughts, Water logging and salinity, Conflicts over water sharing, Rain water harvesting, clouds seeding and watershed management. d. Energy resources Energy needs: Renewable and non-renewable energy needs use of alternate energy sources, Impact of energy use of environment. **UNIT-III** Environmental Pollution: Local and global issues, Causes, Effects and control measures of Air pollution, Water Pollution, Soil pollution, Marine Pollution, Noise pollution. Solid waste management: Composting, Vermiculture- Urban and industrial wastes, recycling and reuse, Nature of Thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion. **UNIT-IV** Environmental Problems in India: Drinking water, Sanitation and public health. Effects of urbanization, Transportation, Industrialization on the quality of environment, Green revolution. Economy and Environment: The	

	economy and environment interaction, Sustainability, Environment Impact Assessment, Social Issues. **UNIT-V** Environmental Acts: Water (Prevention and control of pollution) Act-Air (Prevention and control of pollution) Act – Environment protection Act, Wildlife protection Act, Forest conservation Act, Coastal Zone Regulations. Case Studies: Silent valley project, Madhura Refinery and Taj Mahal, Tehri Dam, Kolleru Lake Aquaculture, Fluorosis in Andhra Pradesh. Field Work: Visit to Local Area having river/Forest/grass land/hill/mountain to document and environmental assets. Study of local environment-common plants, insects, birds. Study of simple ecosystemspond,visit to industries, water treatment plants, effluent treatment plants.
Text Books & Reference Books:	**Text Books:** 1. "Environmental science" by Anubha Kaushik and C.P.Kaushik. 2."Environmental science and Engineering" by P.Anandan and R.K.Kumaravelan. **Reference Books:** 1. "Introduction to Environmental science" by Y.Anjaneyulu. 2. "Environmental studies" by Dr B.S.Chauhan. 3. "Environmental science" by M.Chandra sekhar
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE31P3 – CONTROL SYSTEMS LAB

Course Category:	Professional core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	1.Basic knowledge of differential equation solution techniques. 2.Basic concepts of controllers and compensators. 3.Basic knowledge of bode plot and root locus technique. 4.Basic knowledge of AC and DC servo motors.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1.To introduce the mathematical techniques needed to analyze and design a system with different controllers and different compensators. 2.To gain practical knowledge about linear systems and their control techniques for open loop and closed loop systems.	
Course Outcomes:	**CO1**	Able to get knowledge of Feedback control and controller design.
	CO2	Able to model simple first order & second-order systems.
	CO3	Able to apply Laplace transform techniques to compare with frequency response laboratory measurements.
	CO4	Able to verify system design via Matlab/Simulink simulation tools.
	CO5	Able to identify system parameters from time traces of step inputs and from Bode diagrams of sinusoidal or sine sweep inputs.
Course Content:	**LIST OF EXPERIMENTS** 1. Frequency response specifications 2. Speed control of dc servo motor 3. Simulation of P,PI,PD,PID controller 4. State space model for classical transfer function using Matlab 5. Lag and lead compensators 6. Temperature controller using PID 7. Characteristics of ac servo motor 8. Root locus plot, bode plot of transfer function using Matlab. 9. Lag-lead compensators 10. Frequency response characteristics 11. Time response of second order systems 12. Simulation of transfer function using operational amplifier	

13SH31P1 – ADVANCED COMMUNICATION SKILLS LABORATORY

Course Category:	Humanities	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	1.Knowledge of issues around the world 2.Ability to use language in professional contexts 3.Understand the importance of maintenance of good relationships	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To understand the strategies of the interviews to facilitate better responses during the placements 2. To develop inter personal skills and be an effective goal oriented team player with idealistic, practical and moral values 3. Understand what constitutes proper etiquette in a professional environment. 4. To equip with a wide range of vocabulary technically and perform better in tests like GRE, TOEFL etc 5. To sharpen communication skills towards writing a persuasive resume and effective job application letters	
Course Outcomes:	**CO1**	To understand the strategies of the interviews to facilitate better responses during the 'Placement'.
	CO2	To develop inter personal skills and be an effective goal oriented team player with idealistic, practical and moral values.
	CO3	Understand what constitutes proper etiquette in a professional environment.
	CO4	To equip with a wide range of vocabulary technically and perform better in tests like GRE, TOEFL etc.
	CO5	To sharpen communication skills towards writing a persuasive resume and effective job application letters.
Course Content:	**LIST OF EXPERIMENTS** 1. **Vocabulary Building** – Synonyms and Antonyms, Word roots, One-word Substitutes, Prefixes and Suffixes, Study of word origin, Analogy, Idioms and Phrases. 2. **Group Discussion** – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of voice, Body Language, Relevance, Fluency and Coherence. 3. **Intrapersonal & Interpersonal Relationship Skills** - Intrapersonal & Interpersonal Relationship Skills - To be an Effective Team Player 4. **Resume' Writing** – Structure and Presentation, Planning, Defining the career Objective, Projecting ones strengths and Skill-Sets, Summary, Formats and Styles, Letter-Writing. 5. **Interview Skills** – Concept and Process, Pre-Interview Planning, Opening Strategies, Answering Strategies, Interview through Tele and Video-Conferencing. 6. **Corporate Etiquettes**- Dressing Etiquettes- Dining Etiquettes- Nonverbal Communication- Proximity of Place.	

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY:: VIDYANAGAR (AUTONOMOUS)
(AFFILIATED TO JNTU ANANTAPUR:NELLORE)
SPSR NELLORE DIST
III YEAR OF FOUR YEAR B.TECH DEGREE COURSE – II SEMISTER
ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EVALUATION
(With effect from the academic year 2015-2016)
(For the batch admitted in the academic year 2013-2014)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	100
1	13EC3201	Microprocessor and Interfacing * #	4	-	-	4	2	40	2	40	0.8*Best of two+0.2*least of two	3	60	100
2	13EE3210	Electronic Measurements	4	-	-	4	2	40	2	40		3	60	100
3	13EE3211	Modern Control Theory	4	-	-	4	2	40	2	40		3	60	100
4	13EE3212	Power Systems-II	4	-	-	4	2	40	2	40		3	60	100
5	13EE3213	Power Electronics	4	-	-	4	2	40	2	40		3	60	100
6	13EE32E1	Elective - I	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
7	13EE32P4	EMEC- II Lab			3	2	-	-	-	-	Day to Day Evaluation and a test (40 Marks)	3	60	100
8	13EE32P5	Electrical Measurements Lab			3	2	-	-	-	-		3	60	100
		TOTAL	24	-	06	28	-	-	-	-		-	480	800

***ECE, # EEE**

13EC3201 – MICROPROCESSOR AND INTERFACING
(Common to EEE, ECE and CSE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Logic circuit design ,A/D & D/A converters, fundamental programming skills	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. Understand the history and need of different types of microprocessor. 2. Learn and understand the internal architecture details, pin configuration, and their timing diagrams of 8085µp. 3. Develop various projects and to know complete architectural, programming, and interfacing details of 8085 microprocessor. 4. Understand the internal architecture details, pin configuration, and their timing diagrams of 8086µp. 5. Understand various Interrupts and their uses using 8086 Microprocessor. 6. Develop Programs in assembly level language of the 8086 family of microprocessors. 7. Learn techniques of interfacing between the processors and peripheral devices so that they themselves can design and develop a complete microprocessor based system. 8. Learn to interface 8257/8253/8259/8251 peripheral chips and I/O devices with 8086. 9. Design different real-time projects and they will know use of timers, interrupts and serial communication techniques. 10. Develop programs to control different hardware's using 8086µp.	
Course Outcomes:	**CO1**	Understand the evaluation of different types of microprocessors.
	CO2	Write efficient programs in Assembly level language of the 8085 family of µp's with the help of instruction set easily.
	CO3	Gain the knowledge on internal architecture of 8086µp (Execution unit, Bus interfacing unit, queue, and 8086 memory address).Programming structure and able to write programs in assembly language of the 8086 family of microprocessors.
	CO4	Know the techniques of interfacing between the processors and peripheral devices so that they themselves can design and develop a complete microprocessor based systems real time projects.
	CO5	Understand the inter connections of different co-processors, hardware knowledge of programmable devices like 8257/8253/8259/8251/8255 with 8086µp and developing hardware applications involving microprocessors.
Course Content:	**UNIT-I** **INTRODUCTION TO MICROPROCESSORS**:Evaluation of Microprocessors, Types of microprocessors, Architecture of 8085 microprocessor, pin configuration, Instruction Cycle, Timing Diagrams, Stack and Subroutines. **UNIT-II** **INSTRUCTION SET OF 8085 MICROPROCESSOR**:Addressing modes, Assembly Language Programs(8085) for addition, subtraction, multiplication, division etc., Interrupts of 8085, Memory and I/O interfacing of 8085 microprocessor. **UNIT-III** **Architecture of 8086 microprocessor:** Instruction set, Addressing modes, Interrupt system. Minimum mode and Maximum mode operations of 8086 and	

