2020

SYLLABUS SCHEME

B. TECH IN ELECTRONICS & COMMUNICATION ENGINEERING

VEER MADHO SINGH BHANDARI UTTARAKHAND TECHNICAL UNIVERSITY

SHIVALIK COLLEGE OF ENGINEERING

EVALUATION SCHEME & SYLLABUS

W.E.F. ACADEMIC SESSION 2020-21

Uttarakhand Technical University, Dehradun

Scheme of Examination as per AICTE Flexible Curricula

Evaluation Scheme & Syllabus

I Year (Common to All Branches)

W.E.F. Academic Session 2020-21

Uttarakhand Technical University, Dehradun
New Scheme of Examination as per AICTE Flexible Curricula
Bachelor of Technology (B. Tech.) I Year
W.E.F. Academic Session - 2020-21

I Semester - GROUP A: (Branches for Group "A" to be decided by the Institutes)

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
Mandatory Induction Program (First three weeks)				Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations									
Fourth week onwards classes will start													
1.	BAST 101 BASP 101	BSC-1	Engineering Chemistry	100	30	20	30	20	200	3	1	2	5
2.	BAST 102	BSC-2	Mathematics-I	100	30	20	-	-	150	3	1	-	4
3.	BAST 103 BASP 103	HSMC-1	English for Communications	100	30	20	30	20	200	3	-	2	4
4.	BEET 101 BEEP 101	ESC-1	Basic Electrical Engineering	100	30	20	30	20	200	3	1	2	
5.	BCST 101 BCSP 101	ESC-6	Fundamentals of Computers & Programming in C	100	30	20	30	20	200	3	1	2	5
6.	BMEP 101	ESC-3	Manufacturing Practices / Workshop	-	-	-	30	20	50	1	-	2	2
7.	BASP 102	DLC-1	Internship-I (60 Hrs Duration) at the Institute level	To be completed during or at the end of the second semester. Its evaluation/credit to be added in third semester.									
8.	BASP 105	DLC-2	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach				15	10	25*	-	-	4	-
			Total	**500**	**150**	**100**	**150**	**100**	**1000**	**16**	**4**	**10**	**25**

*It is non credit course. Student must clear it to be promoted in II Year; Marks will not be added to the total

Note: The Meaning of last Character of Subject Code (T – Theory and P – Practical)

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

Uttarakhand Technical University, Dehradun
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I Semester - GROUP B: (Branches for Group "B" to be decided by the Institutes)

S.No .	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	BAST 104 BASP 104	BSC-3	Engineering Physics	100	30	20	30	20	200	3	1	2	5
2.	BAST 102	BSC-2	Mathematics-I	100	30	20	-	-	150	3	1	-	4
3.	BMET 102 BMEP 102	ESC-4	Basic Mechanical Engineering	100	30	20	30	20	200	3	1	2	5
4.	BECT 101 BECP 101	ESC-5	Basic Electronics Engineering	100	30	20	30	20	200	3	1	2	5
5.	BMEP 103	ESC-2	Engineering Graphics	-	-	-	50	25	75	1	-	2	2
6.	BASP 106	HSMC-2	Language Lab & Seminars	-	-	-	50	25	75	1	-	2	2
7.	BEST 101	BSC	Environmental Studies	70	Not Credit Course. Student must clear it to complete the degree.			30 (Field & Project Work)	100	3	-	-	-
8.	BASP 102	DLC-1	Internship-I - (60 Hrs Duration) at the Institute level	To be completed during first/second semester. Its evaluation/credit to be added in third semester.									
			Total	**470**	**120**	**80**	**190**	**140**	**1000**	**17**	**4**	**10**	**23**

Note: The Meaning of last Character of Subject Code (T – Theory and P – Practical)

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

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II Semester - GROUP A: (Branches for Group "A" to be decided by the Institutes)

S.No .	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	**BAST 104 BASP 104**	BSC-3	**Engineering Physics**	100	30	20	30	20	200	3	1	2	5
2.	**BAST 105**	BSC-4	**Mathematics-II**	100	30	20	-	-	150	3	1	-	4
3.	**BMET 102 BMEP 102**	ESC-4	**Basic Mechanical Engineering**	100	30	20	30	20	200	3	1	2	5
4.	**BECT 101 BECP 101**	ESC-5	Basic Electronics Engineering	100	30	20	30	20	200	3	1	2	5
5.	**BMEP 103**	ESC-2	**Engineering Graphics**	-	-	-	50	25	75	1	-	2	2
6.	**BASP 106**	HSMC-2	**Language Lab & Seminars**	-	-	-	50	25	75	1	-	2	2
7.	**BEST 101**	**BSC**	**Environmental Studies**	70	Not Credit Course. Student must clear it to complete the degree.			30 (Field & Project Work)	100	3	-	-	-
8.	**BASP 102**	DLC-1	**Internship-I - (60 Hrs Duration) at the Institute level**	**To be completed during first/second semester. Its evaluation/credit to be added in third semester.**									
			Total	**470**	**120**	**80**	**190**	**140**	**1000**	**17**	**4**	**10**	**23**

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II Semester - GROUP B: (Branches for Group "B" to be decided by the Institutes)

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
Mandatory Induction Program (First three weeks)				Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations									
Fourth week onwards classes will start													
1.	**BAST 101 BASP 101**	BSC-1	**Engineering Chemistry**	100	30	20	30	20	200	3	1	2	5
2.	**BAST 105**	BSC-4	**Mathematics-II**	100	30	20	-	-	150	3	1	-	4
3.	**BAST 103 BASP 103**	HSMC-1	**English for Communication**	100	30	20	30	20	200	3	-	2	4
4.	**BEET 101 BEEP 101**	ESC-1	**Basic Electrical Engineering**	100	30	20	30	20	200	3	1	2	5
5.	**BCST 101 BCSP 101**	ESC-6	**Fundamentals of Computers & Programming in C**	100	30	20	30	20	200	3	1	2	5
6.	**BMEP 101**	ESC-3	**Manufacturing Practices / Workshop**	-	-	-	30	20	100	1	-	2	2
7.	**BASP 102**	DLC-1	**Internship-I (60 Hrs Duration) at the Institute level**	**To be completed during or at the end of the second semester. Its evaluation/credit to be added in third semester.**									
8.	**BASP 105**	DLC-2	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach				15	10	25*	-	-	4	-
			Total	**500**	**150**	**100**	**150**	**100**	**1000**	**16**	**4**	**10**	**25**

*It is non credit course. Student must clear it to be promoted in II Year; Marks will not be added to the total

Note: The Meaning of last Character of Subject Code (T – Theory and P – Practical)

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

BAST-101 BASP-101	Engineering Chemistry	3 1 2	05 Credits

Course Contents:

Periodic Properties (5 Lectures)

Effective Nuclear Charge, Atomic & Ionic sizes, Electron affinity, Electro negativity, Ionization Potential, Ploarizability, Oxidation States & Hydrogen Bonding.

Phase equilibrium (5 Lectures)

Gibbs Phase Rule, Phase diagram of single component system (Water & Sulphur) Phase diagram of Binary Eutectic System (Cu-Ag.)

Water Analysis - (8 Lectures)

Soft and Hard Water, Degree of Hardness, Determination of hardness by EDTA method (related numerical problems), Softening methods (Lime-Soda, Zeolite and Ion Exchange Methods), Alkalinity & It's determination.

Boiler Feed Water, Sludge & Scale, Priming & Foaming, Boiler Corrosion, Caustic Embrittlement.

Polymers (8 Lectures)

Introduction, Types of polymerization, Classification, Thermoplastic & Thermosetting polymers Elementary idea of Biodegradable polymers, Conducting Polymers & Nano Particles, Preparation, properties & uses of the following polymers - PVC, PMMA, Teflon, Nylon 6, Nylon 6:6, Polyester & Bakelite, Rubbers, Vulcanization of Rubber.

Corrosion (4 Lectures):

Introduction, Dry Corrosion, Wet Corrosion, Mechanism of Corrosion, Factors affecting corrosion and Prevention of corrosion.

Lubricants (6 Lectures)

Introduction, Mechanism of lubrication, Classification of lubricants, significance & determination of Viscosity and Viscosity Index, Flash & Fire Points, Cloud & Pour Points, Aniline & Mixed Aniline Points, Acid Number, Saponification Number.

Spectroscopic techniques and application (4 Lectures)

Principle and Applications of UV – visible, IR, Raman & NMR, Spectroscopy.

Course Outcomes

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

Practical List

NOTE: Choice of 10-12 experiments of the following core experiments must be performed during the session.

1. Determination of hardness of water using EDTA method (Complexometric Titration).

2. Determination of alkalinity of water.
3. Determination of chloride content of water (Mohr's Method)
4. Determination of viscosity of unknown sample using Ostwald's viscometer
5. Determination of surface tension of unknown sample using stalagmometer.
6. Determination of saponification value of oil sample
7. Determination of acid value of oil sample
8. Synthesis of a polymer.
9. Determination of percentage moisture content in a coal sample.
10. Determination of percentage volatile matter in a coal sample.
11. Determination of ash content in a coal sample.
12. Separation of binary mixture by thin layer chromatography.
13. Separation of binary mixture by ascending paper chromatography.
14. Determination of adsorption isotherm of acetic acid on charcoal.
15. Determination of percentage purity of ferrous ammonium sulphate and copper sulphate.
16. Chemical analysis of salt (mixture of one acidic and one basic radical)

Reference Books :

1 Chemistry in Engineering and Technology - Vol.1 &2 Kuriacose and Rajaram , McGraw Hill Education
2 Fundamental of Molecular Spectroscopy C.N. Banwell , McGraw Hill Education
3 Engineering Chemistry – B.K. Sharma, Krishna Prakashan Media (P) Ltd., Meerut.
4 Basics of Engineering Chemistry – S.S. Dara & A.K. Singh, S. Chand &Company Ltd., Delhi.
5 Applied Chemistry – Theory and Practice, O.P. Viramani, A.K. Narula, New Age International Pvt. Ltd. Publishers, New Delhi.
6 Elementary Spectroscopy ,Y .R. Sharma , S. Chand Publishing
7 Polymer Science, Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar, New Age International Pvt. Ltd
8 Advanced Inorganic Chemistry, G.R. Chatwal, Goal Publishing house
9 Engineering Chemistry (NPTEL Web-book) B.L. Tembe, Kamaluddin and M.S. Krishna
10 Advanced Physical Practical Chemistry by JB Yadav.

BAST-102	MATHEMATICS-I	3 1 0	04 Credits

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

To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.

To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.

To familiarize the student with functions of several variables that is essential in most branches of engineering.

To develop the essential tool of vector spaces, matrices and linear algebra in a comprehensive manner.

Course Contents:

Module 1: Calculus: (10 hours): Rolle's theorem, Mean Value theorems, Expansion of functions by Maclaurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two and three variables), Method of Lagranges Multipliers.

Module 2: Calculus: (8 hours): Definite Integral as a limit of a sum and Its application in summation of series; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Multiple Integral, Change the order of the integration.

Module 3: Vector Calculus : (10 hours) : Differentiation of Vectors, Scalar and vector point function, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Line Integral, Surface Integral and Volume Integral, Gauss Divergence, Stokes and Green theorems (without proof).

Module 4: Vector Spaces (6 hours): Vector Space, Vector Sub Space, Linear Combination of Vectors,Linearly Dependent, Linearly Independent, Basis of a Vector Space,Linear Transformations.

Module 5: Matrices (6 hours): Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

BAST 103 & BASP 103	English for Communication	3L-0T-2P	4 Credits

COURSE CONTENTS:

Unit-I

Identifying Common errors in writing: Articles, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure.

Unit-II

Vocabulary building and Comprehension:

Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, synonyms, antonyms, Reading comprehension.

Unit-III

Communication:

Introduction, Meaning and Significance, Process of Communication, Oral and Written Communication, 7 c's of Communication, Barriers to Communication and Ways to overcome them, Importance of Communication for Technical students, nonverbal communication.

Unit-IV

Developing Writing Skills:

Planning, Drafting and Editing, Precise Writing, Précis, Technical definition and Technical description. Report Writing: Features of writing a good Report, Structure of a Formal Report, Report of Trouble, Laboratory Report, Progress Report.

Unit-V

Business Correspondence:

Importance of Business Letters, Parts and Layout; Application, Contents of good Resume, guidelines for writing Resume, Calling/ Sending Quotation, Order, Complaint, E-mail and Tender.

Books Recommended:

1. 'Technical Communication : Principles and practice', Meenakshi Raman and Sangeeta Sharma (Oxford)
2. 'Effective Business Communication', Krizan and merrier (Cengage learning)
3. 'Communication Skill, Sanjay Kumar and pushlata, OUP2011
4. "Practical English Usage Michael Swan OUP, 1995.
5. "Exercises in spoken English Parts I-III CIEFL, Hyderabad, Oxford University Press
6. On writing well, William Zinsser, Harper Resource Book 2001.
7. Remedial English Grammar, F.T. Wood,Macmillan2007.

Course Outcomes:

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Communicative Language Laboratory:

Course objective: The language laboratory focuses on the practice of English through audio-visual aids and Computer software. It intends to enable the students to speak English correctly with confidence and intends to help them to overcome their inhibitions and self –consciousness while speaking in English.

Topics to be covered in the Language laboratory sessions:

1. Listening Comprehension.
2. Pronunciation, Intonation, Rhythm
3. Practising everyday dialogues in English
4. Interviews.
5. Formal Presentation

Final Assessment should be based on assignment, assessment, presentation and interview of each candidate.

BEET 101 & BEEP 101	Basic Electrical Engineering	3L-1T-2P	5 Credits

Course outcomes:

The final outcome of the subject will result into an enhancement in understanding the basic concepts of Core Electrical Engineering subjects.

The topics covered under this subject will help to enhance the basic understanding of Electrical machines and power systems and basic electronics.

Course Contents:

UNIT 1 :

DC Circuits (8 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin , Norton Theorems and maximum power transfer theorem . Star to Delta conversion. Time-domain analysis of first-order RL and RC circuits.

UNIT 2:

AC Circuits (8 hours)

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections and power measurement

UNIT 3:

Transformers (6 hours)

Magnetic circuits and materials, BH characteristics, Basic laws of electromagnetism, single phase transformer. ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT 4:

Electrical Machines (8 hours)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor construction and workings . Construction, working, torque-speed characteristic and speed control of separately and self excited dc machines . Construction and working of synchronous generators

Unit 5:

Electrical Installations (6 hours)

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing methods. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

References

1. D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, latest edition.
2. S.N. Singh , Basic Electrical Engineering, P.H.I.,2013
3. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall,2014
4. M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press, 2012
5. C.L. Wadhwa, Basic Electrical Engineering. New Age International.
6. B.L. Theraja & A.K Theraja Textbook of Electrical Technology - Vol. 1, S. Chand Publication
7. E. Hughes & I.M. Smith Hughes Electrical Technology Pearson
8. Vincent Del Toro Electrical Engineering Fundamentals

List of experiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

2. Measurement of steady-state and transient response of R-L, R-C, and R-L.
3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L- C circuits.
4. Verification of Network theorems.
5. To perform Load test on single phase Transformer.
6. To study the Starting and reversal of 3 phase induction motor.
7. Study of Speed control of a DC shunt Motor by Field Control Method.
8. Study the characteristic of DC Motor.
9. Study the characteristic DC generator.

Institute can add upto two experiment of their own choice.

BMET 105	Engineering Graphics	1L-0T-2P	2 Credits

Course Objective:

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

- to prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- to prepare you to communicate effectively
- to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

Goals & Outcomes:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

Course Contents:

UNIT 1: Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Orthographic Projections covering, Principles of Orthographic Projections- Conventions - Projections of Points

UNIT 2: Projection of lines inclined to both planes; vertical and horizontal traces. Projections of planes - Auxiliary Planes; Projections of Regular Solids in simple position, projection of solids with base on ground and axis perpendicular to HP, Projection of solids with axis parallel to both the principal planes. Projection of solids inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning.

UNIT 3: Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Frustums and truncated solids. Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only) . Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Isometric axes, Conventions; Isometric Views of solids, Box method, coordinate method, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT 4: Introduction of CAD in engineering drawing. Overview of Computer Graphics covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area

(Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable),

UNIT 5: Customization & CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits Applying various ways of drawing circles; ; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing of lines, circles, polygons using CAD technique. Introduction of solids. Multi views.

Text/Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
   B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
4. (Corresponding set of) CAD Software Theory and User Manuals

BMEP 101	Manufacturing Practices/Workshop	1L-0T-2P	2 Credits

Course Objective:

Manufacturing is fundamental to the development of any engineering product. The course on Engineering Workshop Practice is intended to expose engineering students to different types of manufacturing / fabrication processes, dealing with different materials such as metals, ceramics, plastics, wood, glass etc. While the actual practice of fabrication techniques is given more weightage, some lectures and video clips available on different methods of manufacturing are also included.

Course Outcomes:

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

- Understanding different manufacturing techniques and their relative advantages/ disadvantages with respect to different applications.
- Selection of a suitable technique for meeting a specific fabrication need.
- Acquire a minimum practical skill with respect to the different manufacturing methods and develop the confidence to design & fabricate small components for their project work and also to participate in various national and international technical competitions.
- Introduction to different manufacturing methods in different fields of engineering.
- Practical exposure to different fabrication techniques.
- Creation of simple components using different materials.
- Exposure to some of the advanced and latest manufacturing techniques being employed in the industry.

Course Contents:

Lectures & videos: (10 hours)

1. Manufacturing Methods- casting, forming, machining, joining, Introduction to Lathe, Drilling etc. **(3 lectures)**
2. CNC machining, Additive manufacturing **(1 lecture)**
3. Fitting operations & power tools **(1 lecture)**
4. Electrical &Electronics **(1 lecture)**
5. Carpentry **(1 lecture)**
6. Plastic moulding, glass cutting **(1 lecture)**
7. Metal casting **(1 lecture)**
8. Welding (arc welding & gas welding), brazing **(1 lecture)**

(ii) Workshop Practice:(60 hours)

1. Machine shop **(10 hours)**
2. Fitting shop **(8 hours)**
3. Carpentry **(6 hours)**
4. Electrical & Electronics- Soldering, Brazing, Winding etc.**(8 hours)**
5. Welding shop **(8 hours (Arc welding 4 hrs + gas welding 4 hrs)**
6. Casting **(8 hours)**
7. Smithy **(6 hours)**
8. Plastic moulding/ Glass Cutting/ Sheet Metal Shop (6 hours)

Note: Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

BAST 104 & BASP 104	Engineering Physics	3L-1T-2P	5 Credits

Course Contents:

Module 1: Wave nature of particles and the Schrodinger equation (8 lectures)

Introduction to Quantum mechanics, Wave nature of Particles, Free-particle wave function and wave-packets, Group Velocity and Phase Velocity and relation, Uncertainty principle, wave function, Born interpretation of wave function, operators, Time-dependent and time-independent Schrodinger equation for wave function, Application: Particle in a One-dimensional Box.

Module 2: Wave optics (8 lectures)

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach- Zehnder interferometer.

Fraunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

Module 3: Introduction to solids (8 lectures)

Free electron theory of metals, Fermi level of Intrinsic and extrinsic, density of states, Bloch's theorem for particles in a periodic potential. V-I characteristics of PN junction, Zener diode, Solar Cell, Hall Effect, concept of zero resistivity and superconductivity, Meissner effect, Type - I and Type - II superconductors, applications of superconductivity.

Module 4: Lasers (8 lectures)

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO_2), solid-state lasers (ruby, Neodymium), Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine. Introduction to Optical fiber, acceptance angle and cone, Numerical aperture, V number, attenuation.

Module 5: Electrostatics in vacuum (8 lectures)

Gradient, Divergence and curl, Stokes' theorem, Gauss Theorem, Calculation of electric field and electrostatic potential for a charge distribution; Electric displacement, Basic Introduction to Dielectrics, Continuity equation for current densities; Maxwell's equation in vacuum and non-conducting medium; Poynting vector.

List of Experiment*

1. To determine the dispersive power of prism.
2. To determine the wave length of sodium light with the help of newton's Ring.
3. Resolving Power of Telescope.
4. YDSE (Young's double slit Experiment).
5. To determine the frequency of AC mains supply.
6. V-I Characteristics of P-N junction diode.
7. To determine the wave length of diode loses by single slit diffraction.
8. To determine the plank's constant with the help of photocell.
9. Hall's effect experiment.
10. Calibration of ammeter by using reference zener diode.

11. To study the effect of temperature on reverse saturation current in P-N junction diode and to determine the energy band gap.
12. To determine the wave length of sodium by using plane diffraction grating.
13. To determine the prominent lines of mercury source by plane diffraction grating.
14. To determine the numerical aperture of an optical fiber.
15. To determine wave length of given laser by plane diffraction grating.
16. To determine the variation of magnetic field along the axis of current carrying circular coil and the estimation the radius of coil. 1. To determine the resistivity and band gap by four probe method.
17. Use of Michelson-Morley interferometer for determining the wavelength of He-Ne laser
18. To determine the specific rotation of sugar solution using Loren's half shade polarimeter.
19. To calculate the dielectric constant of the given dielectric material.
20. To find the capacitance and permittivity of the given material.
21. Measurement of length (or diameter) using vernier calliper, screw gauge and travelling microscope
22. To determine g by bar pendulum and Kater's pendulum.
23. To determine g and velocity for a freely falling using digital timing technique.
24. To study the motion of a spring and calculate (a) spring constant (b) value of g
25. To determine the height of an object using a sextant.
26. Determination of the value of e/m of an electron by helical method/ Thomson method.

**** Minimum 15 experiment are mandatory to perform out of above list of experiments as well other than these experiments 3-4 more experiments can be considered as per their availability***

Suggested Reference Books

1. A. Ghatak, Optics.
2. O. Svelto, Principles of Lasers.
3. David Griffiths, Introduction to Electrodynamics.
4. D.J. Griffiths, Quantum Mechanics.
5. Halliday & Resnick, Physics.
6. HC Verma, Quantum Physics
7. MN Avdhanulu, PG Kshirsagar et all, Engineering Physics

BAST 105	MATHEMATICS-II	3L-1T-0P	4 Credits

OBJECTIVES: The objective of this course is to familiarize the prospective engineers with techniques in Ordinary and partial differential equations, complex variables and vector calculus. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines. More precisely, the objectives are:

- To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
- To introduce the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems.
- To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.
- To develop the tool of Series and Fourier series for learning advanced Engineering Mathematics.

Course Contents:

Module 1:Ordinary Differential Equations I :(8 hours) : Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Differential Equations of First Order and Higher Degree, Higher order differential equations with constants coefficients, Homogeneous Linear Differential equations, Simultaneous Differential Equations.

Module 2:Ordinary differential Equations II:(8 hours) : Second order linear differential equations with variable coefficients, Method of variation of parameters, Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Module 3: Partial Differential Equations : (8 hours) : Formulation of Partial Differential equations, Linear and Non-Linear Partial Differential Equations, Homogeneous Linear Partial Differential Equations with Constants Coefficients.

Module 4: Sequences and series: (8 hours): Convergence of sequence and series, tests for convergence; Comparison Test; Ratio Test; D'Alembert's Ratio Test, Raabe's Test, Logarithmic Test, Cauchy Root Test, Weierstrass M Test; Alternating Series, Uniform Conversions, Fourier series: Half range sine and cosine series, Parseval's theorem.

Module 5: Functions of Complex Variable :(8 hours) : Functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral (Unit Circle).

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

BMET 102 **BMEP 102**	**Basic Mechanical Engineering**	**3L-1T-2P**	**5 Credits**

Course Contents:

UNIT-1:Fundamental Concepts and Definitions

Definition of thermodynamics, System, Surrounding and universe, Phase, Concept of continuum,Macroscopic & microscopic point of view. Density, Specific volume, Pressure, temperature.Thermodynamic equilibrium, Property, State, Path, Process, Cyclic and non cyclic processes,Reversible and irreversible processes, Quasi static process, Energy and its forms, Enthalpy.

UNIT-2:

Zeroth law: Zeroth law, Different temperature scales and temperature measurement

First law: First law of thermodynamics. Processes - flow and non-flow, Control volume, Flow work and non-flow work, Steady flow energy equation, Unsteady flow systems and their analysis.

Second law: Limitations of first law of thermodynamics, Essence of second law, Thermal reservoir, Heat engines. COP of heat pump and refrigerator. Statements of second law and their equivalence,Carnot cycle, Carnot theorem, Thermodynamic temperature scale, Clausius inequality. Concept of entropy.

UNIT-3:

Properties of steam: Properties of steam, Phase transformation process and its graphical representation on P-V, T-V& T-s diagram, Mollier diagram and Steam Tables, Processes involving steam in closed and open systems.

Introduction to I.C. Engines: Two & four stoke S.I. and C.I. engines. Otto cycle, Diesel cycle, Dual cycle.

UNIT-4:Force system and Analysis

Basic concept: Review of laws of motion, transfer of force to parallel position, resultant of planer force system,Free Body Diagrams, Equilibrium. **Friction:** Introduction, Laws of Coulomb friction,Equilibriumof bodies involving dry fiction.

Structure Analysis

Beams: Introduction, Shear force and bending moment, Shear force and bending moment diagram for statically determinate and indeterminate beams.

Trusses: Introductio n, Simple Trusses, Determination of forces in simple truss members, Method of Joints and Method of section.

UNIT-5

Stress and Strain Analysis

Simple stress and strain: Introduction, Normal shear stresses, Stress-strain diagrams for ductile and brittle materials,Elastic constants, One dimensional loading of members of varying cross section, Strain energy,Thermal stresses.

Compound stress and strains: Introduction, State of plane stress, Principal stress and strain, Mohr's circle for stress and strain.

Pure Bending of Beams: Introduction, Simple bending theory, Stress in beams of different cross sections.

Torsion: Introduction, Torsion of Shafts of circular section, Torque and Twist, Shear stress due to Torque.

References:

1. Van Wylen G.J. & Sonntag R.E. : Fundamentals of classical thermodynamics, John Wiley &Sons, Inc.NY.
2. Holman, J.P. : Thermodynamics, Mc Graw Hill book Co. NY.
3. Singh Onkar, Bhavikatti S.S., Chandra Suresh : Introduction to Mechanical Engineering:
Thermodynamics, Mechanics and Strength of Materials, New Age International Publishers
4. Yadav R. : Thermodynamics and Heat Engines, Vol I & II (SI Editio n) Central Publishing
House Allahabad.
5. G. H. Ryder : Strength of Materials, Mc Millan Publishers India Ltd.
6. Timoshenko : Strength of Materials, D. Van Nostrand Company Inc.

MECHANICAL ENGINEERING LAB

List of Practical **L T P 0 0 2**

A minimum of 8 experiments from the following :

1. Study of Steam engine and steam turbine models.
2. Study of 2-stroke and 4 -stroke I.C.E. models.
3. Study of Fiat engine and/ or Diesel engine prototype.
4. Study of a vapour compression Refrigeration unit tutor/refrigerator.
5. Study of a window type air conditioner.
6. To conduct the tensile test on a UTM and determine ultimate Tensile strength, percentage elongation for a steel specimen.
7. To conduct the compression test and determine the ultimate compressive strength for a specimen.
8. To conduct the Impact test (Izod / charpy) on the Impact testing machine and to find the impact strength.
9. To determine the value of acceleration due to gravity by Atwood's Machine appratus.
10. To verify the principle of moment by Bell Crank Lever Appratus
11. To determine the moment of inertia of a flywheel apparatus about its axis of rotation.
12. To find out coefficient of friction by combined inclined plane & friction slide apparatus.