	its timing diagrams, Assembler directives, Assembly language programs (8086), Stages of software development. **UNIT- IV** **Data transfer schemes:**-synchronous, Asynchronous, Interrupt driven and DMA type schemes, Programmable interrupt controller (8259) and its interfacing, Programmable DMA controller (8257) and its interfacing, Programmable Interval Timer (8253) and its interfacing, Programmable communication Interface(8251 USART) and its interfacing. **UNIT-V** **Memory interfacing to 8086:**-Interfacing various types of RAM and ROM chips, PPI (8255) and its interfacing, ADC and DAC Interfacing, Waveform generation, Traffic light controller, Stepper motor control, temperature measurement and control.
Text Books & Reference Books:	**Text Books** 1.Ram . B," Fundamentals of Microprocessors and Micro controllers" ,DhanpatRai publications. 2.Douglas V. Hall, " Microprocessors and interfacing: Programming and hard ware", TMH, 2nd edition. **Reference Books:** 1.A.K. Ray and K.M. Bhurchandi, " Advanced Microprocessors and Peripherals", TMH. 2."Microprocessor Architecture, Programming, and Applications with the 8085" by Ramesh S. Gaonkar",Prentice Hall PTR.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE3210 – ELECTRONIC MEASUREMENTS
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Concepts of Analog ,Digital circuits and Basic Electronic devices	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	To understand various measurement techniques available and working of instruments used for the measurement.	
Course Outcomes:	**CO1**	Measure various electrical parameters with accuracy, precision, resolution.
	CO2	Use AC and DC bridges for relevant parameter measurement.
	CO3	Select appropriate passive or active transducers for measurement of physical phenomenon
	CO4	Use Signal Generator, frequency counter, CRO, bridges for appropriate measurement
	CO5	Test and troubleshoot electronic circuits using various measuring instruments
Course Content:	**UNIT- I** **Cathode Ray Oscilloscopes :** Motion of electron in electric field and in magnetic field – Block diagram of CRO, CRT, Electrostatic deflection sensitivity – Vertical and Horizontal deflection systems – Principle of operation of dual beam, dual trace, sampling and storage CROs – Measurements with CRO (voltage, current, time, frequency, phase angle, lissajous figures). **UNIT-II** **Digital instruments:** Digital voltmeters-Ramp- Dual slope- stair case-successive approximation types- Digital multimeter- universal counter- Digital tachometer- Digital phase meter Auto ranging- 3,3 $\frac{1}{2}$,3$\frac{3}{4}$ Digit display. **UNIT -III** **Signal Analyzers:** AF, HF Wave Analyzers. Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers-oscillators- Potentiometric recorders-Rectifier type instrument half wave and full wave, true RMS meter- Q-meter, **UNIT -IV** **Transducers:** Classification, Strain gauges, Bonded, unbonded; Force and Displacement Transducers. Resistance Thermometers-LVDT- Thermocouples, Digital Temperature sensing system. Piezoelectric Transducers, Variable Capacitance Transducers. Magneto strictive Transducers. **UNIT -V** **Measurement of Physical Parameters:** Flow Measurement. Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure - High Pressure, Vacuum level, Temperature - Measurements, Data Acquisition Systems.	
Text Books & Reference Books:	**Text Books:** 1.“Electronic Measurements and Instrumentation” , K. Lai Kishore, Pearson Education 2010. 2. “Electronic Instrumentation”, H.S.KalsiTMH, 2nd Edition 2004.	

	Reference Books: 1.. "Electronic Instrumentation and Measurements", David A. Bell, Oxford Univ. Press, 1997. 2. "Modern Electronic Instrumentation and Measurement Techniques" A.D. Helbincs. W.D. Cooper: PHI 5aEdition 2003. 3." Electronic Measurements and Instrumentation", B.M. Oliver, J.M. Cage TMH Reprint 2009. 4."Electornic Measurements & Instrumentation", Rajendra Prasad,kanna publishers 2009
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE3211– MODERN CONTROL THEORY
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	control systems, circuits and networks, Mathematics	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1.To derive mathematical models of typical engineering processes 2.To provide basic knowledge of control system analysis and design tools.	
Course Outcomes:	**CO1**	Design of compensators and controllers.
	CO2	Perform state variable analysis and examine the system stability, controllability and observability
	CO3	Develop state-space models and design state feedback controller and observer
	CO4	Basis idea of non-linearities and Stability analysis.
	CO5	Different techniques of non-linear systems stability analysis
Course Content:	**UNIT-I** **Linear system design:** Introduction of compensating networks – Lead, Lag, lead – lag cascade compensation – Feedback compensation – P, PI and PID controllers design using Bode plot and root locus techniques. **UNIT-II** **State variable analysis:** concepts of state, state variables, state vector, state space model system, representation in state variable form, phase variable representation – Diagonalization – Cannonical variable representation. **Controllability and Observability:** Definition of controllability – Controllability tests for continuous time systems – Definition of Observability – Observability tests for continuous time systems. **UNIT – III** **Time response of linear systems:** Introduction – Solution of state equations – State Transition matrix – Block diagram approach to Resolvant matrix – Sylvesters expansion theorem – Pole placement by state feedback – Full order and reduced order observers. **UNIT – IV** **Non linear systems:** Introduction – common physical non linearities, Singular points, Basic concepts of phase plane method, construction of phase trajectories by phase plane method. Basic concepts and derivation of describing functions. Stability analysis by describing function method. **UNIT – V** **Stability:** Introduction – Equilibrium points – Stability concepts and definitions Stability in the sense of Liapunov stability of linear system – Methods of constructing Liapunov functions for Non-linear system – Krasovskii's method – Variable gradient method.	

Text Books & Reference Books:	**Text Books:** 1."Advanced Control Systems" by A.Nagoor kani RBA publishers 2."Modern control system theory" by M.Gopal, TMH publishers. **Reference Books:** 1."Discrete Time Control Systems" by Ogata. K, 2nd edition, Pearson Publication. 2. "State functions and linear control systems" by Schultz and Melsa 3. "Control system Engineering" by NISE, Wiley, 2000. 4. "Modern control systems" by Richard. C. Dorfand. R. H. Bishop Addison Wesley longman
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE3212– POWER SYSTEMS-II
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	power system-I, circuits and networks	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To understand the design and performance of over head transmission lines and reactive power compensation 2. To understand the concepts of power system transients and power system earthing. 3. To understand the concept of attenuation, distortion and arcing grounds in power systems, substation key diagram and components, EHV and HVDC transmission. 4. To understand the concept of system modeling and per unit representations	
Course Outcomes:	**CO1**	Design and evaluate the performance of the over head lines
	CO2	Know the various power system transients of various transmission line termination and their effects on power system operation.
	CO3	Know the different types of power ear things
	CO4	Have knowledge on components in substation and different ways of transmitting the power.
	CO5	Perform the per unit method of representing quantities and can draw impedance and reactance diagram of a power system.
Course Content:	**UNIT-I** **Performance of transmission lines**: Representation of lines-Short transmission lines-Medium transmission lines-Nominal pie and T representation of long lines by distributed parameters-Equivalent T and Pie representation of long transmission lines – Evaluation of ABCD parameters of long lines-Ferranti effect-Power flow through a transmission line-Voltage control and line compensation-Introduction-Shunt capacitors-Series capacitors-Synchronous compensation, Receiving end power circle diagrams. **UNIT-II** **Power system transients:** Introduction-Circuit closing transients-Sudden symmetrical short circuit analysis of alternator-Recovery transient due to removal of a short circuit-Travelling waves on transmission line –Surge impedance and wave velocity-Specification of travelling waves-Reflections and refractions of waves-Different types of terminations-Forked line-Successive reflections-Beweley's Lattice diagram-Attenuation and Distortion. **UNIT-III** **Power system earthing:** Objectives-Definitions-Tolerable limits of body currents-Soil resistivity-Earth resistance-Tolerable Step and touch voltages-Design of earthing grid-Tower footing resistance-Neutral earthing-Ungrounded and effectively earthed system-Resistance, Reactance, Arc suppression coil earthing and grounding transformers. Arcing grounds-protection against arcing grounds. **UNIT-IV** **Substations:** Number and size-Location and installation-The main equipment's in substations- Bus bar arrangements-Key diagram of a typical primary substation.	

	Extra high voltage transmission: Introduction-Need for EHV and UHV-Environmental aspects in EHV and UHV lines-EHV systems in India. **HVDC transmission:** Introduction-Types of DC links-Advantages of DC transmission-Incorporating HVDC into AC systems-HVDC systems in India.FACTS introduction **UNIT-V** **System modelling:** Representation of transmission lines-Circuit representation of synchronous machine, two winding and three winding transformers-Per unit representation and advantages-Single line diagram representation-Impedance and reactance diagrams-Changing the base of per unit quantities.
Text Books & Reference Books:	**Text Books :** 1."Power system analysis and Design" byB.R.Gupta Wheelers publishing 3rd edition. 2."Electrical power system" by C.L.Wadhwa Newage publications. **Reference Books:** 1."Elements of power system analysis" by William D.Stevenson. Jr Mc GRAW-HILL International pub. 4th edition. 2."Power System Engineering" byI.J Nagarath and D.P Kothari, TMH Publications.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE3213– POWER ELECTRONICS
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Circuits and networks	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1.To provide knowledge about interface circuits between source and load. 2.To impart knowledge on single phase and three phase circuits. 3.To understand and acquire knowledge about various power semi conductor devices	
Course Outcomes:	**CO1**	Able to understand the construction and operation of SCR.
	CO2	Able to analyze the performance of phase controlled rectifiers for different loads.
	CO3	Able to analyze various types of converters.
	CO4	Able to identify suitable converter based on source and load requirements.
	CO5	Able to control develop skills to build and troubleshoot power electronic converters.
Course Content:	**UNIT-I** **Thyristors:** Silicon Controlled Rectifiers (SCR's) - Basic theory of operation of SCR – Static and Dynamic characteristics of SCR -Two transistor analogy-turn on methods–gate characteristics-Series and parallel operation of SCRs – Snubber circuit – Specifications and Ratings of SCR's - Commutation methods **UNIT-II** **Controlled Rectifiers:** Phase control technique – Single phase line commutated converters – Mid point and Bridge connections – Half controlled and full controlled converters with R, RL loads -without and with Free wheeling diode-Effect of Source inductance. **Three pulse and six pulse converters –** Mid point and bridge connections - average load voltage With R and RL loads **UNIT-III** **Choppers:** Step-down and step-up chopper - Derivation of output voltage-Time ratio control and current limit control strategies-types of choppers- Morgan' s chopper – Jones chopper and load commutated chopper - Waveforms. **UNIT-IV** **Inverters:** Single phase inverter –three phase inverters- Basic series inverter – Basic parallel inverter –Waveforms – forced commutated thyristor inverters – Mc Murray half bridge inverter- Voltage control techniques for inverters- Pulse width modulation techniques –introduction to CSI -Difference between voltage source inverter and current source inverter. **UNIT-V** **Ac Voltage Controller** - Single phase two SCR's in anti parallel – With R and RL loads – Derivation of RMS load voltage, current and power factor. **Cyclo converters** – Single phase mid point and bridge configuration cyclo converters with R and RL loads (step up and step down)	
Text Books & Reference Books:	**Text Books :** 1.*"Power Electronics: Circuits, Devices and Applications"* by M.H. Rashid, Pearson Education, PHI Third edition, New Delhi 2004.	

	2."Power Electronics" by P.S. Bimbra, Khanna Publishers, third Edition, 2003. *3."Power Electronics"* by *MD Singh* And Khanchandani TMH Publishes **Reference Books:** 1. *"Power Electronics for Technology"* by Ashfaq Ahmed Pearson Education, Indian reprint, 2003. 2. *"Power Electronics: Converters, Applications and Design"* by Ned Mohan, Tore.M.Undeland, William. P. Robbins, John Wiley and sons, third edition, 2003. 3. *"Elements of Power Electronics"* by Philip T. Krein, Oxford University Press, 2004 Edition.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE32E1– UTILIZATION OF ELECTRIC POWER
(EEE)

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Machines, drives	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1.This subject deals with fundamentals of illumination and its classification and the electrical heating and welding. 2.It gives the detailed study of all varieties of electric drives and their applications to electrical traction system	
Course Outcomes:	**CO1**	To understand the basic concepts of illumination and design of different lighting schemes.
	CO2	To understand the concepts of different electric heating and welding techniques.
	CO3	To understand the concepts of electrical drives ,different motor characteristics and load classification.
	CO4	To understand different traction system and electrical breaking concepts.
	CO5	To understand speed-time curves of different train services, calculation of tractive effort.

Course Content:

UNIT – I

Illumination - Introduction, terms used in illumination, laws of illumination, polar curves, sources of light, discharge lamps, MV and SV lamps – Comparison between tungsten filament lamps and fluorescent tubes- Basic principles of light control- Types and design of lighting schemes -lighting calculations- factory lighting, street lighting and flood lighting.

UNIT-II

Electric heating & welding: Advantages and methods of electric heating - types and applications of electric heating equipment- , resistance ovens- induction heating –dielectric heating-arc furnace -Electric welding –resistance welding and arc welding techniques.

UNIT –III

Electric drives – Types of Electric drives, Choice of motor, starting and running characteristics, Speed control, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT –IV

Electric traction: Systems of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motors, methods of electric braking – plugging, rheostatic braking and regenerative braking.

UNIT –V

Mechanism of train movement: Speed-time curves for different services – Trapezoidal and quadrilateral speed time curves – Calculations of tractive effort, power, specific energy consumption for a given run, effect of varying acceleration and braking retardation, adhesive weight and coefficient of adhesion.

Text Books & Reference Books:	**Text Books:** 1."Utilization of Electric energy" by E.Openshaw Taylor, Orient Longman 2."Utilization of Electrical power including Electric drives and Electric traction" by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996. **Reference Books:** 1. "Art & Science of Utilization of Electrical Energy" – by H.Partab, Dhanpat Rai &Sons. 2."Generation, Distribution and Utilization of Electrical energy" – by C.L.Wadhwa, New Age International (P) Limited, Publishers, 1997.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE32E2– EMBEDDED SYSTEMS
(EEE)

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Machines, drives	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	To introduce students to the modern embedded systems and to show how to understand and program such systems using a concrete platform built around	
Course Outcomes:	**CO1**	Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems..
	CO2	Become aware of the architecture of the ATOM processor and its programming aspects (assembly Level)
	CO3	Become aware of interrupts, hyper threading and software optimization.
	CO4	Design real time embedded systems using the concepts of RTOS.
	CO5	Analyze various examples of embedded systems based on ATOM processor
Course Content:	**UNIT-I** Introduction of embedded systems, their characteristics, modeling of systems, system specification languages, study of specification example. **UNIT-II** Specification translation, translation of various features such as state transition, message passing communication, concurrency, exception handling etc. **UNIT-III** System partitioning- Introduction, partitioning issues, partitioning algorithms, functional portioning, hardware/software partitioning algorithms, functioning for systems. **UNIT-IV** Design quality estimation- Quality metrics, hardware estimation, software estimation. **UNIT-V** Specification refinement- Refining variable grouping, channel refinement, resolving access conflict, refining incompatible interfaces, Refining hardware/software interfaces. Study of a system design methodology and study of generic synthesis system.	
Text Books & Reference Books:	**Text Books :** 1.Specifiction and design of embedded systems, David D Gajski, Frandk vahid, S. Narayan, J Garg. **Reference Books:** 1..Embedded system design, Heath Steve and Newns 1997 2.Art of programming embedded Systems, J. Gassle	
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm	

13CS3208– DATA BASE MANAGEMENT SYSTEMS

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Fundamentals of File Systems and Storage Structures	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To expose the student to the basic concepts involved in designing and building a database management system 2. To know how normalization is important for DBMS and different normalization Techniques	
Course Outcomes:	**CO1**	Able to design a Database based on given requirements
	CO2	Able to make projects with knowledge of subject provided to them.
	CO3	Understand the use of Standard Query Language and its various versions.
	CO4	Able to apply normalization techniques on given database
	CO5	Able to understand File Organization and Indexing.

Course Content:

UNIT-II

Relational Model: Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing integrity constraints – Querying relational data – Logical data base Design – Introduction to view – destroying / altering Tables and Views.

Relational Algebra and Calculus: Relational Algebra – Selection and projection set operations – renaming joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus –Expressive power of algebra and calculus.

From of basic SQL Query – Examples of SQL Queries – Introduction to Nested Queries -

Correlated Nested Queries set – Comparison Operators – Aggregative operators NULL values – Comparison using NULL values – Logical connectivity's – AND,OR and NOTR – Impact on SQL Constructs – Outer joins –Disallowing NULL values – Complex integrity Constraints in SQL 0 Triggers and Active Data bases.

UNIT-III

Schema refinement – Problems caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS-FIRST, SECOND, THIRD Normal forms – BCNG – Lossless join Decompositions – Dependency preserving Decomposition – Schema refinement in data base design – Multi valued dependencies – Forth Normal form.

Overview of Transaction Management: ACID Properties – Transactions and Schedules – Concurrent Execution of transaction – Lock Based concurrency control – Performance locking – Transaction support in SQL – Introduction to Crash recovery.

UNIT-IV

Concurrency Control : Serializability and recoverability – introduction to Lock Management – Lock Conversions – Dealing with Dead locks – Specialized Locking Techniques – Concurrency with out locking.

Crash recovery: Introduction to ARIES – the Log – Other Recovery related structures – The Write Ahead Log protocol – Check pointing – recovering from a system Crash – Media recovery –Other approaches and interaction with Concurrency control.

	UNIT-V **Over view of Storage and Indexing:** Data on External storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data structures – Hash Based Indexing – Tree base Indexing – Comparison of file organizations – Indexes and performance Tuning. **Storage data:** Disks and Files:- The memory Hierarchy – Redundant Arrays of Independent – Disks –Disk Space Management – Buffer Manager – Files of records –Page formats – record formats. Tree Structured Indexing- Intuitions for free Indexes – Indexed sequential Access Methods (ISAM)-B+ **Trees :**A Dynamic Index Structure **Hash Based Indexing:** Static Hashing – Extendable hashing – Linear Hashing – Extendeblevs Linear Hashing.
Text Books & Reference Books:	**Text Books :** 1.Database Management system, Raghurama Krishna, Johannes Gehrke, TATA McGraw Hill, 3rd edition. 2.Database Systems Design, Implementation, and management, Rob & Coronel 5th Edition, Thomson. **Reference Books:** 1.Introduction to Database Systems, C.J.Data Pearson Eduction. 2.Database Systems Design, Implementation, and management, Rob & Coronel 5th Edition, Thomson. 3.Database Management System, ElmasriNavrate Pearson Education. 4.Database Management System Mathew Leon, Leon Vikas. 5.Database Systems, Connoley Pearson education.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13CS3205– COMPUTER ORGANISATION

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Knowledge of Digital Logic Design.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. Comprehend operational concepts and understand register organization in a basic computer system. 2. Understand the design of Central processing unit organization and various arithmetic operations with algorithms.	
Course Outcomes:	**CO1**	Students able to demonstrate knowledge of register organization of a basic computer system.
	CO2	Students able to incorporate In-depth understanding of control unit organization and micro programmed control.
	CO3	Students able to perform arithmetic operations and understand the performance of central processing unit of a basic computer system.
	CO4	Students able to analyze and emphasize various communication media in the basic computer system
	CO5	Develop an ability to analyze and design various memory structures
Course Content:	**UNIT-I** Register Transfer And Micro operations: Register transfer. Bus and memory transfers, Arithmetic micro operations. Logic micro operations, Shift micro operations. Arithmetic logic shift units. Basic Computer organization And Design: Instruction codes, computer Registers and instructions , timing and control, instruction cycles, memory reference instructions, Input Output and interrupt. **UNIT-II** Programming the basic control**:** Machine language, Assembly language, the assembler, programming arithmetic and logic operations, subroutines. Micro programmed Control: Control memory, address sequencing , micro program example, design of control unit. **UNIT-III** Central Processing unit: General register organization, stack organization, instruction formats, addressing modes, program control, RISC, parallel processing, pipelining, arithmetic pipe line, instruction pipe line. **UNIT-IV** Input – Output Organization: peripheral devices, input output interface, asynchronous data Transfer. Modes of transfer, priority interrupt, DMA, Input – Output Processor, Serial communication. **UNIT-V** Memory Organization**:** Memory hierarchy, main memory, auxiliary memory, associative memory, Cache memory, virtual memory, Characteristics of multi processors, interprocessor arbitration, inter processor communication and synchronization and cache coherence	
Text Books & Reference Books:	**Text Books:** 1. Computer System Architechture 3/e M.Moris Mano PHI-I 2.Computer Organization – V.C. Hemacher, Z.G.Vranesic and others Mc-Graw-Hill**.** **Reference Books:** 1. Computer architechutre and organization –Hays& Briggs –PHI 2.Computer Organization Willium stallings PHI.	