BecT 101 **BECP 101**	**Basic Electronics Engineering**	**3L-1T-2P**	**5 Credits**

Course

Contents:

Module	Basic Electronics(BECT101,BECP101)	Hr
1.	**Semiconductor Diodes** Semiconductor materials- intrinsic and extrinsic types , Ideal Diode , Terminal characteristics of diodes: p-n junction under open circuit condition p-n junction under forward bias and reverse bias conditions p-n junction in breakdown region , Diode small signal model Zener diode and applications , Rectifier Circuits, Clipping and Clamping circuits	**8**
2	**DIODE APPLICATIONS:** Rectifiers and filter circuit: Half wave rectifier, Full wave rectifier, bridge rectifier and their analysis, L,C and Pi filters, Series and shunt diode clippers, Clipping at two independent levels, Clamping operation , Clamping circuit, Practical clamping circuits, Basic regulator supply using zener diode	**7**
3	**Bipolar Junction Transistors (BJTs)** Physical structure and operation modes, Active region operation of transistor, D.C. analysis of transistor circuits, Transistor as an amplifier, Biasing the BJT: fixed bias, emitter feedback bias, collector feedback bias and voltage divider bias, Basic BJT amplifier configuration: common emitter, common base and common collector amplifiers, Transistor as a switch: cut-off and saturation modes , High frequency model of BJT amplifier	**10**
4	**Field Effect Transistor (FET**) ***Enhancement-type MOSFET***: structure and physical operation, current-voltage characteristics Depletion-type MOSFET , D.C. operation of MOSFET circuits, MOSFET as an amplifier, Biasing in MOSFET amplifiers , Basic MOSFET amplifier configuration: common source, common gate and common drain types , High frequency model of MOSFET amplifier , Junction Field-Effect Transistor (JFET)	**10**
5	**Operation Amplifier (Op-amps)** ***Ideal Op-amp Differential amplifier*****:** differential and common mode operation common mode rejection ratio (CMRR) , ***Practical op-amp circuits***: inverting amplifier, non -inverting amplifier, weighted summer, integrator, differentiator , Large signal operation of op-amps , Other ***applications of op-amps*****:** instrumentation circuits, active filters, controlled sources, logarithmic amplifiers, waveform generators, Schmitt triggers, comparators	**10**

TEXT BOOKS:

1. Integrated devices & Circuits by Millman & Halkias.
2. Electronics Devices and Circuit Theory by R. Boylestad.

REFERENCE BOOKS:

1. Electronics Devices and Circuits-II by A.P.Godre & U.A. Bakshi.
2. Electronics Devices and Circuit by G.K. Mithal.

Basic Electronics Lab

Sr.	Experiment
1	CRO-Applications
2	V-I Characteristics of Silicon & Germanium PN Junction diodes
3	V-I Characteristics of Zener Diode
4	Characteristics of BJT in Common Emitter Configuration
5	Characteristics of JFET in Common Source Configuration
6	Half Wave and Full Wave Rectifier With Filter
7	Common Emitter BJT Amplifier for audio signal amplification
8	Applications of Operational Amplifier as adder and Subtractor
9	Applications of Operational Amplifier as differentiator and integrator
10	All logic Gate's truth table validation

BCST 101 & BCSP 101	Fundamentals of Computer & Programming in C	3L-1T-2P	5 Credits

Course Objective

1. To learn basics of computers
2. To learn basics of Operating System
3. To learn basics of C Language
4. To learn basics of Programming

Course Outcomes:

1. The student will learn to formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. To use arrays, pointers and structures to formulate algorithms and programs.
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

Detailed Contents

Module I

Introduction to Programming - Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)
Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm Flowchart/Pseudocode with examples.
From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

Module II

Arithmetic expressions and precedence, Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops,
Arrays - Arrays (1-D, 2-D), Character arrays and Strings

Module III

Basic Algorithms - Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)
Function - Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Module IV –

Recursion - Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.
Structure - Structures, Defining structures and Array of Structures

Module V

Pointers - Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)
File handling - (only if time is available, otherwise should be done as part of the lab)

Experiments

The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures

Tutorial 12: File handling:
Lab 12: File operations Laboratory

Suggested Text Books

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill Suggested

Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

13. WAP to illustrate constructor & Destructor
14. WAP to illustrate Object and classes.
15. WAP to illustrate Operator overloading
16. WAP to illustrate Function overloading
17. WAP to illustrate Derived classes & Inheritance
18. WAP to insert and delete and element from the Stack
19. WAP to insert and delete and element from the Queue
20. WAP to insert and delete and element from the Linked List

Recommended Text Books:

1. Fundamentals of Computers : E Balagurusamy, TMH
2. Basic Computer Engineering: Silakari and Shukla, Wiley India
3. Fundamentals of Computers : V Rajaraman, PHI
4. Information Technology Principles and Application: Ajoy Kumar Ray & Tinku Acharya PHI.

Recommended Reference Books:

1. Introduction of Computers : Peter Norton, TMH
2. Object Oriented Programming with C++ :E.Balagurusamy, TMH
3. Object Oriented Programming in C++: Rajesh K.Shukla, Wiley India
4. Concepts in Computing: Kenneth Hoganson, Jones & Bartlett.
5. Operating Systems – Silberschatz and Galvin - Wiley India
6. Computer Networks:Andrew Tananbaum, PHI
7. Data Base Management Systems, Korth, TMH

BASP 206	Language Lab and Seminars	0L-0T-2P	1 Credits

Course objective: This course intends to impart practical training in the use of English Language for Communicative purposes and aims to develop students' personality through language Laboratory.

Topics to be covered in the Language laboratory sessions:

1. Introducing oneself, family, social roles.
2. Public Speaking and oral skills with emphasis on conversational practice, extempore speech, JAM(Just a minute sessions), describing objects and situations, giving directions, debate, telephonic etiquette.
3. Reading Comprehension: Intensive reading skills, rapid reading, and reading aloud (Reading material to be selected by the teacher).
4. To write a book review. Standard text must be selected by the teacher.
5. Role plays: preparation and delivery topic to be selected by teacher/faculty.
6. Practice of Communication Skills using Language Lab

BEST 101	Environmental Studies	L - T - P 3 0 0	0 Credits

AS Per UGC Syllabus

Total Marks - 100

The structure of the question paper and Marks Distribution:

University Examination
- Part A - Short answer pattern - 20 marks
- Part B - Essay type with inbuilt choice - 50 marks

Internal Evaluation at Institute Level
- Part C - Field & Project Work - 30 marks

AIM of Environmental Studies Subject

The aim of E.V.S. (environmental studies) is to develop a world population that is aware of and concerned about the environment and its associated problems and which has the knowledge ,Skills, attitudes ,motivations and commitment to work individually and collectively towards solutions of current problems and prevention of new ones. In view of this aim, environmental studies should form an integral part of the educational process, be centered in practical problems and be of an interdisciplinary/multidisciplinary character.

OBJECTIVES of Environmental Studies Subject

- Awareness: To help social groups and individuals acquire awareness of and sensitively to the total environment and it's allied problems.
- Knowledge: To help social groups and individuals gain a variety of experiences and acquire a basic understanding of environment and it's associated problems.
- Attitudes: To help social groups and individuals acquire a set of values and feelings of concern for environment.
- Skills: To help the individuals in acquiring skills for identifying and solving environmental problems.
- Participation: To provide social groups and individuals with an opportunity to be actively involved at all levels in working towards the resolution of environmental problems.

Detailed Content

Unit I –

Introduction: Introduction to environmental studies, Multidisciplinary nature of environmental studies; Scope and importance; the need for environmental education. Concept of sustainability and sustainable development.

Natural Resources:
Renewable and non-renewable resources: Natural resources and associated problems.
- Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

- Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit II : **Ecosystems**:

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

Unit III: **Biodiversity and Conservation**

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

Unit IV : **Environmental Pollution**

Definition

- Cause, effects and control measures of :-
    - Air pollution
    - Water pollution
    - Soil pollution
    - Marine pollution
    - Noise pollution
    - Thermal pollution
    - Nuclear hazards
- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management : floods, earthquake, cyclone and landslides.

UNIT V - Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case Studies
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.

- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

UNIT VI - Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies. (6 lectures)

Note: Introduction and familiarize students with the following

Global Environmental Issues and Environmental Laws

Pollution Tragedies: Love canal, Bhopal Gas, Endosulfan, Minamata and Flint water. UN Initiatives and International agreements: Montreal and Kyoto protocols, Paris Climate Summit (2015) and Convention on Biological Diversity (CBD). Environment Laws: Environment Protection Act (1986); Air (Prevention & Control of Pollution) Act (1981); Forest Conservation Act (1980); Water (Prevention and control of Pollution) Act (1974); Wildlife Protection Act (1972).

Field work

1. Visit to a local area to document environmental assets river / forest / grassland / hill / mountain
2. Visit to a local polluted site-Urban / Rural / Industrial / Agricultural
3. Study of common plants, insects, birds.
4. Study of simple ecosystems-pond, river, hill slopes, etc.
5. Plantation at least 2 fruits tree in Surroundings. Pic is to taken.
6. Any useful daily good from waste materials.
7. Taken at least 5 pics of surrounding by mobile in relation to environmental/social issues.
8. Development of detailed list of flora and fauna of college campus.
9. Manufacturing of any technical prototype/model in relation to Climatic Change mitigation.

Note: Minimum Five activities shall be done by each class and reports shall submit to University after host institute verification.

Text Books:

1. Basu, M. and Xavier, S.,Fundamentals of Environmental Studies, Cambridge University Press, 2016.
2. Mitra, A. K and Chakraborty, R., Introduction to Environmental Studies, Book Syndicate, 2016.
3. Enger, E. and Smith, B., Environmental Science: A Study of Interrelationships, Publisher: McGraw-Hill Higher Education; 12th edition, 2010.
4. Basu, R.N, Environment, University of Calcutta, 2000.

Suggested Readings:

1. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
2. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London,Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
6. McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
7. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
8. Ghosh Roy, MK, Sustainalble Development (Environment, Energy and Water Resources), Ane Books Pvt. Ltd., 2011.
9. Karpagam, M and GeethaJaikumar, Green Management, Theory and Applications, Ane Books Pvt. Ltd., 2010.
10. Bala Krishnamoorthy, Environmental Management, PHI learning PVT Ltd, 2012.

Uttarakhand Technical University, Dehradun

Scheme of Examination as per AICTE Flexible Curricula

Evaluation Schemes for B. Tech 2nd to 4th Year

W.E.F. Academic Session 2020-21

III to VIII SEMESTER

Bachelor of Technology (B. Tech.)

in

[Electronics and Communication Engineering]

Uttarakhand Technical University, Dehradun

New Scheme of Examination as per AICTE Flexible Curricula

Bachelor of Technology (B.Tech.) III Year

[Electronics and Communication Engineering]

W.E.F. Academic Session 2020-21

III Semester

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credit
				Theory			Practical						
				End Sem	Mid Sem	Quiz / Assignment	End Sem	Term Work /Lab Work & Sessional		L	T	P	
1.	**BCET 301**	BSC-5	Mathematics-III	100	30	20	--	--	150	3	1	0	4
2.	BECT 302 BECP 302	DC-1	Electronic Measurement & Instrumentation	100	30	20	30	20	200	3	1	2	5
3.	BECT 303 BECP 303	DC-2	Digital Electronics	100	30	20	30	20	200	3	1	2	5
4.	BECT 304 BECP 304	DC-3	Electronic Devices	100	30	20	30	20	200	3	1	2	5
5.	BEET 305 BEEP 305	DC-4	Network Analysis & Synthesis	100	30	20	30	20	200	3	1	2	5
6.	BASP 307	DLC-1	Evaluation of Internship-I completed at I year level /Seminar for Lateral Entry	-	-	-	-	50	50			4	2
7		HV	90 hrs Internship based on using various software's –Internship - II	To be completed anytime during Third/ fourth semester. Its evaluation/credit to be added in fifth semester.									
Total				500	150	100	120	130	1000	15	5	12	26
NSS/NCC													

IV Semester

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credit
				Theory			Practical						
				End Sem	Mid Sem	Quiz / Assignment	End Sem	Term Work /Lab Work & Sessional		L	T	P	
1.	BAST 401	ESC	Energy & Environmental Engineering	100	30	20	-	-	150	3	1	-	4
2.	BECT 402 BECP 402	DC	Signal & Systems	100	30	20			150	3	1	-	4
3.	BECT 403 BECP 403	DC	Analog Communication	100	30	20	30	20	200	3	1	2	5
4.	BEET 404 BEEP 404	DC	Control System	100	30	20	30	20	200	3	1	2	5
5.	BECT 405 BECP 405	DC	Analog Circuits	100	30	20	30	20	200	3	1	2	5
6.	BHUT-401	HV	Universal Human Value -2	50	30	20	-	-	100	2	1	0.	3
	BCST 408	MC	Cyber Security and PCB Design Software Simulation										
7		DLC	90 hrs Internship based on using various software's –Internship -II	To be completed anytime during Third/ fourth semester. Its evaluation/credit to be added in fifth semester.									
Total				550	180	120	90	60	1000	17	6	6	26
NSS/NCC													

V Semester

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credit
				Theory			Practical						
				End Sem	Mid Sem	Quiz / Assignment	End Sem	Term Work /Lab Work & Sessional		L	T	P	
1.	BECT 501 BECP-501	DC	Microprocessors & Interfacing	100	30	20	30	20	200	3	1	2	5
2.	BECT -502 BECP-502	DC	Electromagnetic Theory	100	30	20	30	20	200	3	1	2	5
3.	BECT -503 BECP-503	DC	VLSI Technology and Design	100	30	20	30	20	200	3	1	2	5
4.	BECT -504	DE	Departmental Elective	100	30	20	-	-	150	3	1	0	4
5.	BOEC-505	OE	Open Elective	100	30	20	-	-	150	3	1	0	4
6.	BECP 506	O/E Lab	Simulation Software Lab (Mat Lab, Multisim etc) / PCB design and Fabrication Lab	-	-	-	30	20	50	0	0	2	1
	BECP -507	DLC-1	Evaluation of Internship-II completed at II year level	-	-	-	-	50	50			2	1
8		IN	Internship -III	To be completed any time during Fifth/ Sixth semester. Its evaluation/credit to be added in Seventh semester.									
Total				500	150	100	120	130	1000	15	5	14	25
NSS/NCC													

Departmental Electives			Open Electives	
BECT 504(A)	CNTL		BOEC -505(A)	Data Structure using C++
BECT 504(B)	Data Communication and Networks		BOEC -505(B)	Computer System Organisation
BECT 504(C)	Advanced Control System		BOEC -505(C)	Process Control Instrumentation
BECT 504 (D)	IC Technology		BOET -504 (D)	Innovation and Entrepreneurship

VI Semester

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credit
				Theory			Practical						
				End Sem	Mid Sem	Quiz / Assignment	End Sem	Team Work / Lab Work & Sessional		L	T	P	
1.	BECT 601 BECP-601	DC	Digital Signal Processing	100	30	20	30	20	200	3	1	2	5
2.	BECT -602 BECP-602	DC	Antenna and Wave Propagation	100	30	20	30	20	200	3	1	2	5
3.	BECT -603 BECP-603	DC	Digital Communication	100	30	20	30	20	200	3	1	2	5
4.	BECT -604	DE	Departmental Elective	100	30	20		-	150	3	1	0	4
5.	BOEC -605	OE	Open Elective	100	30	20	-	-	150	3	1	0	4
6.	BECP -606	O/E Lab	Open Source S/w Lab	-	-	-	30	20	50	0	0	2	1
7	BECT -607	P	Minor Project -1						50			2	1
8		IN	Internship - III	Non Credit Course									
Total				500	150	100	120	130	1000	15	5	10	25

Note: Meaning of Last Character of Subject Code (T – Theory; P – Practical)

Departmental Electives		**Open Electives (Using SWAYAM etc may be allowed)**	
BECT 604 (A)	Cellular and Mobile Communication	BOEC -605 (A)	Microcontroller and Embedded Systems
BECT 604 (B)	CMOS Design	BOEC -605 (B)	Bio Medical Electronics
BECT 604 (C)	Satellite Communication	BOEC -605 (C)	Power Electronics
BECT 604 (D)	High Speed Electronics	BOEC 605 (D)	IOT and Applications

VII Semester

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credit
				Theory			Practical						
				End Sem	Mid Sem	Quiz / Assignment	End Sem	Term Work /Lab Work & Sessional		L	T	P	
1.	BECT 701 BECP-701	DC	Microwave Engineering	100	30	20	30	20	200	3	1	2	5
2.	BECT -702 BECP-702	DC	Optical Fibre Communication	100	30	20	30	20	200	3	1	2	5
3.	BECT -703	DE	Departmental Elective	100	30	20	-	-	150	3	1	0	4
4.	BOEC -704	OE	Open Elective	100	30	20	-	-	150	3	1	0	4
5.	BECT -705	D Lab	Virtual Lab	-	-	-	30	20	50	0	0	2	1
7	BECP -706	DLC-1	Evaluation of Internship-III completed at III year level	-	-	-	-	50	50			2	1
8	EC-707	P	Minor Project-II	-	-	-	50	50	100	0	0	4	2
Total				400	120	80	140	160	900	12	4	12	22
NSS/NCC													

Departmental Electives		**Open Electives**	
BECT 703(A)	Mixed Circuit Design	BOEC -704(A)	Mobile Ad Hoc Networks
BECT 703(B)	Digital Image Processing	BOEC -704(B)	Artificial Intelligence
BECT 703(C)	Advanced Communication Systems	BOEC -704(C)	Artificial Neural Networks
BECT 703 (D)	Wireless Sensor Networks	BOEC 704 (D)	Subject from SWAYAM

VIII Semester

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credit
				Theory			Practical						
				End Sem	Mid Sem	Quiz/ Assignment	End Sem	Term Work /Lab Work & Sessional		L	T	P	
1.	BECT 801	DC	Television and Radar Engineering	100	30	20	30	20	200	3	1	2	5
2.	BECT -802	DC	Wireless Communications	100	30	20	30	20	200	3	1	2	5
3.	BECT -803	DE	Departmental Elective	100	30	20	-	-	150	3	1	0	4
4.	BOEC -804	OE	Open Elective	100	30	20	-	-	150	3	1	0	4
5.	BECP -805	P	Major Project	-	-	-	100	100	200	0	0	8	4
Total				400	120	80	120	130	900	11	5	12	22
NSS/NCC													

Departmental Electives		**Open Electives**	
EC 803 (A)	Digital System Design using VHDL	BOEC -804(A)	Industrial Automation Technology
EC 803 (B)	Adaptive Signal Processing	BOEC -804 (B)	Machine Learning
EC 803 (C)	**T**elecommunication Switching Systems	BOEC 804 (C)	Under Water Communication
EC 803 (D)	SDN and Cognitive Radio Networks	BOEC 804 (D)	Subject using SWAYAM etc

NOTE: Open elective in all the semesters can be taken from SWAYAM or any other International University after getting permission from authorities

Uttarakhand Technical University, Dehradun
New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering V-Semester
EC501 MICROPROCESSOR AND INTERFACING

UNIT I

Salient features of advanced microprocessors. RISC & CISC processors. Review and evolution of advanced microprocessors:8086, 8088, 80186/286/386/486/Pentium, introduction to 8086 processor: Register organization of 8086,Architecture,signal description of 8086,minimum mode 8086 systems and timings and maximum mode 8086 systems and timings , Knowledge on iCore processors.

UNIT II

Intel 8086 microprocessor programming: 8086 Instruction Set, Addressing modes, Assembly Language Programming with Intel 8086 microprocessor

UNIT III

Introduction to the various interfacings chips like 8155, 8255, Interfacings keyboards, LEDs , ADC, DAC and memory Interfacing.

UNIT IV

General purposes programmable peripheral devices: Timer (8253/8254), 8259A programmable interrupt controller & 8257 DMA controller, USART, serial I/O & data Communication. Interfacing Programs for chips

UNIT V

Introduction to 8bit and 16 bit microcontrollers and embedded systems, 8051 architecture, pin description , I/O configuration , interrupts, addressing modes instruction set, embedded system, use of microcontrollers in embedded systems, Display systems using microcontrollers

Reference Books:

1. Advance microprocessor and peripheral –A.K. Ray and K. M. Bhurchandi, Tata Mcgraw Hill
2. Microprocessor and Interfacing – D.V. Hall, McGraw Hill.
3. The Intel microprocessor - Barry B. Brey, Pearson
4. The 8086 & 8088 Microprocessor- LIU and Gibson, Tata McGraw Hill
5. GS Tomar, Advanced Microprocessors and Interfacing, Sun India Pub
6. The 8051 microcontroller and embedded systems-M.A. Mazidi, Janice GillispieMazidi, Pearson Prentice Hall

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Electronics & Communication Engineering V-Semester

EC- 502 ELECTROMAGNETIC THEORY

Unit I

Steady Electric Field: Coulomb's Law, units, Electric field intensity, Electric flux and flux density, Gauss law, Boundary relations, concept of divergence, Curl, scalar and vector potential. electric field in dielectric and conductor, continuity equation, methods of images.

Unit II

Magnetic field due to steady currents, force between current carrying wires, Stokes theorem, vector magnetic potential, magnetization vector and its relation to magnetic field.

Unit III

Maxwell's Equation**:** Time varying field and displacement current, faraday's law.

Unit IV

Wave Equation: Pointing vector, Plane electromagnetic waves in free space, dielectric medium and conducting medium, Skin depth, slepian vector.

Unit V

Waves propagation in lossy dielectrics, plane waves in lossless dielectrics, reflection of a plane wave at normal incidence, reflection of a plane wave at oblique incidence.

Reference Books:

1. Elements of Engineering Electromagnetic Third Edition- N.N. Rao- Prentice Hall, India.
2. Elements opf Electromagnetic, Second Edition- Matthew N.O. Sadiku- Saunders coll Publishing.
3. Fields & Waves in Communication Electronics- S.Ramo, J.R. Whinnery& T. Van Duzer- John Wiley & Sons.
4. Electromagnetic- J.D. Kraus-McGraw Hill
5. Electromagnetic Waves & Radiating Systems- E.C. Jordan & K.G. Balmain- Prentice Hall.

Uttarakhand Technical University, Dehradun

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Electronics & Communication Engineering V-Semester
EC- 503 VLSI Technology and Design

UNIT 1

Process steps in IC fabrication Crystal growth and wafer preparation- Czochralski process- apparatus- silicon shaping, slicing and polishing

UNIT 2

Diffusion of impurities- physical mechanism- Fick's I and II law of diffusion- Diffusion profiles- complementary (erfc) error function- Gaussian profile- Ion implantation- Annealing process- Oxidation process, Lithography- Photolithography, Fine line lithography, electron beam and x-ray lithography- Chemical vapour deposition (CVD)- epitaxial growth- reactors- metallisation- patterning- wire bonding and packaging.

UNIT 3 :

Monolithic components Isolation of components- junction isolation and dielectric isolation- Transistor fabrication- buried layer- impurity profile- parasitic effects- monolithic diodes- schottky diodes and transistors- FET structures- JFET- MOSFET- PMOS and NMOS, control of threshold voltage (V^{th})- silicon gate technology- Monolithic resistors- sheet resistance and resistor design

UNIT 4 :

NMOS and PMOS transistors, Process parameters for MOS and CMOS, Electrical properties of CMOS circuits and device modelling, Scaling principles and fundamental limits, CMOS inverter scaling, propagation delays, Stick diagram, Layout diagrams

UNIT 5 :

Examples of Combinational Logic Design, Elmore's constant, Pass transistor Logic, Transmission gates, static and dynamic CMOS design, Power dissipation – Low power design principles.

UNIT 6 :

Static and Dynamic Latches and Registers, Timing issues, pipelines, clock strategies, Memory architecture and memory control circuits, Low power memory circuits, Synchronous and Asynchronous design

UNIT 7: Introduction to ASICs –Types, Standard Cell Array, Gate Arrays, Programmable Array Logic- PLAs, CPLDs, FPGAs, Design Approach- Design capture tools, Design Verification Tools, Synthesis, testing.

TEXT BOOK:

1. VLSI Fabrication Principles Silicon and Gallium Arsenide, Sorab K. Gandhi, Second Edition 1994, Wiley-Interscience Publication.
2. Physics of Semiconductor Devices, Simon. M. Sze, Kwok K.Ng. 3rd Edition,
3. CMOS Digital Integrated Circuits, Analysis and Design, Sung Mo Kang Yusuf Leblebici 2nd edition 2003, McGraw Hill Education.
4. Principles of CMOS VLSI Design by N. Weste and K. Eshranghian

REFERENCE BOOK:

1. Pucknell DA & Eshraghian K, Basic VLSI Design, PHI
2. Physics and Technology of semiconductor devices by A.S Grove
3. VLSI Technology by B.G Streetman
4. The Design and Analysis of VLSI, Circuits by L.Glaser and D. Dobberpuhl

Uttarakhand Technical University, Dehradun

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Electronics & Communication Engineering V-Semester

Departmental Elective EC- 504 (A) Communication Network and Transmission Lines (CNTL)

Unit I

Characteristic Parameters of symmetrical and asymmetrical two port networks and their design Image impedance, iterative impedance, characteristic impedance, propagation coefficient, image transfer coefficient, iterative transfer coefficient, Lattice and Bridged T networks, reactive matching networks, matching techniques, insertion loss, symmetrical and asymmetrical attenuators and their design.

Unit II

Passive LC Filters Analysis and design of Low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, Filter specifications, Butterworth approximation, Chebyshev approximation, elliptic function approximation, frequency transformation.

Unit III

Positive real function LC, RL, RC, and RLC network synthesis, Foster and Cauer network, minimum positive real function, Brune's method, Bott-Duffin method, Synthesis-Coefficient.

Unit IV

Transmission line fundamentals Lumped parameter equivalent, voltage and current on a transmission line, infinite line, characteristic impedance and propagation constant, waveform distortion, attenuation and phase equalizers, distortion-less line, loading, liner reflection on aline, reflection coefficient, input and transfer impedances, open circuit and short circuit line, reflection factors, reflection loss, insertion loss, T and π equivalents of a line, location of line fault, construction and design of two wire line and coaxial cable.

Unit V

Line at radio frequencies Parameters of line and coaxial cable at radio frequencies, dissipation-less line, voltage and current on a dissipation-less line, standing waves, standing wave ratio, input impedance of open circuit and short circuit, power and impedance measurement on lines, eighth-wave, quarter-wave and half wave line, circle diagram, Smith chart, solution of problems using Smith chart, single and double stub matching .introduction to micro-strip lines and its analysis.

References:

1. Ryder: Networks and Transmission Lines, PHI Learning.
2. Valkenberg: Introduction to Modern Network synthesis, Wiley India.
3. Suresh: Electric Circuits and Networks, Pearson Education.
4. Raju: Electromagnetic field theory and Transmission Lines, Pearson Education.
5. Ganesan: Transmission Lines and Waveguides, TMH.
6. Rao: Electromagnetic Waves and Transmission Lines, PHI learning.

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Electronics & Communication Engineering, VI-Semester

Departmental Elective EC- 504 (B) DATA COMMUNICATION and Networking

Unit-I

Data Communication: Introduction, Components, data representation Serial & Parallel transmission, Modes of data transmission, Line Encoding: Unipolar, Polar, Bipolar, Networks – Protocols and standards – Standards organizations – Line configurations – Topology– Transmission mode – Categories of networks – Inter networks.

Unit-II

OSI model: Functions of the layers. Transmission media: Guided media – Unguided media – Transmission impairment –Performance. Switching Circuit switching , packet switching (virtual circuit and datagram approach), message switching

Unit-III

ERROR CONTROL AND DATA LINK PROTOCOLS

Error detection and correction: Types of errors – Detection – Vertical Redundancy Check (VRC) – Longitudinal Redundancy Check (LRC) – Cyclic Redundancy Check (CRC) – Check sum –Error Correction. Data Link Layer Protocols: Framing , HDLC, ARQ: Stop and Wait, Sliding Window. Efficiency

Unit-IV

NETWORKS

LAN: Project 802 – Ethernet – Token bus – Token ring – FDDI. MAN: IEEE 802.6 (DQDB) – SMDS.X.25, FRAME RELAY, ATM AND SONET/, SDH

Unit-V. NETWORKING DEVICES AND TCP / IP PROTOCOL SUITE

Networking and internetworking devices: Repeaters – Bridges – Gateways – Other devices – Routing algorithms – Distance vector routing – Link state routing. TCP / IP protocol suite: Overview of TCP/IP.

REFERENCE BOOKS

1. Data and Computer Communication – W. Stallings, Pearson
2. LANs – Keiser, Tata Mc-Graw Hill
3. Data Communication & Networking – B.A. Forouzan, Tata Mc-Graw Hill
4. Internetworking with TCP/IP – VOL-I – D.E. Comer, PHI
5. ISDN and Broad band ISDN with Frame Relay & ATM – W. Stallings, Pearson

Textbooks:

1. Computer Networks by Tanenbum/PHI.
2. Shay, William A. / "Understanding Data communications & Networks" / Vikas Publishing HousePvt. Ltd.