E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE32P4– ELCTRO MECHANICAL ENERGY CONVERSION –II LAB

Course Category:	Professional core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Electrical machines	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To prepare the students to have a basic knowledge of transformers. 2. To prepare the students to have a basic knowledge of induction machines. 3. To prepare the students to have a basic knowledge of alternators.	
Course Outcomes:	**CO1**	Have knowledge of various parts of a electrical machine.
	CO2	Able to conduct open circuit/ short circuit test on transformer.
	CO3	Ability to conduct experiments on Ac Machines to find the characteristics.
	CO4	Able to calculate torque and speed of given Machine
	CO5	Ability to conduct No Load and Full load tests on transformers/Induction Motor
Course Content:	**LIST OF EXPERIMENTS** 1. Scott Connection 2. 3-Ø Transformer Connections 3. Study of AC Windings 4. Circle Diagram of 3-Ø Induction Motors 5. Equivalent Circuit of 3-Ø Induction Motor 6. Load test on 3-Ø Induction Motor 7. Equivalent Circuit of 1-Ø Induction Motor 8. Voltage Regulation of an Alternator Using Synchronous Impedance and MMF Method 9. Voltage Regulation of an Alternator Using ZPF Method 10. Slip Test 11. Parallel operation of Two Alternators 12. V and Inverted V Curves of Synchronous Motor	

13EE32P5– ELECTRICAL MEASUREMENTS LAB

Course Category:	Professional core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Basic knowledge of circuit elements and networks	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1.To demonstrate various Bridges &sensors using simulation and hardware set ups. 2.To Measure Voltage, Current, Power factor, Power, Energy.	
Course Outcomes:	**CO1**	Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy
	CO2	Measurement of Magnetic Circuits.
	CO3	Measurement uses PMMC and Moving Iron type Instruments
	CO4	Measurement of power using LPF and UPF methods.
	CO5	Ability to balance AC Bridges to find unknown values.
Course Content:	**LIST OF EXPERIMENTS** 1. Range extension of ammeter and voltmeter 2. Measurement of capacitance using CRO 3. Capacitive transducer 4. Measurement of current with current transformer 5. Characteristics of RTD 6. Calibration of energy meter 7. Displacement measurement using LVDT 8. Wheatstone bridge 9. Characteristics of thermocouple 10. Characterstics of thermistors 11. Kelvin's double bridge 12. Wein bridge 13. Anderson's bridge 14. Schering bridge 15. Hay's bridge	

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY:: VIDYANAGAR (AUTONOMOUS)
(AFFILIATED TO JNTU ANANTAPUR:NELLORE)
SPSR NELLORE DIST
IV YEAR OF FOUR YEAR B.TECH DEGREE COURSE – I SEMISTER
ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EVALUATION
(With effect from the academic year 2016-2017)
(For the batch admitted in the academic year 2013-2014)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	100
1	13EC4101	Digital Signal Processing *#	4	-	-	4	2	40	2	40	0.8*Best of mid+0.2*other mid	3	60	100
2	13EE4114	Power Semi conductor Drives	4	-	-	4	2	40	2	40		3	60	100
3	13EE4115	Switch Gear And Protection	4	-	-	4	2	40	2	40		3	60	100
4	13SH4102	Management Science *#	4	-	-	4	2	40	2	40		3	60	100
5	13EE4116	Power System Analysis	4	-	-	4	2	40	2	40		3	60	100
6	13EE41E2	Elective-II	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
7	13EE41P6	Power Electronics Lab			3	2	-	-	-	-	Day to Day Evaluation and a test (40 Marks)	3	60	100
8	13EC41P1	Microprocessors and Applications Lab			3	2	-	-	-	-		3	60	100
		TOTAL	24	-	06	28	-	-	-	-		-	480	800

***ECE, # EEE**

13EC4101 – DIGITAL SIGNAL PROCESSING
(Common to EEE and ECE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Signals and systems, Fourier transforms, Laplace transform, Fourier series and basic fundamentals in mathematics	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To have an overview of signals and systems. 2. To learn Z-transforms and its applications. 3. To learn DFT & FFT Transforms. 4. To study the design of IIR, FIR filters. 5. To study the applications of DSP techniques in processors.	
Course Outcomes:	**CO1**	Able to apply Z-transforms and block-diagram reduction techniques to discrete time systems
	CO2	Able to develop pulse transfer function and state space models of the given discrete time system.
	CO3	Able to investigate controllability, observability and stability of control systems for pole placement at desired locations.
	CO4	Able to design different controllers in time/frequency domain to improve the system performance.
	CO5	Able to design full order and reduced order observers for state estimation.
Course Content:	**UNIT – I** **Review of Discrete signals & systems:** Z-transform and Inverse Z- transform, Theorems and Properties, system function, Sampling the Z- Transform, Fourier representation of finite duration sequences. **UNIT – II** **Discrete & Fast Fourier Transform:** DFT, properties of DFT, FFT, FFT algorithms, Use of DFT for fast computation of convolution, IDFT – Correlation. **UNIT – III** **Digital filter structures:** Basic FIR structures, IIR structures: Direct form-I, Direct form-II, Parallel form, Cascade form Lattice Structure, Lattice-ladder structures, State space structures, **UNIT – IV** **Design of IIR filters:** Properties of analog filters – Frequency domain filter models – Better worth, Chebyshev and other approximations – Filter design data – Low pass to high, Band pass and Band stop transformation – Filter response curves. **UNIT – V** **Design of FIR filters:** Fourier series method, Windowing, Sampling, Applications of Digital signal processing.	
Text Books & Reference Books:	**Text Books:** 1. Digital Signal Processing A.V. Oppenheim and R.W. Schafer, Prentice – Hall of India, New Delhi, 1988. 2.Digital signal Processing Salivahanan-TMH 3.Digital signal Processing Computer based approach, S.K.Mitra – Tata Mc Graw – Hill (III) (p-339-400).	

	Reference Books: 1. Digital Signal Processing P.Ramesh Babu Scitech Publishers 2. Digital Signal Processing Jhon G Proakis and monolokis –Whilly eastern economy edition
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE4114 – POWER SEMICONDUCTOR DRIVES
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Fundamentals of electrical circuits and networks, Basic knowledge of Power Electronics and Electrical Motors(AC and DC motor)	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To provide students with a strong background in different types of electrical drives 2. To train the students to have the solid foundation in Mathematical and technical concepts required to engineering problems 3. To prepare the students to excel in post graduate programs or to succeed in industry 4. To provide a foundation in the theory and applications of electrical machinery and their different types with respect to their control	
Course Outcomes:	**CO1**	Able to deal with the importance of electrical drives
	CO2	Able to control DC motor by Single phase and three phase converters
	CO3	Able to control the Induction motor in four quadrants by controllers
	CO4	Able to control the synchronous motor in open loop
	CO5	Able to find losses and importance of energy conservation in electric drives
Course Content:	**UNIT-I** **Electric Drives:** Concept of Electric Drive - Classification, Advantages and choice of Electric Drives – Parts of Electric Drives – Electric Motor, Power Modulators, sources and control unit. Steady state Speed and Torque expressions of various DC motors– Speed – Torque Characteristics **UNIT-II** **DC motor Drives:** Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Dual converters -Four quadrant operation of D.C motors. **Converter controlled DC drives:** Single Phase semi and fully controlled converters connected to D.C separately excited– continuous and discontinuous current operation **UNIT-III** **Converter controlled DC drives:** Three phase semi and fully controlled converters connected to D.C separately excited motor. Single quadrant, **Chopper controlled DC drives:** Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuous current operation – Speed torque expressions – speed torque characteristics. **UNIT -IV** **Induction motor drives:** Speed torque characteristics -Variable voltage characteristics-Control of Induction Motor by AC Voltage Controllers .Variable frequency characteristics-Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters- PWM control – Comparison of VSI and CSI operations– Closed loop operation of induction	

	motor drives (Block Diagram Only) **UNIT-V** **Slip power recovery schemes:** Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages applications– problems **Synchronous Motor drives:** speed torque characteristics -Separate control & self control of synchronous motors – Operation of self controlled synchronous motors by VSI and CSI cycloconverters. Load commutated CSI fed– Closed Loop control operation, variable frequency control- Cycloconverter, PWM, VFI, CSI.
Text Books & Reference Books:	1. ”Fundamentals of Electric Drives”, G K Dubey ,Narosa Publications 2. ”Power Electronic Circuits, Devices and applications” by M.H.Rashid, PHI. 3. “Power Electronic”,MD Singh and K B Khanchandani, Tata – McGraw-Hill Publishing company,1998 4. “Modern Power Electronics and AC Drives” by B.K.Bose, PHI publishers. 5. “Thyristor Control of Electric drives”, Vedam Subramanyam, Tata McGraw Hill Publilcations. 6. “A First course on Electrical Drives”, S K Pillai, New Age International(P) Ltd. 2nd Editon.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE4115 – SWITCH GEAR AND PROTECTION
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Require knowledge on power system equipment, power system transmission and faults occurs in it, knowledge in circuit analysis and field theory	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To develop knowledge on protection against over voltages 2. To understand insulation co-ordination 3. To provide knowledge on details of circuit breakers, classification of breakers 4. To provide knowledge on details of fuses 5. To develop knowledge on relays, static relays	
Course Outcomes:	**CO1**	Students gain knowledge in the field of over- voltage protection and the basics of data transmission
	CO2	Students gain knowledge in the field of power system protection, and circuit breakers operation and its application in power system.
	CO3	Students gain knowledge in the operation and application of relays in the real time applications in power system
	CO4	Students gain knowledge in the operation and application of relays in the real time applications in power system
	CO5	Students will demonstrate and have ability to design the relevant protection systems for the main elements of a power system
Course Content:	**UNIT-I** **FUSES:** Definitions - characteristics - selection of fuses, types of fuses and applications. **CIRCUIT BREAKERS:** Arc phenomena - initiation & maintenance of arc – methods of arc interruption- Terms associated with CBs – Expression for RRRV – Resistance switching – Single frequency transients – Double frequency Transients – Current Chopping – Interruption of capacitive currents. **UNIT-II** **CLASSIFICATION OF CIRCUIT BREAKERS:** Principle of operation & constructional features of oil - air blast – SF_6& vacuum CB's- Ratings of CB's – Testing of CB's-Auto reclosing. PROTECTIVE RELAYS: Basic idea – essential qualities of protection – principle of operation of protective schemes. **UNIT-III** **TYPES OF RELAYS:** Types of Electromagnetic relays – over current, directional and non-directional, earth fault, distance, negative sequence, differential and under frequency relays-applications. Static relays: Basic static relays used in protective scheme – classification-over current - differential protection. Comparators– Amplitude& phase comparators – Duality. **UNIT-IV** **EQUIPMENT PROTECTION:** Main considerations in apparatus protection - transformer protection, generator protection, protection of bus bars, Feeder protection -Transmission line protection - zones of protection. CTs and PTs and	