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Electronics & Communication Engineering V-Semester

Departmental Elective EC- 504 (C) ADVANCED CONTROL SYSTEM

Unit I Advantages and disadvantages of digital control system, Ideal sampler, sampled and hold circuit, zero order hold circuit, Z transform, Inverse Z transform by various method, mapping between s plane and Z plane, solution of the linear difference equation.

Unit II Pulse transfer function, general procedure for obtaining pulse transfer function, pulse transfer function of cascaded elements, pulse transfer function of closed loop systems. Transfer function of discrete data system, stability analysis of closed loop system in the z plane, Jury stability test.

Unit III Non Linear Systems: introduction , common physical non linearity's, phase plane method , basic concepts ,singular points, stability of non linear system , construction of phase trajectories, system analysis by phase plane method, Describing functions methods, basic concepts derivation of describing function, liapunov's stability criterion.

Unit IV Review of root locus, lead compensation, lag compensation, lag- lead compensation and their comparison, review of state space methods, observability and controllability of system , pole placement by state feedback.

UnitVTuning rules of PID controller, modifications of PID controllers, Introduction to software package used in control systems- MATLAB SIMULINK.

Reference Books:

1. Automatic control system—B. C.Kuo, wiley
2. Control system engineering—Nagrath&gopal, Publishers: New Age International
3. Modern control engineering –K. Ogata, Pearson; 5 edition
4. Control system engineering—Norman Nise, **P**ublisher: Wiley
5. Discrete time Control system— K. Ogata, Pearson; 2 edition

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Electronics & Communication Engineering V-Semester
Departmental Elective EC- 504 (D) IC Technology

UNIT-I

Semiconductor technology trend, Clean rooms, Wafer cleaning, Phase diagram and solid solubility, Crystal structure, Crystal defects, Czochralski growth, Bridgman growth of GaAs, Float Zone growth, Wafer Preparation and specifications

Unit -2

Deposition: Evaporation, Sputtering and Chemical Vapor Deposition, Epitaxy: Molecular Beam Epitaxy, Vapor Phase Epitaxy, Liquid Phase Epitaxy, Evaluation of epitaxial layers, Silicon Oxidation: Thermal oxidation process, Kinetics of growth, Properties of Silicon Dioxide, Oxide Quality, high κ and low κ dielectrics, Diffusion: Nature of diffusion, Diffusion in a concentration gradient, diffusion equation, impurity behavior, diffusion systems, problems in diffusion, evaluation of diffused layers, Ion Implantation: Penetration range, ion implantation systems, process considerations, implantation damage and annealing

Unit-3

Etching: Wet chemical etching, dry physical etching, dry chemical etching, reactive ion etching, ion beam techniques, Lithography: Photoreactive materials, Pattern generation and mask making, pattern transfer, Electron beam, Ion beam and X-ray lithography, Device Isolation, Contacts and Metallization: Junction and oxide isolation, LOCOS, trench isolation, Schottky contacts, Ohmic contacts, Metallization and Packaging, CMOS Process Flow: N well, P-well and Twin tub

Unit 4

Semiconductor Measurements: Conductivity type, Resistivity, Hall Effect Measurements, Drift Mobility, Minority Carrier Lifetime and diffusion length, Packaging: Integrated circuit packages, Electronics package reliability, Testing: Technology trends affecting testing, VLSI testing process and test equipment, test economics and product quality

Unit 5

SOI Technology: SOI fabrication using SIMOX, Bonded SOI and Smart Cut, PD SOI and FD SOI Device structure and their feature, GaAs Technologies: MESFET Technology, Digital Technologies, MMIC technologies, MODFET and Optoelectronic Devices, Silicon Bipolar Technologies: Second order effects in bipolar transistor, Performance of BJT, Bipolar processes and BiCMOS

Reference Books:

1. VLSI Technology, S.M. Sze
2. Physics of Semiconductors, S.M. Sze

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Electronics & Communication Engineering V-Semester

Open Elective EC- 505 (A) Data Structure using C++

UNIT 1

COMPLEXITY ANALYSIS: Time and Space complexity of algorithms, asymptotic analysis, big O and other notations, importance of efficient algorithms, program performance measurement, data structures and algorithms.

LINEAR LISTS: Abstract data type, sequential and linked representations, comparison of insertion, deletion and search operations for sequential and linked lists, list and chain classes, exception and iterator classes for lists, doubly linked lists, circular lists, linked lists through simulated pointers, lists in STL, skip lists, applications of lists in bin sort, radix sort, sparse tables.

UNIT 2

STACKS AND QUEUES: Abstract data types, sequential and linked implementations, exception handling in classes, representative applications such as parenthesis matching, towers of Hanoi, wire routing in a circuit, finding path in a maze, simulation of queuing systems, equivalence problem.

UNIT 3

HASHING: Search efficiency in lists and skip lists, hashing as a search structure, hash table, collision avoidance, linear open addressing, chains, uses of hash tables in text compression, LZW algorithm.

UNIT 4

TREES: Binary trees and their properties, terminology, sequential and linked implementations, tree traversal methods and algorithms, heaps as priority queues, heap implementation, insertion and deletion operations, heapsort, heaps in Huffman coding, leftist trees, tournament trees, use of winner trees in mergesort as an external sorting algorithm, bin packing.

UNIT 5

GRAPHS: Definition, terminology, directed and undirected graphs, properties, connectivity in graphs, applications, implementation – adjacency matrix and linked adjacency chains, graph traversal – breadth first and depth first, spanning trees.

SUGGESTED BOOKS:

1. M. T. Goodrich and R. Tamassia, *Algorithm Design: Foundations, Analysis and Internet Examples*, John Wiley & Sons, 2001.
2. Drozdek, A., "Data Structures and Algorithms in C++", Vikas Publishing House. 2002
3. Wirth, N., "Algorithms and Data Structures", Prentice-Hall of India. 1985
4. Lafore, R., "Data Structures and Algorithms in Java", 2nd Ed., Dorling Kindersley. 2007
5. Datastructure using C, Bandopadhyaya, "Data Structures, Algorithms, and Applications in Java", WCB/McGraw-Hill. 2001
6. C and datastructure, Padnabham, BSP, Hyderabad

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Electronics & Communication Engineering V-Semester

Open Elective EC- 505 (B) Computer System Organization

Unit-I

COMPUTER BASICS AND CPU Von Newman model, various subsystems, CPU, Memory, I/O, System Bus, CPU and Memory registers, Program Counter, Accumulator, Instruction register, Micro-operations, Register Transfer Language, Instruction Fetch, decode and execution, data movement and manipulation, Instruction formats and addressing modes of basic computer.

Unit-II

CONTROL UNIT ORGANIZATION Hardwired control unit, Micro and nano programmed control unit, Control Memory, Address Sequencing, Micro Instruction formats, Micro program sequencer, Microprogramming,

ARITHMETIC AND LOGIC UNIT Arithmetic Processor, Addition, subtraction, multiplication and division, Floating point and decimal arithmetic and arithmetic units, design of arithmetic unit.

Unit-III

INPUT OUTPUT ORGANIZATION Modes of data transfer – program controlled, interrupt driven and direct memory access, Interrupt structures, I/O Interface, Asynchronous data transfer, I/O processor. Data transfer – Serial / parallel, synchronous/asynchronous, simplex/half duplex and full duplex.

Unit-IV

MEMORY ORGANIZATION Memory Maps, Memory Hierarchy, Cache Memory -Organization and mappings. Associative memory, Virtual memory, Memory Management Hardware.

Unit-V

MULTIPROCESSORS Pipeline and Vector processing, Instruction and arithmetic pipelines, Vector and array processors, Interconnection structure and inter-processor communication.

Books:

1. Morris Mano: Computer System Architecture, Pearson Education.
2. William Stallings: Computer Organization and Architecture, PHI
3. Carl Hamacher: Computer Organization, TMH
4. Tanenbaum: Structured Computer Organization, Pearson Education

Uttarakhand Technical University, Dehradun

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Electronics & Communication Engineering V-Semester

Open Elective EC- 505 (C) Process Control Instrumentation

Unit-I

Introduction: Historical Perspective, incentives of process control, synthesis of control system. Classification and definition of process variables. Mathematical modeling: Need and application of mathematical modeling, Lumped and distributed parameters, Analogies, thermal, Electrical, and chemical systems, Modeling of CSTR, Modeling of heat exchanger, Interactive and non-interactive type of system, Dead time elements, Developing continuous time and discrete time models from process data.

Unit-II

Control Modes: Definition, Characteristics and comparison of on-off, proportional, Integral, Differential, PI, PD, PID, Dynamic behavior of feedback controlled processes for different control modes, Control system quality, IAE, ISE, IATE criterion, Tuning of controllers Ziegler-Nichols, Cohen-Coon Methods, controller trouble shooting.

Unit-III

Realization of Control Modes: Realization of different control modes like P, I, D in Electric, Pneumatic, Hydraulic controllers. Use of DDC and PLC, Process monitoring, man machine interface, real time systems: RTS introduction and its characteristics.

Unit-IV

Actuators: Hydraulic, Pneumatic actuators, Solenoid, E-P converters, control valves, Types, Functions, Quick opening, Linear and equal percentage valve, Ball valves, Butterfly valves, Globe valves, Pinch valves, valve application and selection, Cavitations and flashing, Dampers and variable speed Drives.

Unit-V

Advanced Controls: Introduction to advanced control system like Cascade, Feed forward, Ratio, Selective, Override, Split range and Auctioneering control, Plant wide control. PI Diagrams: Symbols, Terminology, Case studies, a brief study of instrumentation and control relevant to industries.

References:

1. Dale Patrick, Stephen Fardo, “Industrial Process Control System”.
2. Shinskey F.G., “Process Control System”, III Ed., McGraw Hill.
3. Smith C.A. & A.B. Corripio, “Principle & Practiced Automatic Process Control”, J. Willey.
4. Rao M &S.Qiv, “Process Control Engg.”,Gorden& Breach.
5. S Levi and AK Agrawala. Real-time system design. McGraw-Hill International.
6. GeorgeStephanopoulos “ Chemical Process Control” PHI, Delhi
7. C.D. Johnson “Process control instrumentation technology’ PHI
8. Harriott- Process Control 1st ed., TMH
9. Patranabis- Principles of Process Control 2nd ed., TMH

Uttarakhand Technical University, Dehradun

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Electronics & Communication Engineering V-Semester

Open Elective EC- 505 (D) Innovation and Entrepreneurship

Course Objectives:

- Think critically and creatively about the nature of business opportunities, resources, and industries.
- Describe the processes by which innovation is fostered, managed, and commercialized.
- Spot new business opportunities in the environment, whether by recognition, development, or creation.
- Effectively and efficiently evaluate the potential of new business opportunities.
- Assess the market potential for a new venture, including customer need, competitors, and industry attractiveness.
- Develop a business model for a new venture, including revenue, margins, operations, working capital, and investment.
- Develop pro forma financial statements that reflect business model decisions and that can be used to determine future funding requirements.
- Write a clear, concise, and compelling business plan for a new venture.
- Identify appropriate sources of financing for an entrepreneurial business plan.
- Develop a compelling sales pitch to acquire financing necessary to a new venture.
- Explain the operational implications of common terms and conditions for early-stage investment deals.
- Describe the process by which new ventures are created and launched.

Course Learning Outcomes:

1. Comprehend the role of bounded rationality, framing, causation and effectuation in entrepreneurial decision making.
2. Demonstrate an ability to design a business model canvas.
3. Evaluate the various sources of raising finance for startup ventures.
4. Understand the fundamentals of developing and presenting business pitching to potential investors.

Course Content:

Unit I: Introduction to Entrepreneurship: Entrepreneurs; entrepreneurial personality and intentions - characteristics, traits and behavioral; entrepreneurial challenges.

Unit II: Entrepreneurial Opportunities: Opportunities. Discovery/ creation, Pattern identification and recognition for venture creation: prototype and exemplar model, reverse engineering.

Unit III: Entrepreneurial Process and Decision Making: Entrepreneurial ecosystem, Ideation, development and exploitation of opportunities; Negotiation, decision making process and approaches, Effectuation and Causation.

Unit IV: Crafting business models and Lean Start-ups: Introduction to business models; Creating value propositions-conventional industry logic, value innovation logic; customer focused innovation; building and analyzing business models; Business model canvas, Introduction to lean startups, Business Pitching.

Unit V: Organizing Business and Entrepreneurial Finance: Forms of business organizations; organizational structures; Evolution of Organisation, sources and selection of venture finance options and its managerial implications. Policy Initiatives and focus; role of institutions in promoting entrepreneurship.

Text/Reference Books:

1. Ries, Eric(2011), The lean Start-up: How constant innovation creates radically successful businesses, Penguin Books Limited.
2. Blank, Steve (2013), The Startup Owner's Manual: The Step by Step Guide for Building a Great Company, K&S Ranch.
3. S. Carter and D. Jones-Evans, Enterprise and small business- Principal Practice and Policy, Pearson Education (2006)
4. T. H. Byers, R. C. Dorf, A. Nelson, Technology Ventures: From Idea to Enterprise, McGraw Hill (2013).

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Electronics & Communication Engineering VI-Semester

EC- 601 Digital Signal Processing

Unit – I: Discrete-Time Signals and Systems

Discrete-time signals, discrete-time systems, analysis of discrete-time linear time-invariant systems, discrete time systems described by difference equation, solution of difference equation, implementation of discrete-time systems, stability and causality, frequency domain representation of discrete time signals and systems.

UNIT –II: z-Transform

The direct z-transform, properties of the z-transform, rational z-transforms, inversion of the z transform,analysis of linear time-invariant systems in the z- domain, block diagrams and signal flow graph representation of digital network, matrix representation.

Unit – III: Frequency Analysis of Discrete Time Signals

Discrete fourier series (DFS), properties of the DFS, discrete Fourier transform (DFT), propertiesof DFT, two dimensional DFT, circular convolution.

Unit – IV: Efficient Computation of the DFT

FFT algorithms, decimation in time algorithm, decimation in frequency algorithm, decomposition for 'N'composite number.

Unit – V: Digital filters Design Techniques

Design of IIR and FIR digital filters, Impulse invariant and bilinear transformation, windowing techniques rectangular and other windows, examples of FIR filters, design using windowing.

References:

1. Oppenheim and Schafer: Digital Signal Processing, PHI Learning.
2. Johnny R. Johnson: Introduction to Digital Signal Processing, PHI Learning.
3. Proakis: Digital Signal Processing, Pearson Education.
4. Rabiner and Gold: Theory and Application of Digital Signal Processing, PHI Learning.
5. Ingle and Proakis: Digital Signal Processing- A MATLAB based Approach, Thompson, Cengage Learning.

List of Experiments:

1. Generation, analysis and plots of discrete-time signals.
2. Implementation of operations on sequences (addition, multiplication, scaling, shifting, folding etc).
3. Implementation of Linear time-invariant (LTI) systems and testing them for stability and causality.
4. Computation and plot of DTFT of sequences, verification of properties of DTFT.
5. Computation and plots of z-transforms, verification of properties of z-transforms.
6. Computation and plot of DFT of sequences, verification of properties of DFT.
7. Computation and plots of linear/circular convolution of two sequences.
8. Computation of radix-2 FFT- Decimation in time and Decimation in frequency.
9. Implementation of IIR and FIR filter structures (direct, cascade, parallel etc).
10. Implementation of **v**arious window design techniques (Rectangular, Bartlett, Hann, Hamming etc).

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Electronics & Communication Engineering, VI-Semester

EC- 602 Antennas and wave Propagation

Unit I

Radiation

Potential function and the Electromagnetic field, potential functions for Sinusoidal Oscillations, retarded potential, the Alternating current element (or oscillating Electric Dipole), Power radiated by a current element, Application to short antennas, Assumed current distribution, Radiation from a Quarter wave monopole or Half wave dipole, sine and cosine integral, Electromagnetic field close to an antenna, Solution of the potential equations, Far-field Approximation.

Unit II: Antenna Fundamentals

Introduction, network theorems, directional properties of dipole antennas, travelling –wave antennas and effect of feed on standing-wave antennas, two –element array, horizontal patterns in broad-cast arrays, linear arrays, multiplication of patterns ,effect of earth on vertical patterns, Binomial array, antenna gain, effective area.

Unit III: Types of antennas

Log periodic antenna, loop antenna, helical antenna, biconical antenna, folded dipole antenna, Yagi-Uda antenna, lens antenna, turnstile antenna. Long wire antenna: resonant and travelling wave antennas for different wave lengths, V-antenna, rhombic antenna, beverage antenna,

Unit IV: Aperture and slot

Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna , Reflector antenna , Aperture blockage , Feeding structures , Slot antennas, Microstrip antennas – Radiation mechanism – Application ,Numerical tool for antenna analysis

Unit V: Propagation of radio waves

Fundamentals of electromagnetic waves, effects of the environment, modes of propagation. Ground wave propagation- Introduction, plane earth reflection, space wave and surface wave, transition between surface and space wave, tilt of wave front due to ground losses. Space wave propagation- Introduction, field strength relation, effects of imperfect earth, curvature of earth and interference zone, shadowing effect of hills and buildings, absorption by atmospheric phenomena, variation of field strength with height, super refraction, scattering, tropospheric propagation, fading, path loss calculations. Sky wave propagation- Introduction, structural details of the ionosphere, wave propagation mechanism, refraction and reflection of sky waves by ionosphere, ray path, critical frequency, MUF, LUF, OF, virtual height, skip distance, relation between MUF and skip distance.

References:

1. Jordan and Balmain: Electromagnetic Waves and Radiating System, PHI Learning.
2. Krauss: Antennas and wave propagation, TMH.
3. Balanis: Antenna Theory Analysis and Design, Wiley India Pvt. Ltd.
4. Harish and Sachidananda: Antennas and wave propagation, Oxford University Press.
5. Raju: Antennas and Wave Propagation, Pearson Education.
6. Kennedy: Electronic Communication Systems, TMH.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering V-Semester

EC603 DIGITAL COMMUNICATION

Unit I

Sampling theorem for low pass and band pass signals, Ideal sampling, Natural sampling, Flat top sampling, crosstalk, aliasing, time division multiplexing, PAM, PWM and PPM their generation and detection.

Unit II

Pulse code modulation, Quantization, quantization noise, companding, Inter symbol interference, Eye pattern, Delta and adaptive modulation, Encoding techniques: On-Off signaling, Polar signaling, RZ signaling, Bipolar signaling, AMI, Manchester code, Differential encoding their advantage and disadvantages.

Unit III

Band pass data transmission: ASK, Binary phase shift keying (BPSK), QPSK, DPSK, coherent and non coherent BFSK, minimum shift keying, QAM, Concept of M-ary PSK and M-ary FSK. Spectral properties of QPSK and MSK.

UNIT IV

Matched filter and correlator detector. Gram Schmidt orthogonalization procedure and concept of signal space for the computation of probability of error, calculation of error probability for BPSK, QPSK, QAM and coherent BFSK, comparison of different modulation techniques.

Unit V

Concept of information theory, entropy, information rate, channel capacity, Shannon's theorem, Shannon Hartley theorem , BW and signal to noise ratio trade off, sources encoding, extension of zero memory source, Error correcting codes**:** linear block codes and cyclic codes: encoder and decoder circuits, burst error correcting codes, concept of convolution codes.

Reference Books:

1. Communication Systems –Simon Haykins, Wiley
2. Principle of Communication Systems-Taub and Schilling, Tata McGraw-Hill
3. Communication Systems-Singh and Sapre, Tata McGraw-Hill
4. Analog communication-Tomar and Ashish, PHI

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Electronics & Communication Engineering VI-Semester

Departmental Elective EC- 604 (A) Cellular and MOBILE COMMUNICATION

Unit I Introduction to wireless communication systems, different generations of wireless networks. Cellular system design fundamentals, frequency reuse, handoff strategies, Interference and system capacity, Trunking and grade of service.

Unit II Mobile radio propagation**:** free space propagation model, Ground reflection propagation model, Long term fading, Small scale multipath propagation, Time dispersion parameters, Coherence bandwidth, Doppler spread and coherence time, types of small scale fading, Clarke's model for flat fading, level crossing and fading statistics.

Unit III Capacity in cellular systems, cell splitting and sectoring, cell-site antennas and mobile antenna, cochannel interference reduction, Frequency management and channel assignment.

Unit IV Frequency division and time division multiple access. Global System for Mobile: System Architecture. GSM Radio subsystem,. GSM.. GSM Traffic Channel and Control Channel, Frame Structure. Introduction to 3G/4G/LTE/5G communication Systems.

Unit V Spread spectrum multiple access (Frequency Hopped Multiple Access and. Code Division Multiple Access). Different spreading codes. CDMA Digital Cellular system: different standards with detailed description of forward and reverse channels. Capacity of cellular systems. Introduction to Cognitive Radio Networks.

Reference Books:

SUGGESTED BOOKS:

1. Alaxendar K, Introduction to Mobile Network Engg: GSM, 3G-WCDMA, LTE and road to 5G", 2018.
2. Simon Haykin & Michael Moher, "Modern Wireless Communications", Pearson Education, 2007.
3. Sridhar Iyer, "Wireless and Mobile communications", , 2013.
4. Gordon L. Stuber, "Principles of Mobile Communication", Springer International Ltd., 2001.
5. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.

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Electronics & Communication Engineering, VI-Semester

Departmental Elective EC- 604 (B) CMOS DESIGN

Unit I

Introduction

Introduction to CMOS VLSI circuit, VLSI design flow, Design strategies ,Hierarchy, regularity,modularity, locality, MOS Transistor as a Switches, CMOS Logic, Combinational circuit, latchesand register, Introduction of CAD Tool , Design entry, synthesis, functional simulation.

Unit II

Specification of sequential systems

Characterizing equation & definition of synchronous sequential machines. Realization of statediagram and state table from verbal description, Mealy and Moore model machines state tableand transition diagram. Minimization of the state table of completely and incompletely specifiedsequential machines.

Unit III

Asynchronous Sequential Machine

Introduction to asynchronous sequential machine, Fundamental mode and Pulse modeasynchronous sequential machine, Secondary state assignments in asynchronous sequential
machine, races and hazards.

Unit IV

Introduction, Size and complexity of Integrated Circuits, The Microelectronics Field, IC Production Process, Processing Steps, Packaging and Testing, MOS Processes, NMOS Process, CMOS Process, Bipolar Technology, Hybrid Technology, Design Rules and Process Parameters

Unit V

Dc Models, Small Signal Models, MOS Models, MOSFET Models in High Frequency and smallsignal, Short channel devices, Sub threshold Operations, Modeling Noise Sources in MOSFET's,Diode Models, Bipolar Models, Passive component Models.

Refrences:

1. Neil Weste: Principle of CMOS VLSI Design, TMH.
2. Kohavi: Switching & Finite Automata Theory, TMH.
3. Lee: Digital Circuits and Logic Design, PHI Learning..
4. Geiger, Allen and Strader: VLSI Design Techniques for Analog and Digital Circuits, TMH.
5 Sorab Gandhi: VLSI Fabrication Principles, Wiley India.
6. Weste and Eshraghian: Principles of CMOS VLSI design, Addison-Wesley

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Electronics & Communication Engineering, VI-Semester

Departmental Elective EC- 604 (C) Satellite Communication

Unit-I

Overview of satellite systems: Introduction, Frequency allocations for satellite systems.

Orbits and launching methods: Kepler's three laws of planetary motion, terms used for earth orbiting satellites, orbital elements, apogee and perigee heights, orbit perturbations, inclined orbits, local mean solar point and sun-synchronous orbits, standard time.

Unit-II

The Geostationary orbit: Introduction, antenna look angles, polar mount antenna, limits of visibility, near geostationary orbits, earth eclipse of satellite, sun transit outage, launching orbits.

Polarization: antenna polarization, polarization of satellite signals, cross polarization discrimination.

Depolarization: ionospheric, rain, ice.

Unit-III

The Space segment: introduction, power supply, attitude control, station keeping, thermal control, TT&C subsystem, transponders, antenna subsystem, Morelos and Satmex 5, Anik satellites, Advanced Tiros-N spacecraft.

The Earth segment: introduction, receive-only home TV systems, master antenna TV system, Community antenna TV system, transmit-receive earth station.

Unit-IV

The space link: Introduction, Equivalent isotropic radiated power (EIPR), transmission losses, the link power budget equation, system noise, carrier-to-noise ratio (C/N), the uplink, the downlink, effects of rain, combined uplink and downlink C/N ratio, inter modulation noise, inter satellite links. Interference between satellite circuits.

Unit-V

Satellite services

VSAT (very small aperture terminal) systems: overview, network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network.

Direct broadcast satellite (DBS) Television and radio: digital DBS TV, BDS TV system design and link budget, error control in digital DBS-TV, installation of DBS-TV antennas, satellite radio broadcasting.

References:

1. Roddy: Satellite Communications, TMH.
2. Timothy Prattt: Satellite Communications, Wiley India.
3. Pritchard, Suyderhoud and Nelson: Satellite Communication Systems Engineering, PearsonEducation.
4. Agarwal: Satellite Communications, Khanna Publishers.
5. Gangliardi: Satellite Communications, CBS Publishers.
6. Chartrand: Satellite Communication, Cengage Learning.
7. Raja Rao: Fundamentals of Satellite communications, PHI Learning.

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Electronics & Communication Engineering, VI-Semester

Departmental Elective EC- 604 (D) High Speed Electronics

Unit-I

Silicon based MOSFET and BJT circuits for high speed operation and their limitations:- Emitter coupled Logic (ECL) and CMOS Logic circuits with scaled down devices. Silicon On Insulator (SOI) wafer preparation methods and SOI based devices and SOICMOS circuits for high speed low power applications.

Unit-II

Materials for high speed devices and circuits
Merits of III –V binary and ternary compound semiconductors (GaAs, InP, InGaAs, AlGaAs ETC.), silicon-germanium alloys and silicon carbide for high speed devices, as compared to silicon based devices. Brief outline of the crystal structure, dopants and electrical properties such as carrier mobility, velocity versus electric field characteristics of these materials. Material and device process technique with these III-V and IV – IV semiconductors

Unit-III

Metal semiconductor contacts and Metal Insulator Semiconductor and MOS devices: Native oxides of Compound semiconductors for MOS devices and the interface state density related issues. Metal semiconductor contacts, Schottky barrier diode. Thermionic Emission model for current transport and current-voltage (I-V) characteristics. Effect of interface states and interfacial thin electric layer on the Schottky barrier height and the I-V characteristics.

Unit-IV

High Electron Mobility Transistors (HEMT):
Hetero-junction devices. The generic Modulation Doped FET (MODFET) structure for high electron mobility realization. Principle of operation and the unique features of HEMT. InGaAs/InP HEMT structures.

Unit-V

Hetero junction Bipolar transistors (HBTs): Principle of operation and the benefits of hetero junction BJT for high speed applications. GaAs and InP based HBT device structure and the surface passivation for stable high gain high frequency performance. SiGe HBTs and the concept of strained layer devices

References:

1. Stephen: High-Speed Digital System Design: A Handbook of Interconnect Theory and Design Practices, Wiley.
2. Tomar: Fundamentals of Electronic Devices & Circuits, Springer.
3. Lee: The Design of CMOS Radio-Frequency Integrated Circuits, Cambridge University Press
4. Razavi: RF Microelectronics, Prentice-Hall.
5. Gonzalez: Microwave Transistor Amplifiers, Prentice Hall.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VI-Semester

Open Elective EC- 605 (A) Microcontroller & Embedded system

UNIT-I

Introduction to 8-bit microcontrollers:8051 Interfacing, Applications and serial communication8051 interfacing to ADC and DAC, Stepper motor interfacing, Timer/ counter functions, 8051based data acquisition system 8051 connections to RS-232, 8051 Serial communication , Serialcommunication modes, Serial communication programming, Serial port programming in C.

UNIT II:

Microcontroller 8096 Introduction to 16-bit Microcontroller, functional block-diagram, memorystatus, complete 8096 instruction set, classification of instruction set, addressing modes,programming examples using 8096, hardware features of 8096,parallel ports, control &statusRegisters, Introduction to 16/32 bit PIC microcontrollers and DSPIC.