	their applications in protection schemes. **UNIT-V** **OVER VOLTAGE PROTECTION:** causes of overvoltage's – Phenomena of lightning – protection against direct lightning strokes & traveling waves. Protection of power station &substation from direct lightning strokes-Insulation coordination
Text Books & Reference Books:	**Text Books:** 1."Power system protection and Switchgear" by Badriram & D.N.Viswakarma,TMH publishing company Ltd. 2."Electrical Power systems" byC.L. Wadhwa, Wiley Eastern Ltd. 3."A Course in Power systems" by J.B Gupta, S.K.Kataria&Sons **Reference Books:** 1. "Switchgear & Protection " by Sunil S Rao, Khanna Publishers. 2. "Power System Protection & Switchgear" by B.Ravindranath & M.Chander, Wiley Eastern Limited. 3. "Electrical Power "by S.L. Uppal., Khanna Publishers
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13SH4102– MANAGEMENT SCIENCE
(Common to EEE and ECE)

Course Category:	Humanities	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Economics and accountancy	**Sessional Evaluation:**	40
		Univ.Exam Evaluation:	60
		Total Marks:	100

Course Objectives:	1. To analyze the characteristics and contributions of enterprising people 2. To develop an understanding of the general role of Small Business Enterprises 3. Have an introductory understanding of global entrepreneurship concepts 4. Identify the general characteristics of entrepreneurs; know the differences between entrepreneurial and managerial type jobs 5. Understand the role of entrepreneurship in economic development.	
Course Outcomes:	**CO1**	Understanding the concept of Management and its objectives
	CO2	Able to understand Corporate Planning mission and objectives
	CO3	Exploring on Human resource management such as man powering, personal management.
	CO4	Getting more functionality about personal management
	CO5	Understanding about mass production and Batch production and exploring on PERT and CPM
Course Content:	**UNIT-I** Concept of Management – Administration, organization – Functions of Management, evolution of management thought – Organization, principles of organization – Types – Organization charts – Managerial objectives and social responsibilities. **UNIT – II** Corporate planning – Mission, Objectives, and programmes, SWOT analysis – Strategy formulation and implementation – plant location and plant layout concepts- Production control. **UNIT –III** Human resources management- Manpower planning – Personnel management – Basic functions of personnel management, job evaluation and merit rating – Incentive plans – Marketing, Functions of marketing. **UNIT-IV** Productivity – Batch and mass production – Work study- Basic procedure involved in method study- work measurement –Elements of cost- method of calculation of overhead charges – Depreciation. **UNIT- V** Network Analysis to project management - PERT/CPM- Application of network techniques to engineering problems. – Cost Analysis- Project crashing.	
Text Books & Reference Books:	**Text Books:** 1. Principles of management by Koontz and O.Donnel. 2.Industrial Engineering and Management by O.P.Khanna. 3.Industrial organisation and management by T.R.Banga & S.C.Sharma **Reference Books:** 1. Marketing by Philip Kotler 2. PERT/CPM by L.S. Srinath. 3. Business policy by Gluek (TMH).	

E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE4116 – POWER SYSTEM ANALYSIS
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Basic concepts in Generation of electric power, Basic concepts in electrical circuits, Transient analysis Synchronous Machines	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To learn the fundamentals of power system for designing a system that meets specific need 2. To analyze the phasor techniques in the analysis of power systems 3. To know the necessity of load flow in a regulated system. 4. To examine the need of various analysis like fault analysis, short circuit analysis stability analysis, steady state and transient analysis	
Course Outcomes:	**CO1**	Understand and analyze various power system faults.
	CO2	Develop power system model for symmetrical and un-symmetrical faults
	CO3	Build Y-bus and Z-bus Matrix for a complex power system.
	CO4	Understand and analyze various load flow methods.
	CO5	Predict stability of power system by various methods.
Course Content:	**UNIT-I** **Symmetrical fault analysis:** Introduction-Transients on transmission line-Short circuit of a synchronous machine-on no load-short circuit of a loaded synchronous machine-selection of circuit breakers-Algorithm for short circuit studies-Z Bus formulation. **UNIT-II** **Symmetrical components:** Introduction-symmetrical component transformation-phase shift in star-delta transformers-sequence impedances of transmission lines-sequence impedance and sequence network of power system-synchronous machine, transmission line and transformers-construction of sequence network of a power system. **UNIT-III** **Unsymmetrical fault analysis:** Introduction-Symmetrical component analysis of Unsymmetrical faults-single-line-to-ground (LG) fault-line-to-line (LL) fault-Double line-to-ground (LLG) fault-Open conductor faults-Bus impedance matrix method for analysis of unsymmetrical shunt faults **UNIT-IV** **Load flow studies:** Introduction-Network model formulation-formation of Y Bus by singular transformation-Load flow problem-Gauss-Seidel method-Newton Raphson Method-Decoupled Load Flow methods-Comparison of load flow methods-Control of voltage profile. **UNIT-V** **Power system stability:** Introduction-Dynamics of a synchronous machine-Power angle equation-Node elimination techniques-Simple systems-Steady state Stability-Transient Stability-Equal area criterion-Numerical solution of swing equation Some factors affecting Transient stability-small signal stability analysis.	

Text Books & Reference Books:	1. "Modern Power System Analysis" by D.P Kothari and IJ Nagarath. TMH-3rd Edition. 2. "Power system analysis and Design" by B.R.Gupta Wheelers publishing 3rd edition. 3. "Elements of Power System Analysis" by John J. Grainger and William D.Stevenson , Jr TMH. 4. "Electrical power system" by C.L.Wadhwa new age publications.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE41E2 – ELECTRICAL DISTRIBUTION SYSTEMS
(EEE)

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Requires knowledge in power system transmission and distribution ,Basic fundamentals of electric power generation, Basic circuit analysis	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. Explain the principles of design and operation of electric distribution feeders. 2. Apply analytic techniques pertaining to primary distribution systems. 3. Use basic design principles for distribution substations and facilities. 4. Examine primary distribution systems using computer-based modeling. 5. Discuss computational algorithms of distribution system analysis and operation.	
Course Outcomes:	**CO1**	Able to understand different load characteristics, modelling and analysis of different factors
	CO2	Able to understand types of feeder, feeder voltage levels and its loading .Analyze benefits of optimal location of substations.
	CO3	Able to calculate power loss, voltage drop, efficiency for transmission lines
	CO4	Able to understand different protective devices operations, applications and co-ordination procedure
	CO5	Able to analyze voltage improvement by using different types power capacitors , and optimum capacitor location
Course Content:	**UNIT–I** **Introduction to distributed systems:** Introduction, classification of loads (Residential, Commercial, and Agricultural & Industrial) and their characteristic – an overview of rate of Computers in distributed system planning, load modelling and characteristics, coincidence factor contribution factor and loss factor. **UNIT–II** **Design of distributed networks:** Distribution feed back & substation – design considerations of distribution feeders – radial & loop types of primary feeders – voltage levels – feeder loading. **Location of substations**: Rating of distribution substations – service area with 'n' primary feeders. Benefits of optimal location of substations. **UNIT–III** **Distribution system analysis:** Voltage drop & power loss calculations – Derivation of voltage drop & power loss in lines – manual methods of solution for radial networks - 3ϕ balanced primary lines. **UNIT–IV** **Protective devices & co-ordination:** Objectives of distribution system protection, types of common faults and procedure for fault calculations – protective devices – principles of operation of fuses – circuit breakers – general co-ordination procedure. **UNIT–V** **Power – factor & voltage control improvement:** Capacitive compensation for power factor control – Different types of power capacitors – shunt & series capacitors – power factor correction – procedure to determine best capacitor	

	location & equipment for voltage control.
Text Books & Reference Books:	1. Electrical Power Distribution System Engineering – Turan Gonen, MC – Graw Hill 2. Electric Power Distribution by A.S. Pabla, Tata MC Graw Hill Company, 4th Edition.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13CS4107 – COMPUTER NETWORKS

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	computer communication and network fundamentals	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To analyse Data Communications and Computer Networks. 2. To analyse Network Security and Mobile Communications. 3. To provides the student with fundamental knowledge of the various aspects of computer networking and enables students to appreciate recent developments in the area.	
Course Outcomes:	**CO1**	Understanding of concepts of computer networks
	CO2	Familiarize the student with the ta3onomy of the networking area
	CO3	Introduce advanced networking concepts
	CO4	Gain expertise in application areas of networking
	CO5	Gain knowledge of networking concepts
Course Content:	**UNIT-I** Theoretical basis for communication, Maximum data rate of channel, communications media, Networks goals, Application of networks, protocol hierarchies, OSI reference model, Design issues for the layers in the model, Modulation and keying alternatives, multiplexing, modems, parallel and serial data transmission, handshake procedures. Rs 232C, V.14/V.28, Rs449 interfaces, X.21, IEEE protocols, Link switching techniques. **UNIT-II** Local Area Networks: Local communication alternatives, static and dynamic channel allocation in LANs, the ALOHA protocols, LAN protocols, IEEE logical link control, Ethernet , Token bus and Token ring protocols. Data link layer: Design issues Error detection and correction, sliding window protocols. Wide area network standards, SDLC,HDLC,X 25 protocols. **UNIT-III** Network layer Design issues, Routing algorithms, congestion control algorithms, Internetworking, Transport layer design issues, connection management, Transport protocol X 25, session layer design issues, Remote procedure cell. **UNIT-IV** Presentation layer Abstract syntax notation, Data compression techniques, Cryptography Application such as file transfer, Electronic mail and virtual terminals, X 400 protocol for electrical messaging overview of ARPANET, MAP, TOP, Novell Netware, PC/NOS, Unix support for networking. **UNIT-V** World wide web, web browsers, web servers, uniform resource locator, Home pages, Basics of HTML, creating links, Anatomy of URL and kinds of URLs, HTML assignments, Editors and converters, New features of HTML, creating tables, Using images, Using external media, writing and designing web pages, Introduction to CGI scripts.	
Text Books & Reference Books:	**Text Books :** 1.Computer Networks – Andrew S Tanenbaum, 4th edition. Pearson Education/PHI 2.Data Communications and Networking – BehrouzA.Forouzan, Third edition, TMH.	