UNIT-III

Introduction to Embedded Systems:

Definition of embedded system, embedded systems vs. general computing systems, history of embedded systems, classification, major application areas, purpose of embedded systems, characteristics and quality attributes of embedded systems, common design metrics, and processor technology: general purpose processor, application specific processor, single purpose processor.

UNIT-IV

Embedded System Architecture:

Von Neumann v/s Harvard architecture, instruction set architecture, CISC and RISC. instructions set architecture, basic embedded processor, microcontroller architecture, CISC & RISC examples: 8051, ARM, DSP processors.

UNIT-V

Input Output and Peripheral Devices

Timers and counters, watchdog timers, interrupt controllers, PWM, keyboard controller, analogto digital converters, real time clock.

Reference Books:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcontroller and EmbeddedSystems, Pearson education, 2005.
2. Kenneth J. Ayala, The 8051 Microcontroller Architecture, III edition, CENGAGE Learning.
3. V. Udayashankara and M.S. Mallikarjunaswamy, 8051 Microcontroller: Hardware, Software& Applications, Tata McGraw - Hill, 2009.
4. McKinlay, The 8051 Microcontroller and Embedded Systems - using assembly and C, PHI,2006 / Pearson, 2006.
5. Tim Wilmshurst, Designing embedded system with PIC microcontrollers Principles and applications. 2nd ed. 2011 Bsp books pvtlt
6. Shibu K V, “Introduction to Embedded System”, TMH.
7. David E Simon, “An Embedded Software Primer”, Pearson education Asia, 2001.
8. Steven F. Barett, Daniel J. Pack, “Embedded Systems” Pearson education, First Impression2008.

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Electronics & Communication Engineering, VI-Semester

Open Elective EC- 605 (B) BIOMEDICAL ELECTRONICS

UNIT I - PHYSIOLOGY AND TRANSDUCERS

Cell and its structure - Resting and Action Potential - Nervous system: Functional organization of the nervous system - Structure of nervous system, neurons - synapse - transmitters and neural communication - Cardiovascular system - respiratory system - Basic components of a biomedical system - Transducers - selection criteria - Piezo electric, ultrasonic transducers – Temperature measurements - Fiber optic temperature sensors.

UNIT II - ELECTRO - PHYSIOLOGICAL MEASUREMENTS

Electrodes -Limb electrodes -floating electrodes - propelled disposable electrodes - Micro, needle and surface electrodes - Amplifiers: Preamplifiers, differential amplifiers, chopper amplifiers -Isolation amplifier. ECG - EEG - EMG - ERG - Lead systems and recording methods– Typical waveforms. Electrical safety in medical environment: shock hazards leakage current-Instruments for checking safety parameters of biomedical equipments

UNIT III - NON-ELECTRICAL PARAMETER MEASUREMENTS

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound –Pulmonary function measurements - Spiro meter - Photo Plethysmography, Body Plethysmography Blood Gasanalyzers : pH of blood -measurement of blood pCO2, pO2, finger-tip oxymeter ESR, GSR measurements .

UNIT IV - MEDICAL IMAGING

Radio graphic and fluoroscopic techniques - Computer tomography - MRI - Ultrasonography-

Endoscopy - Thermography - Different types of biotelemetry systems and patient monitoring -Introduction to Biometric systems

UNIT V- ASSISTING AND THERAPEUTIC EQUIPMENTS

Pacemakers - Defibrillators - Ventilators - Nerve and muscle stimulators - Diathermy - Heart -Lung machine - Audio meters - Dialysers - Lithotripsy

REFERENCES

1. M. Arumugam, ‘Bio-Medical Instrumentation’, Anuradha Agencies, 2003.
2. L.A. Geddes and L.E. Baker, ‘Principles of Applied Bio-Medical Instrumentation’, John Wiley& Sons, 1975.
3. J. Webster, ‘Medical Instrumentation’, John Wiley & Sons, 1995.
4. C. Rajarao and S.K. Guha, ‘Principles of Medical Electronics and Bio-medical Instrumentation’, Universities press (India) Ltd, Orient Longman ltd, 2000.

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Electronics & Communication Engineering, VI-Semester

Open Elective EC- 605 (C) POWER ELECTRONICS

Unit-1

Power Semiconductor Switches

Power diodes - Basic structure and V-I characteristics - various types - **DIACs** – Basic structureand V-I characteristics – **TRIACs** - Basic structure and V-I characteristics

Power BJT: Construction and working principle, quasisaturation, primary breakdown,secondary breakdown.

IGBTs - Basic structure and V-I characteristics.

Power MOSFETs - Basic structure and V-I characteristics

Thyristors- basic structure - static and dynamic characteristics - device specifications and ratings - methods of turning on - gate triggering circuit using UJT

Unit 2: Rectifiers

Thyristors- series and parallel operation, methods of turning off - commutation circuits.

Line frequency phase controlled rectifiers using SCR

Single Phase – Half wave rectifier with R and RL loads – Full wave half controlled and fully controlled converters with continuous and constant currents - Input side harmonics and power factor - Effect of source inductance

Three Phase - Half wave rectifier with R and RL loads - Full wave fully controlled converterswith continuous and constant currents

Unit 3: Inverters &Cycloconverters Inverters –

Single phase inverters – series, parallel andbridge inverters. Single Phase Pulse Width Modulated (PWM) inverters – Basic circuit andoperation.Single phase series resonant inverter, Single phase bridge inverters,Three phase bridge inverters,Voltage control of inverters, Harmonics reduction techniques, Single phase and three phasecurrent source inverters

Unit-IV

AC Voltage Controllers

Principle of On-Off and phase controls, Single phase ac voltage controller with resistive and inductive loads Three phase ac voltage controllers (various configurations and comparison only),Single phase transformer taps changer. Cyclo Converters-Basic principle of operation, singlephase to single phase, three phase to single phase and three phase to three phase cyclo converters, output voltage equation

Unit V: DC – DC Converters

Choppers - Principle of operation - step-up and step-down choppers.

Switching regulators - Buck regulators - Boost regulators - Buck-boost regulators – Switchedmode power supply - principle of operation and analysis

Text/Reference Books:

1. Ned Mohan, Power Electronics., John Wiley and Sons, 2nd edition, 1995.
2. Rashid, Power Electronics, Circuits Devices and Applications, Pearson Education, 3rdedition,2004.
3. G.K.Dubey, Thyristorised Power Controllers, Wiley Eastern Ltd, 1993.
4. Dewan&Straughen, Power Semiconductor Circuits, John Wiley & Sons, 1975.
5. Cyril W Lander, Power Electronics, McGraw Hill, 3rd edition, 1993.
6. M.D. Singh and K.B.Khanchandani, "Power Electronics"Tata MC Graw Hill, 2005
7. P.C Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2nd Edition.
8. P.S Bhimbhra , " Power Electronics", Khanna Publishers, 2012

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VI-Semester

Open Elective EC- 605 (D) IoT and Applications

UNIT 1

Introduction – Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs .

UNIT 2

IoT & M2M:

Machine to Machine, Difference between IoT and M2M, Software define Network.

UNIT 3

Network & Communication aspects:

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination, Communication with Cognitive radio networks: OSI model and framework.

UNIT 4

Challenges in IoT:

Design challenges, Development challenges, Security challenges, Other challenges.

UNIT 5

Domain specific applications of IoT:

Home automation, Industry applications, Surveillance applications, Other IoT applications

Developing IoTs:

Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python.

Suggested Books:

1. Vijay Madisetti, Arshdeep Bahga, Internet of Things: A Hands-On Approach,

2. Waltenegus Dargie,Christian Poellabauer, Fundamentals of Wireless Sensor Networks: Theory and Practice"

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering V-Semester

Open Elective EC- 703 (D) Wireless Sensor Networks

Unit I Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks. Issues and challenges in wireless sensor networks.

Unit II Fundamentals of MAC protocols - Low duty cycle protocols and wakeup concepts – Contention based protocols - Schedule-based protocols - SMAC - BMAC - Traffic-adaptive medium access protocol (TRAMA) - The IEEE 802.15.4 MAC protocol.

Unit III Issues in Wireless Sensor Networks, Flooding and gossiping – Data centric Routing – SPIN – Directed Diffusion – Energy aware routing - Gradient-based routing - Rumor Routing – COUGAR – ACQUIRE – Hierarchical Routing - LEACH, PEGASIS – Location Based Routing – GF, GAF, GEAR, GPSR – Real Time routing Protocols – TEEN, APTEEN, SPEED, RAP - Data aggregation - data aggregation operations - Aggregate Queries in Sensor Networks - Aggregation Techniques – TAG, Tiny DB.

Unit IV Operating Systems for Wireless Sensor Networks – Introduction - Operating System Design Issues - Examples of Operating Systems – TinyOS – Mate – MagnetOS – MANTIS - OSPM - EYES OS – SenOS – EMERALDS – PicOS – Introduction to Tiny OS – NesC – Interfaces and Modules-Configurations and Wiring - Generic Components -Programming in Tiny OS using NesC, Emulator TOSSIM.

Unit V WSN Applications with 5G Networks, efficient energy routing protocol, 5G with Adhoc networks, wireless Adhoc network with 5G, WSN: Home Control - Building Automation - Industrial Automation - Medical Applications, Nanoscopic Sensor Applications – Case Study: IEEE 802.15.4 LR-WPANs Standard - Target detection and tracking - Contour/edge detection - Field sampling. Cognitive Radio N: Introduction applications, features, challenges.

Reference Books:

1. Wireless Sensor Networks Technology, Protocols, and Applications- Sohraby, Minoli and Znati Wiley.
2. Advanced Wireless Sensing Techniques for 5G Networks- Tomar, and Ashish, CRC Press, T&F.
3. Protocols and Architectures for Wireless Sensor Networks- Karl and Willig, John Wiley & Sons.
4. Sensors Handbook- Sabrie Soloman, McGraw Hill.

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Electronics & Communication Engineering, VI-Semester

Open Elective EC- 704 (A) Mobile Ad hoc networks

Unit-1

Introduction to adhoc networks – definition, characteristics features, applications. Charectristics of Wireless channel, Adhoc Mobility Models:- Indoor and out door models.

Unit -2

Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad hoc wireless Networks, Classification of MAC protocols, Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

UNIT III

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, Hierarchical Routing, Table drive routing protocol, On-demand routing protocol. Hybrid routing protocol, Routing protocols with effective flooding mechanisms, Hierarchical routing protocols, Power aware routing protocols

UNIT IV

Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks, Other transport layer protocols for Ad hoc wireless Networks.

Unit-V

Security: Security in wireless Ad hoc wireless Networks, Network security requirements, Issues & challenges in security provisioning, Network security attacks, Key management, Secure routing in Ad hoc wireless Networks.

Unit-VI

Quality of service in Ad hoc wireless Networks: Introduction, Issues and challenges in providing QoS in Ad hoc wireless Networks, Classification of QoS solutions, MAC layer solutions, network layer solutions.

TEXT BOOKS

1. C. Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007
2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000

REFERENCES

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobilead hoc networking, Wiley-IEEE press, 2004.
2. Mohammad Ilyas, The handbook of adhoc wireless networks, CRC press, 2002.
3. T. Camp, J. Boleng, and V. Davies “A Survey of Mobility Models for Ad Hoc Network
4. Research,” Wireless Commun. and Mobile Comp., Special Issue on Mobile Ad Hoc Networking Research, Trends and Applications, vol. 2, no. 5, 2002, pp. 483–502.

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Electronics & Communication Engineering VII-Semester

EC701 MICROWAVE ENGINEERING

UNIT 1

ELEMENTS OF MICROWAVE/MILLIMETER WAVE INTEGRATED CIRCUITS: classification of Transmission lines: Planar, quasi- planar and 3D structure and their properties, field distribution and range of application, Transverse transmission the techniques for multi-dielectric planar structure, Analysis of discontinuities in planar and non-planar transition line.

UNIT 2

PROPAGATION THROUGH WAVEGUIDES: Rectangular and circular waveguides solution of wave equation for TE & TM modes, degenerate and dominant modes, power transmission power loss, Excitation of wave guides , Non existence of TEM mode in waveguide, Introduction to stripline and Microstrip-line.

UNIT 3

MICROWAVE CAVITY RESONATORS: Rectangular and cylindrical cavities, Quality factor and Excitation of cavities. Microwave Components: Waveguide couplings, bends and tourists, Design and circuit realization of filters, couplers, phase shifters, E-plane, H-plane and hybrid Tees, Hybrid ring wave meters: Isolators and circulators, tunable detectors, slotted line carriage, VSWR meter.

UNIT 4

MICROWAVE MEASUREMENTS: measurement of frequency, wave length, VSWR, impedance, Attenuation Low and high power radiation patterns. Limitation of Conventional active devices at microwave frequency.

UNIT 5

MICROWAVE TUBES: Klystron, Reflex klystron, magnetron, TWT, BWO: principle of operation and its performance characteristic and application.

SUGGESTED BOOKS:

1. Pozar « Microwave Engineering » 3rd edition, John Wiley (India).
2. Microwave Engg. , Radhakrishna, BSP Publication
3. Collin, R.E. Foundations for Microwave Engineering; TMH 2nd Ed.
4. Rizzi, Microwave Engineering: Passive Circuits; PHI.

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Electronics & Communication Engineering V-Semester

EC- 702 OPTICAL FIBRE COMMUNICATION

Course Objective:

- To study about the various optical fiber modes, configuration and transmission characteristics of optical fibers
- To learn about the various optical sources, detectors and transmission techniques
- To explore various idea about optical fiber measurements and various coupling techniques
- To enrich the knowledge about optical communication systems and networks

UNIT 1

INTRODUCTION: Introduction to Optical fiber Communication System, Technology used in OFC System, Structure and types of Fiber, modes and Configuration**,** mode theory for circular guide modal equation, modes in optical fiber, linearly polarized modes, attenuation factors, pulse broadening in optical fiber, single mode fiber, mode field diameter, single distortion in single mode fiber, Derivation of material dispersion and waveguide dispersion.

Attenuation, Signal Degradation in Optical Waveguides, Pulse Broadening in Graded index fiber Waveguides, Mode Coupling.