	Reference Books: 1. An Engineering Approach to Computer Networks – S.Keshav,2nd edition, Pearson Education 2. Understanding communications and Networks,3rd edition,W.A.Shay,Thomson
E-Resources	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE41E1 – NEURAL NETWORKS AND FUZZY LOGIC
(EEE)

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Basic knowledge on brain system	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. It deals with introduction and different architecture of neural networks 2. It deals with an application of Neural Network 3. It deals with fuzzy logic	
Course Outcomes:	**CO1**	Design the neural network to meet the needs of control systems and pattern classification issues
	CO2	Able to understand the concept of fuzziness involved in various systems.
	CO3	Gain adequate knowledge about fuzzy set theory and gain comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control
	CO4	Get adequate knowledge of application of fuzzy logic control to real time systems.
	CO5	Gain adequate comprehensive knowledge of fuzzy logic control.
Course Content:	**UNIT-I** **Artificial neural networks:** Introduction to Neural Networks-Biological neurons-artificial neurons- MCculloch-pitts model-neuron modeling for artificial neural systems-feed forward network-Feedback network-perception network-Supervised and Unsupervised Learning. Learning rules: Hebbain learning rule, perception learning rule, Delta learning, Winner take all learning rule, ouster learning rule. **UNIT-II** **Supervised learning:** Preceptors -exclusive OR problem-single layer preceptor network- Multilayer feed forward networks: linearly non-separable pattern classification-delta learning rule for multi preceptor layer-Error back propagation algorithm-training errors-ADALINE-introduction to Radial basis function networks (RBFN) **UNIT-III** **Unsupervised learning:** Hamming net, Max net, Winner take all learning, counter propagation network-feature mapping-self organizing feature maps. Applications of neural algorithms-elementary aspects of applications of character recognition-Neural network control applications-process identification. **UNIT-IV** **Fundamentals of Fuzzy logic and Fuzzy sets:** Definition of Fuzzy set, a-level fuzzy set Cardinality-operation of Fuzzy set Cardinality-operations of fuzzy sets-Union, intersection, Complement- Cartesian product- Algebraic sum-definition of Fuzzy relation-properties of fuzzy relations-fuzzy composition. **UNIT-V** **Design of Fuzzy Systems:** Components of fuzzy systems-Functions of fuzzification, Rule base patterns-Inference mechanisms-methods of defuzzification: Centre of Gravity method, mean of maxima method, weighted average method, Height method. Design of fuzzy systems for temperature setting of storage water heater-fuzzy system for control of air conditioner.	

Text Books & Reference Books:	**Text Books:** 1. "Introduction to Artificial Neural Systems" by Kacel M.Jurada, Jaico Publications 2."Fuzzy Set Theory and its Applications" byZimmerman K.J. Kluwer Academic Publishers **Reference Books:** 1. "Fuzzy Logic with Engineering Applications" by Timothy Ross,TataMcGrawHill 2. "Foundations of Neural Networks, Fuzzy Systems, and Knowledge Engineering"by Nikola K. Kasabov
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE41E3 – DIGITAL CONTROL SYSTEMS
(EEE)

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Require knowledge in control systems concepts (Controllability and Observability),Z-transforms, S domain Analysis, Transient Analysis and basic concepts in electrical circuits	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To equip the students with the basic knowledge of A/D and D/A conversion 2. To understand the concepts of Z- Transform 3. To study the stability analysis of digital control system 4. To equip the basic knowledge of digital process control design	
Course Outcomes:	**CO1**	Able to apply Z-transforms and block-diagram reduction techniques to discrete time systems.
	CO2	Able to develop pulse transfer function and state space models of the given discrete time system.
	CO3	Able to investigate controllability, observability and stability of control systems for pole placement at desired locations
	CO4	Able to design different controllers in time/frequency domain to improve the system performance.
	CO5	Able to design full order and reduced order observers for state estimation.
Course Content:	**UNIT-I** Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z-Transforms **UNIT-II** Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane. State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations **UNIT -III** Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function. Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stablility test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion. **UNIT-IV** Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-	

	plane, Lead, Lag and Lead-Lag compensators and digital PID controllers. **UNIT-V** Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.State Observers – Full order and Reduced order observers.
Text Books & Reference Books:	1. "Discrete-Time Control systems" by K. Ogata, Pearson Education/PHI, 2nd Edition 2. "Digital Control Systems" by Kuo, Oxford University Press, 2nd Edition, 2003. 3. "Digital Control and State Variable Methods" by M.Gopal, TMH
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EC41P1 – MICROPROCESSOR & APPLICATIONS LAB

Course Category:	Computing	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Basic knowledge in programming C , knowledge In microprocessors and programming	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. Expose the features of the software tool – TASAM simulator. 2. Demonstrate the arithmetic and data transfer instructions of 8086. 3. To Write the assembly language programs for counters and code conversions. 4. Demonstrate the application of DOS interrupts. 5. Develop the assembly language programs for simple logical and arithmetic operations. 6. Demonstrate the interfacing knowledge with Microprocessor kit	
Course Outcomes:	**CO1**	Able to design the home appliances and toys using Microcontroller chips.
	CO2	Able to design computers like desktops , laptops using various processors
	CO3	Able to design the high speed communication ckts using serial bus connection
	CO4	Able to use a commercial CPU(s) as realistic vehicles to demonstrate these concepts by introducing students to CPU instructions and internal register structures
	CO5	Able to understand the full internal workings of a typical simple CPU including the utilization of the various hardware resources during the execution of instructions.

Course Content:

LIST OF EXPERIMENTS

1. SUMMATION & BLOCK TRANSFER OF DATA
   a) Write and execute 8086 to add the given series of BCD numbers and show the result.
   b) Write and execute 8086 ALP to transfer a Block of data from one memory area to another memory area.
2. MULTIPLICATION & DIVISION
   a) Write and execute 8086 ALP to perform the following multiplications.
      1) Repeated addition
      2) Using SHIFT and ADD instruction
   b) Write and execute 8086 ALP to perform the following.
      1) Binary division
      2) BCD division
3. SEARCHING & SORTING DATA
   a) Write and execute 8086 ALP to find the minimum and maximum number from a given data array
   b) Write and execute 8086 ALP to arrange the given data array in ascending order or descending order
4. EVALUATION OF MATHEMATICAL EXPRESSION
   Mathematical Expressions
   a) a*b- c/d + e
   b) $\sum_{i=1}^{n} xi\ yi$

	c) Write and execute 8086 Alp to compute the following : Evaluation of Multiplication of Series 5. CODE CONVERSION a) Write and execute 8086 ALP to convert HEX to BCD number b) Write and execute 8086 ALP to convert BCD to HEX number c) Write and execute 8086 ALP to convert HEX to ASCII number d) Write and execute 8086 ALP to convert ASCII to HEX number 6. LOGIC CONTROLLER MODULE Write and execute 8086 ALP to design the logical expression using Logic controller interface module 7. STEPPER MOTOR MODULE Write and execute 8086 ALP to rotate a stepper motor either in clockwise direction or in anticlockwise direction and to control the speed of rotation 8. SERIAL INPUT DISPLAY UNIT MODULE(SIDU) Write and execute 8086 ALP to display the desired word in a display of serial input display unit interface module 9. PARALLEL INPUT DISPLAY UNIT MODULE (PIDU) Write and execute 8086 Alp to design an up and down counter using PIDU Interface module 10. DIGITAL TO ANALOG CONVERTER INTERFACE MODULE Write and execute 8086 Alp to generate given waveform through CRO using DAC

13EE41P6 – POWER ELECTRONICS LAB

Course Category:	Professional core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Basic knowledge in MATLAB simulation, concepts of power electronics, basic concepts in electrical circuits	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. Analyze characteristics of SCR, TRAIC and DIAC 2. To visualize the outputs of full wave and half wave rectifiers using MATLAB Software 3. To understand the characteristics, triggering methods for SCR and DIAC 4. To analyse and demonstrate the operations of inverters 5. To demonstrate power control with SCR, TRAIC and DIAC 6. To understand the operation of Cyclo converter with R load	
Course Outcomes:	**CO1**	Choose power electronic switches based on their characteristics
	CO2	Evaluate the performance of various firing circuits of SCR
	CO3	Design the commutation circuits depending on the converter
	CO4	Design of various converters for real-time applications
	CO5	Design of various triggering circuits for converters
Course Content:	**LIST OF EXPERIMENTS** 1. Characteristics of SCR, TRIAC & DIAC. 2. Power Control with SCR using R & RC Triggering. 3. Single Phase Full Wave Control with R Load. 4. Single Phase Parallel Inverter. 5. Single Phase Series Inverter. 6. Single Phase Half Wave Control with R Load. 7. Single Phase Bridge Converter with R Load. 8. Simulation Of Single Phase Full Wave and Semi Converter With R and RL Load. 9. Simulation Of Three Phase Full Wave and Semi Converter With R and RL Load. 10. Single Phase Cyclo Converter With R Load. 11. Single Phase AC Voltage Controller R and Rl Load. 12. Commutation Circuits of SCR. 13. Power Control With SCR using TRIAC & DIAC. 14. Static V-I Characteristics of SCR.	

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY:: VIDYANAGAR (AUTONOMOUS)
(AFFILIATED TO JNTU ANANTAPUR:NELLORE)
SPSR NELLORE DIST
IV YEAR OF FOUR YEAR B.TECH DEGREE COURSE – II SEMISTER
ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EVALUATION
(With effect from the academic year 2016-2017)
(For the batch admitted in the academic year 2013-2014)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	100
1	13EE4217	High Voltage Engineering	4	-	-	4	2	40	2	40	0.8*Best of two+0.2*least of two	3	60	100
2	13EE4218	Power System Operation And Control	4	-	-	4	2	40	2	40		3	60	100
3	13EE42E3	Elective-III	4	-	-	4	2	40	2	40		3	60	100
		PRACTICALS												
4	13EE42P7	Power System Lab			3	2	-	-	-	-	Day to Day Evaluation and a test (40 Marks)	3	60	100
5	13EE42PR	Project Work			3	6	-	-	-	-	Continuous Assesment and Seminar (80 Marks)	3	120	200
		TOTAL	12	-	06	20	-	-	-	-		-	360	600

13EE4217 – HIGH VOLTAGE ENGINEERING
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Basic knowledge of measurement devices and measurement methods	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To understand the detailed analysis of Breakdown occurs in Gaseous, liquids and solid dielectric. 2. To understand the information about generation and measurement of high voltage and current in addition high voltage testing methods.	
Course Outcomes:	**CO1**	Understand different types of High voltage Generation.
	CO2	Explore different methods of High voltages and Currents.
	CO3	List various High voltage testing methods and propose Suitable testing instruments.
	CO4	Estimate different insulation parameters.
	CO5	Outline the behaviour of Gas, Liquid and solids when they are used as insulation.
Course Content:	**UNIT –I** **Generation of high voltages**: Introduction, Half wave rectifier circuit, Cockroft-Walton voltage multiplier circuit, Electrostatic generator, Generation of high A.C. voltages by cascaded transformer. **Generation of impulse voltages and currents**: Definitions, Impulse generator circuits, multistage impulse generator circuits, Impulse current generation. **UNIT -II** **Measurement of high voltages and currents:** Introduction, Sphere gap, uniform field spark gap, Rodgap, Electrostatic voltmeter, Generating voltmeter, Chubb-Fortescue method, Measurement of high D.C., A.C. and impulse currents. **UNIT -III** **High voltage testing of electrical equipment:** Testing of overhead line insulators, testing of cables, testing of bushings, testing of power capacitor, testing of power transformers, testing of circuit breakers. **UNIT -IV** **Non-Destructive insulation techniques:** Measurement of resistivity, Measurement of dielectric constant and loss factor, High voltage schering bridge measurement of large capacitances, Partial discharges. **UNIT –V** **Break down mechanism**: Gases, Liquid and solid insulating materials – Mechanism of breakdown of gases, Townsend's first ionization coefficient, Townsend's second ionization coefficient, Townsend breakdown mechanism, Paschen's law, Principles of breakdown of solid and liquid dielectrics.	
Text Books & Reference Books:	**Text Books:** 1. "High voltage Engineering" by C.L.Wadhwa, New Age International publishers 2."High voltage Engineering" by M. S.Naidu & Kamaraju, Third Edition, Tata Mc-Graw- hill Publishers **Reference Books:** 1. "High voltage Engineering Fundamentals" by E.Kuffel & W.S.Zaengl, Second Edition, Newens publishers	

	2. "An introduction to high voltage Engineering" by Subir Ray, PHI Learning Pvt. Ltd
E-Resources	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE4218– POWER SYSTEM OPERATION & CONTROL
(EEE)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Basic knowledge about Power Systems and Power systems Analysis	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	To clearly understand the basic concepts of economic operating schedule of modern power stations. Further more the effective control and operation of Transmission lines	
Course Outcomes:	**CO1**	Able to understand economic Load dispatch and solution of co-ordinate equation by iteration method.
	CO2	Able to understand forecasting of base load and unit commitment using different methods.
	CO3	Able to understand and design of Load frequency controller.
	CO4	Able to understand generation and absorption of reactive power and the methods of voltage control.
	CO5	Able to understand various tasks power system operation using computer technology.

Course Content:

UNIT-I

Economic operation and Unit commitment: Statement of economic dispatch problem – Economic Dispatch Problem, Thermal System Dispatching with network Losses, Lambda –Iteration method (No derivation of loss coefficients).
Need for Unit Commitment, Unit Commitment solution methods-Priority lists method, Forward Dynamic Programming method spinning reserve.

UNIT -II

Hydrothermal Scheduling: Introduction, Hydroelectric power plant models, Scheduling problems (Problems for one Iteration)-Implementation of Short term Hydrothermal scheduling problem.

UNIT-III

Reactive power and Voltage Control: Basic generator control loops, Cross-coupling between control loops, Exciter types, Exciter modelling, Generator modelling, and Static performance of AVR loop.
Generation and absorption of reactive power, relation between voltage, power and reactive power at a node, single machine infinite bus systems, methods of reactive power control.

UNIT-IV

Automatic Load Frequency Control: Automatic Load frequency control of single area systems, Speed-governing system, Turbine generator response, Static performance of speed governor, Closing of ALFC loop, Concept of control area, Static response of primary ALFC loop, Integral control, ALFC of multi-control area systems (POOL operation), The Two-Area system, Modeling the Tie-Line, Block Diagram representation of Two-Area system, Static response of Two-Area system and Tie-Line Bias control.

	UNIT- V **Computer Control of Power Systems:** Main Tasks in Power System Operation, SCADA : Division of Tasks between Various Control Centers, Features of SCADA Systems, SCADA Configuration, Energy Management Systems System operating states ,System Security,State Estimation
Text Books & Reference Books:	**Text Books:** 1."Power generation, operation and control" by Allen J Wood & Woollenberg. John Wiley and Sons, Second Edition, 2009. 2."Electrical Energy Systems Theory" by O.J Elgerd, TMH,2008. 3.Text book on Power System engineering" by M.L. Soni, P.V. Gupta, U.S.Bhatnagar Dhanpatrai &co 4."Switch Gear and Protection", by Sunil S. Rao, Khanna Publishers, New Delhi,1986 **Reference Books:** 1."Computer Aided Power System Analysis" by G.L.Kusic, PHI,2010. 2."Power System Analysis, Operation and Control" by Abhijit Chakrabarti and Sunita Halder, PHI, Second Edition, 2009 3."Electric Power Systems" by B.M.Weedy and B.J. Cory, Wiley student edition, 1999 4."Modern Power System Analysis" by I J Nagarath and D P Kothari, TMH, 3rd Edition, 2003.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE42E1– HIGH VOLTAGE DIRECT CURRENT TRANSMISSION
(EEE)

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Power Electronics Converters and Power Systems	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	It deals with the importance of HVDC transmission, analysis of HVDC converters, faults and protections, Harmonics and filters. Also able to deal with reactive power control and power factor improvements of the system.	
Course Outcomes:	**CO1**	Able to understand the importance of Transmission power through HVDC
	CO2	Ability to discuss 6 pulse, 12 pulse circuits.
	CO3	Ability to discuss firing angle control.
	CO4	Ability to control reactive power through HVDC.
	CO5	Able to understand the importance of harmonics and design the filter through HVDC
Course Content:	**UNIT-I** **D.C. power transmission technology:** Introduction, Comparison of AC & DC transmission, Description of DC Transmission system, Converter station, Planning of HVDC transmission, Modern trends in DC Transmission. **UNIT-II** **Analysis of HVDC converters:** Pulse number, Choice of converter configuration- valve rating, Transformer rating. Simplified analysis of Graetz circuit with and without overlap, Rectifier and Inverter waveforms, Converter bridge characteristics. **UNIT-III** **Converter and HVDC system control:** Principles of DC link control, Converter control characteristics, System control hierarchy, Firing angle control, Current and excitation angle control, starting and stopping of DC link, Power control, higher level controllers. **UNIT-IV** **Converter faults and protection:** Protection against over currents, Over voltages in a converter station, surge arresters, protection against over voltages. **Smoothing reactor and dc line:** Smoothing reactors, DC line, Transient over voltages in DC line, Protection of DC line, DC breakers. **UNIT-V** **Reactive power control:** Reactive power requirements in steady state, Sources of reactive power, Static var systems. **Harmonics and filters:** Generation of Harmonics, Design of AC filters, DC filters, Carrier frequency and RI noise.	
Text Books & Reference Books:	**Text Books :** 1."HVDC Power Transmission System" by K.R Padiyar; New academic science Ltd publication. 2."EHV-AC &HVDC Transmission Engineering & Practice" by S. Rao; Khanna publication. **Reference Books:** 1. "Direct current Transmission" by Edward Wilson Kimbark, Volume-I. 2. "HVDC Power Transmission" by S.Kamakshaiah & V.Kamaraju; Tata McgrawHill publishers.	

E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE42E2– ELECTRICAL MACHINE DESIGN
(EEE)

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Electrical Machines	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. To gain the knowledge about the calculation of total MMF in the machine. 2. To find out the dimension of various parts of the machine. 3. To examine various losses in the machines. 4. To understand the usage of auxiliary windings.	
Course Outcomes:	**CO1**	Able to understand Machine Design problem and Design of Transformer
	CO2	Able to understand General concepts of rotating machines and Design of DC Machines.
	CO3	Able to understand Design of 3-Phase Induction Motor
	CO4	Able to understand Design of synchronous Machines and Armature Design.
	CO5	Able to understand Heating and Cooling.
Course Content:	**UNIT-I** **Design problem:** Basic considerations, design specifications, ISI specifications, design constraints, specification of transformers, rotating machines. **Design of transformers**: Types of transformer – core construction, output equation, principle of design of core, windings, yoke main dimensions (H & W) for single phase: core type, shell type. 3-phase – core type transformers estimation of no load current of transformer. **UNIT-II** **General concepts of rotating machines:** Output equation of dc machines, ac machines, separation of D & C choice of specific loadings. **Design of dc machines:** Choice of no. of poles, selection of no. of armature slots, choice of winding, estimation of conductor cross section of armature, design of field systems: tentative design of field winding of dc machines. **UNIT–III** **Design of 3-phase induction motor**: Separation of D & C, ranges of AC and Bar. Stator design – Selection of no of stator slots, turns per phase, design of conductor cross section. Rotor design - Selection of no of rotor slots, principles of design of squirrel cage rotor, design of slip ring rotor. **UNIT–IV** **Design of synchronous machines:** Separation of D & C, choice of AC& Bar - short circuit ratio (SCR) and its significance. **Armature design:** choice of no. of stator (Armature) slots, turns/phase, conductor cross section for both salient pole and cylindrical pole machines. **UNIT–V** **Heating & Cooling:** Theory of Solid body heating, heating time constant-cooling time constant, elementary treatment of cooling and heating time curves. Volume of coolant required, types of coolants, cooling methods of transformer-	

	hydrogen cooling, transformer tank design.
Text Books & Reference Books:	**Text Books**: 1. "Electrical machine design" by A.K.Sawhney Dhanpati Rai publishers 2."Design of Electrical Machines" by V. N. Mittle, Standard Publishers Distributors **Reference Books:** 1. "Principles of Electrical machine design" by M.G.Say & parkersmith. 2. "Electrical machine design" by Balbir Singh, Vikas Publishing House
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE42E3– ELECTRICAL POWER QUALITY
(EEE)

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Electrical Power systems, Power systems Analysis and Reliability	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. Understand the various power quality phenomenon, their origin and monitoring and Mitigation methods. 2. Understand the effects of various power quality phenomenon in various equipments	
Course Outcomes:	**CO1**	Able to understand long interruptions and reliability evaluation
	CO2	Able to understand short interruptions.
	CO3	Able to understand voltage sag characteristics
	CO4	Able to understand Design voltage sag equipment behavior.
	CO5	Able to understand voltage sag stochastic assessment.
Course Content:	**UNIT – I** **Long interruption and reliability evaluation:** Over view of power quality, Power qualities and power quality standards, Observation of system performance standards and regulation, Overview of reliability evaluation, Basic reliability evaluation techniques, Cost of interruptions, Comparison of observations and reliability evaluation, Example calculations. **UNIT – II** **Short interruptions:** Introduction, Technology, Origin of short interruptions, Monitoring of short interruption, Influence on interruption, Single –phase tripping and stochastic prediction of short interruptions. **UNIT – III** **Voltage sags –characterization:** Introduction, Voltage sag magnitude, Voltage sag duration, Three phase unbalance, Phase –angle sumps magnitudes and phase –angle jumps for three phase unbalanced sags, Other characteristics of voltage sags, Load influence on voltage sags, Sags due to starting induction motors. **UNIT – IV** **Voltage sags – equipment behaviour:** Introduction, Computers and consumer electronics, Adjustable speed AC –drives, Adjustable speed DC –drive, Other sensitive load. **UNIT – V** **Voltage sags – stochastic assessment:** Compatibility between equipment and supply, Presentation of results, Voltage sag coordination chart, Power quality monitoring, The method of fault, Positions, The method of critical distances.	
Text Books & Reference Books:	**Text Books:** 1. "Understanding power quality problems " by Math H.J. Bollen, , standard publishers distributors, 2001. 2."Electric power quality" by R.C.Dugan, M.F. MC Gran Aghan and H.W. Beaty MC Graw Hill New York 1996. 3."Electric Power Quality control techniques" by W.E. Kazibew and M.H. Sendavla, Van Nostrad Reinhold, New York. **Reference Books:** 1. "Analysis of faulted power systems" by P.M. Anderson, , New York : IEEE Press, 1995.	

	2. "Power Electronics and Motro Control" by W.Shepperd L.N. Hulley and D.T.W.Liang, , 2nd Canbridge University Press, Cambridge, U.K., 1995.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE42E4– BIO-MEDICAL ENGINEERING
(EEE)

Course Category:	Professional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	4-0-0
Pre-requisite:	Basic Sciences, Mathematics, Humanities and Social Sciences	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	1. Learn several signals that can be measured from the human body. Understand how noise from the environment, instruments and other physiologic systems can create artifacts in instrumentation. 2. Understand theory and design on Wheatstone bridge; inverting, non-inverting, differential and instrumentation amplifiers. 3. Review the cardiac, respiratory and neural physiological systems. Study the designs of several instruments used to acquire signals from living systems.	
Course Outcomes:	**CO1**	Demonstrate a basic understanding of disease, medical conditions or physiological conditions.
	CO2	Understand the functional components of various instruments.
	CO3	Suggest a range of methods which are used to diagnose, monitor or manage conditions.
	CO4	Demonstrate a critical appreciation of various biomedical instruments
	CO5	Explore new developments for better management or assessment of conditions.
Course Content:	**UNIT-I** Human cell and its electrical characteristics neuron and impulses, Recording Electrodes-Electrode-Electrolyte interface, polarizable – Non-polarizable Electrodes, body surface recording Electrodes, internal Electrodes, Micro Electrodes, Electrode array &Practical hints in using Electrodes **UNIT-II** Bioelectric potential and cardiovascular measurement circulatory system of heart- ECG anatomy and function of heart abnormal cardiac Rhythms – Arrhythmias – Einthoven triangle.EEG recording system(10-20 electrode system) Biorhythms – sleep pattern **UNIT-III** Therapeutic and prosthetic devices, cardiac pace maker, types – asynchronous and synchronous modes of operation(Demand). Asynchronous pace maker – working principle and function demand PM – working principle – QRS triggered and atrioventricular synchronized PM lead wires and electrodes, cardioverter. Defibrillator : working principle of DC defibrillation electrodes used. Infant incubator and lithotripry **UNIT-IV** Electrical hazards in medical instruments macro and micro shock – devices to protect against electrical hazards – ground fault interrupter, isolation transformer, line isolation monitor, receptacle tester, electrical safety analyzer equipement, preventive maintenance. **UNIT-V** Recent trends : Ultrasonography – lasers principle and operation of laser types of lasers – pulsed Ruby laser – ND-YAG laser – Helium-Neon Argon laser-c02 laser exciner laser, semiconductor lasers – laser safety.	

Text Books & Reference Books:	**Text Books:** 1.Seslie Cromwell, Fres J.Weibell and Esich A.Plefittes "BioMedical Instrumentation & Measurements" 9th edition, pearson education. 2.L.A Geddes and L.E Baker – Principles of Applied Bio Medical Instrumentation, John Wiley,1989 3.Reichard Aston, Principles of Bio Medical Instrumentation and Measurements, Mervill Publishing Company,1990. **Reference Books:** 1. R.S. Khandpur "Handbook of Bio Medical Instrumentation" Tata Mc Graw Hill, 1987. 2. M.Arumugam, Bio Medical Instrumentation, Anuradha Agencies Publisher, Vidayal Karappu-612606, Kumbakansam, R.M.S., 1992. 3. B. John and J.G.Webser Medical and Clinical Engineers, Prentice Hall, 1979.
E-Resources:	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

13EE42P7– POWER SYSTEMS LAB

Course Category:	Professional core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Power system Analysis, Switchgear and Protection	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives	• To have hands on experience on various system studies and different techniques used for system planning. • To perform the dynamic analysis of power system	
Course Outcomes:	**CO1**	Able to understand Inverse Over Current, Differential Over Current and Percentage differential Relay Characteristics
	CO2	Able to modeling of Transmission lines
	CO3	Able to measure Earth resistance and Oil Testing
	CO4	Able to understand Load Flow studies by using G-S Method
	CO5	Able to understand load frequency dynamics of single and two area Power Systems
Course Content:	**LIST OF EXPERIMENTS** 1. Voltage Distribution in a string of Insulators 2. Inverse Over Current Relay Characteristics 3. Directional Over Current Relay Characteristics 4. Percentage Differential Relay Characteristics 5. Fuse Characteristics 6. ABCD Characteristics 7. Sequence Impedance of Synchronous Machine 8. Charatceristics of a Typical Power System Load 9. Measurement of Earth Resistance 10. Oil Testing 11. Computation of Parameter & Modelling of Transmission Lines 12. Formation Of Ybus & Zbus 13. Solution Of Power Flow Using G-S Method 14. Economic Dispatch In Power Systems 15. DVR With & Without Stabilizer Using Matlab Program and Simulation 16. Load-Frequency Dynamics of Single And Two Area Power Systems 17. Numerical Solution of The Swing Equation	

13EE42PR – PROJECT WORK

Course Category:	Project	**Credits:**	6
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Basic knowledge in Electrical and Electronic Engineering Courses, modern tools in software and hardware design	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives:	The aim of the project work to provide an opportunity for the student to develop personally and professionally by arranging and performing a project of his/her own choice in any field of medicine including medicine within the wider context of societies at an approved host institution.	
Course Outcomes:	**CO1**	Able to identify the real world problems and recognize the mathematical and physical foundations of electrical engineering.
	CO2	Use written and oral communications effectively, clearly and coherently.
	CO3	Formulate design methodologies and estimate alternate approaches and tradeoffs in Implementation.
	CO4	Develop collaborative skills through working in a team to achieve common goals.
	CO5	Able to Apply advanced programming and simulation tools for engineering problems.