UNIT 2

Transmission Characteristic of Optical Fiber

Attenuation-absorption –scattering losses-bending losses-core and cladding losses-signal dispersion - inter symbol interference and bandwidth-intra model dispersion-material dispersion- waveguide dispersion-polarization mode dispersion-intermodal dispersiondispersion optimization of single mode fiber-characteristics of single mode fiber-R-I Profilecutoff wave length-dispersion calculation-mode field diameter.

UNIT 3

Optical Sources and Detectors

Sources: Intrinsic and extrinsic material-direct and indirect band gaps-LED-LED structures-surface emitting LED-Edge emitting LED-quantum efficiency and LED power-light source materials-modulation of LED-LASER diodes-modes and threshold conditions-Rate equations-external quantum efficiency-resonant frequencies-structures and radiation patterns-single mode laser-external modulation-temperature effort.

Detectors: PIN photo detector-Avalanche photo diodes-Photo detector noise-noise sources-SNR-detector response time-Avalanche multiplication noise-temperature effects-comparisons of photo detectors.

UNIT 4

ANALYSIS AND PERFORMANCE OF OPTICAL RECEIVER: Receiver Sensitivity, Photodiode for optical receiver, Optical Receiver Design, recent receiver circuits, System configuration and power budget.

UNIT 5

Optical Communication Systems and Networks

System design consideration Point – to -Point link design -Link power budget -rise time budget, WDM -Passive DWDM Components-Elements of optical networks-SONET/SDH-Optical Interfaces-SONET/SDH Rings and Networks-High speed light wave Links-OADM configuration-Optical ETHERNET-Soliton. networks,

Course Outcome:

At the end of the course, the student should be able to:

- Realize basic elements in optical fibers, different modes and configurations.
- Analyze the transmission characteristics associated with dispersion and polarization techniques.
- Design optical sources and detectors with their use in optical communication system.
- Construct fiber optic receiver systems, measurements and coupling techniques.
- Design optical communication systems and its networks.

Text Books:

1. P Chakrabarti, "Optical Fiber Communication, McGraw Hill Education (India)Private Limited, 2016 (Unit I, II, III)
2. Gred Keiser,"Optical Fiber Communication, McGraw Hill Education (India) Private Limited. Fifth Edition, Reprint 2013. (Unit I, IV, V)

References:

1. John M.Senior, Optical fiber communication, Pearson Education, second edition.2007.
2. Rajiv Ramaswami, Optical Networks , Second Edition, Elsevier , 2004.
3. J.Gower, Optical Communication System, Prentice Hall of India, 2001.
4. Govind P. Agrawal, Fiber-optic communication systems, third edition, John Wiley and sons, 2004.

Uttarakhand Technical University, Dehradun

New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering VII-Semester

Elective - EC- 703 (A) MIXED CIRCUIT DESIGN

Course Objective:

The student should be made to:

- Study the mixed signal of submicron CMOS circuits
- Understand the various integrated based filters and topologies
- Learn the data converters architecture, modeling and signal to noise ratio
- Study the integrated circuit of oscillators and PLLs

Unit I

CMOS Amplifiers- Common Source with diode connected loads and current source load, CS stage with source degeneration, CG stage and Source Follower (Only Voltage Gain and Output impedance of circuits)

Unit II

Integrator Based Cmos Filters
Integrator Building Blocks- low pass filter, Active RC integrators, MOSFET-C Integrators, gm-C integrators, Discrete time integrators. Filtering Topologies: The Bilinear transfer function, The Biquadratic transfer function, Filters using Noise shaping.

Unit III

Data Converter Architectures
DAC Architectures- Resistor string, R-2R ladder Networks, Current Steering, Charge Scaling DACs, Cyclic DAC, and Pipeline DAC. ADC Architectures- Flash, Two-step flash ADC, Pipeline ADC, Integrating ADCs, Successive Approximation ADC.

Unit IV

Comparator- Characterization of a comparator-static and dynamic, A Two stage open loop comparator (analysis not required)

Unit V

Oscillators and PLL
LC oscillators, Voltage Controlled Oscillators. Simple PLL, Charge pumps PLLs, Non ideal effects in PLLs, Delay Locked Loops.

Course Outcome:

Upon completion of the course, student should be able to

- Apply the concepts for mixed signal MOS circuit.
- Analyze the characteristics of IC based CMOS filters.
- Design of various data converter architecture circuits.

- Analyze the signal to noise ratio and modeling of mixed signals.
- Design of oscillators and phase lock loop circuit.

References:

1. CMOS Mixed Signal Circuit Design by R.Jacob Baker, Wiley India, IEEE Press, reprint 2008.
2. CMOS Circuit Design, Layout and Simulation by R.Jacob Baker, Wiley India, IEEE Press, Second Edition, reprint 2009.
3. Design of Analog CMOS Integrated Circuits by Behzad Razavi, McGraw Hill, 33rd Reprint, 2016.

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New Scheme of Examination as per AICTE Flexible Curricula
Electronics and Communication Engg, VII-Semester Dep Elective
EC- 703 (B) Digital Image Processing

UNIT 1

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – color models.

UNIT 2

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

UNIT 3

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation- Morphological processing- erosion and dilation.

UNIT 4

Segmentation: Point, Line, and Edge Detection, Thresholding, Region-Based Segmentation, Segmentation Using Morphological Watersheds.Representation and Description: Representation, Boundary descriptors.

UNIT 5

Fundamentals of Video Coding- Inter-frame redundancy, motion estimation techniques – full-search, fast search strategies, forward and backward motion prediction, frame classification – I, P and B; Video sequence hierarchy – Group of pictures, frames, slices, macro-blocks and blocks; Elements of a video encoder and decoder; Video coding standards – MPEG and H.26X.

Video Segmentation- Temporal segmentation–shot boundary detection, hard-cuts and soft-cuts; spatial segmentation – motion-based; Video object detection and tracking.

Suggested Books:

1. Rafael C. Gonzalez, Digital Image Processing Using MATLAB, Mc Graw Hill Pvt. Ltd.
2. Jain, Fundamentals of Digital Image Processing, PHI.
3. Pratt, Digital Image Processing, John Willey.
4. Pakhira, Digital Image Processing and Pattern Recognition, PHI.

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New Scheme of Examination as per AICTE Flexible Curricula
Electronics and Communication Engg, VII-Semester Dep Elective
EC- 703 (C) Advanced Communication Systems

Objective: The objective of the course is to introduce the students to advanced topics in digital communications. The course aims to provide the students an understanding of the fundamental concepts and techniques, used in the design, performance analysis, and implementation of current communication systems and useful in the development of the communication systems of the future.

Syllabus:
Unit 1.
Review of digital modulation schemes for baseband and bandlimited channels and their corresponding optimal detectors and error probabilities.

Unit 2
Digital TV: Digitized Video, Source coding of Digitized Video, Compression of Frames, DCT based (JPED), Compression of Moving Pictures (MPEG). Basic blocks of MPEG2 and MPE4, Digital Video Broadcasting (DVB)

Unit 3
Spread Spectrum Communications:Spreading sequences- Properties of Spreading Sequences, Pseudo-noise sequence, Gold sequences, Kasami sequences, Walsh Sequences, Orthogonal Variable Spreading Factor Sequences, Barker Sequence, Complementary Codes Direct sequence spread spectrum – DS-CDMA Model, Conventional receiver, Rake Receiver, Synchronization in CDMA, Power Control, Soft handoff, Multiuser detection – Optimum multiuser detector, Liner multiuser detection.

UNIT – 4 : MIMO Systems:Introduction, Space Diversity and System Based on Space Diversity, Smart Antenna system and MIMO, MIMO Based System Architecture, MIMO Exploits Multipath, Space – Time Processing, Antenna Consideration for MIMO, MIMO Channel Modelling, MIMO Channel Measurement, MIMO Channel Capacity, Cyclic Delay Diversity (CDD), Space Time Coding, Advantages and Applications of MIMO in Present Context, MIMO Applications in 3G Wireless System and Beyond, MIMO-OFDM

UNIT – V : ATM Traffic and congestion Control: Requirements for ATM Traffic and Congestion Control, CellDelay Variation, ATM Service Categories, Traffic and Congestion Control Framework, Traffic Control, Congestion Control

TEXT BOOKS:

- Gary J. Mullett, “Introduction to Wireless Telecommunications Systems and Networks”, CENGAGE
- Upena Dalal, “Wireless Communication”, Oxford University Press, 2009
- William Stallings, “ISDN and Broadband ISDN with Frame Relay and ATM” Prentice Hall, 4th edition

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering VII Semester

Dep Elective EC- 703 (D) Wireless Sensor Networks

Unit I Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks. Issues and challenges in wireless sensor networks.

Unit II Fundamentals of MAC protocols - Low duty cycle protocols and wakeup concepts – Contention based protocols - Schedule-based protocols - SMAC - BMAC - Traffic-adaptive medium access protocol (TRAMA) - The IEEE 802.15.4 MAC protocol.

Unit III Issues in Wireless Sensor Networks, Flooding and gossiping – Data centric Routing – SPIN – Directed Diffusion – Energy aware routing - Gradient-based routing - Rumor Routing – COUGAR – ACQUIRE – Hierarchical Routing - LEACH, PEGASIS – Location Based Routing – GF, GAF, GEAR, GPSR – Real Time routing Protocols – TEEN, APTEEN, SPEED, RAP - Data aggregation - data aggregation operations - Aggregate Queries in Sensor Networks - Aggregation Techniques – TAG, Tiny DB.

Unit IV Operating Systems for Wireless Sensor Networks – Introduction - Operating System Design Issues - Examples of Operating Systems – TinyOS – Mate – MagnetOS – MANTIS - OSPM - EYES OS – SenOS – EMERALDS – PicOS – Introduction to Tiny OS – NesC – Interfaces and Modules-Configurations and Wiring - Generic Components -Programming in Tiny OS using NesC, Emulator TOSSIM.

Unit V WSN Applications with 5G Networks, efficient energy routing protocol, 5G with Adhoc networks, wireless Adhoc network with 5G, WSN: Home Control - Building Automation - Industrial Automation - Medical Applications, Nanoscopic Sensor Applications – Case Study: IEEE 802.15.4 LR-WPANs Standard - Target detection and tracking - Contour/edge detection - Field sampling. Cognitive Radio N: Introduction applications, features, challenges.

Reference Books:

1. Wireless Sensor Networks Technology, Protocols, and Applications- Sohraby, Minoli and Znati Wiley.
2. Advanced Wireless Sensing Techniques for 5G Networks- Tomar, and Ashish, CRC Press, T&F.
3. Protocols and Architectures for Wireless Sensor Networks- Karl and Willig, John Wiley & Sons.
4. Sensors Handbook- Sabrie Soloman, McGraw Hill.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VIIII-Semester

Open Elective EC- 704 (A) Mobile Ad hoc networks

Unit-1

Introduction to adhoc networks – definition, characteristics features, applications. Charectristics of Wireless channel, Adhoc Mobility Models:- Indoor and out door models.

Unit -2

Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad hoc wireless Networks, Classification of MAC protocols, Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

UNIT III

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, Hierarchical Routing, Table drive routing protocol, On-demand routing protocol. Hybrid routing protocol, Routing protocols with effective flooding mechanisms, Hierarchical routing protocols, Power aware routing protocols

UNIT IV

Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks, Other transport layer protocols for Ad hoc wireless Networks.

Unit-V

Security: Security in wireless Ad hoc wireless Networks, Network security requirements, Issues & challenges in security provisioning, Network security attacks, Key management, Secure routing in Ad hoc wireless Networks.

Unit-VI

Quality of service in Ad hoc wireless Networks: Introduction, Issues and challenges in providing QoS in Ad hoc wireless Networks, Classification of QoS solutions, MAC layer solutions, network layer solutions.

TEXT BOOKS

1. C. Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007
2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000

REFERENCES

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobilead hoc networking, Wiley-IEEE press, 2004.
2. Mohammad Ilyas, The handbook of adhoc wireless networks, CRC press, 2002.
3. T. Camp, J. Boleng, and V. Davies “A Survey of Mobility Models for Ad Hoc Network
4. Research,” Wireless Commun. and Mobile Comp., Special Issue on Mobile Ad Hoc Networking Research, Trends and Applications, vol. 2, no. 5, 2002, pp. 483–502.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VII-Semester

Open Elective EC- 704 (B) Artificial Intelligence

Course Objectives:

- The adoption of Artificial Intelligence (AI) technologies is widely expanding in our society. Applications of AI include: self-driving cars, personal assistants, surveillance systems, robotic manufacturing, machine translation, financial services, cyber security, web search, video games, and code analysis and product recommendations. Such applications use AI techniques to interpret information from a wide variety of sources and use it to enable intelligent, goal-directed behaviour.

Course Learning Outcomes:

1. Acquire advanced Data Analysis skills.
2. Stay Industry relevant and grow in your career.
3. Create AI/ML solutions for various business problems. Ÿ Build and deploy production grade AI/ML applications.
4. Apply AI/ML methods, techniques and tools immediately

Course Content:

Unit-1 (Introduction to AI): Definitions, Goals of AI, AI Approaches, AI Techniques, Branches of AI, Applications of AI. Introduction of Intelligent Systems: Agents and Environments, Good Behavior: the concept of Rationality, The Nature of Environments, The structure of Agents, How the components of agent programs work.

Unit-2 (Problems Solving, Search and Control Strategies)

Solving Problems by Searching, Study and analysis of various searching algorithms. Implementation of Depth-first search, Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform-cost search, Depth-first search, Depth-limited search, Iterative deepening depth-first search, Bi-directional search Informed (Heuristic) Search Strategies: Greedy best-first search A* search: Minimizing the total estimated solution cost, Conditions for optimality: Admissibility and consistency, Optimality of A*, Memory-bounded heuristic search, Heuristic Functions, Generating admissible heuristics from sub problems: Pattern databases, Learning heuristics from experience.

Beyond Classical Search: Local Search Algorithms and Optimization Problems: Hill-climbing search Simulated annealing, Local beam search, Genetic algorithms, Local Search in Continuous Spaces, Searching with Non-deterministic Actions: AND-OR search trees, Searching with Partial Observations.

Unit- 3 (Knowledge Representations Issues, Predicate Logic, Rules)

Knowledge representation, KR using predicate logic, KR using rules. Reasoning System - Symbolic, Statistical: Reasoning, Symbolic reasoning, Statistical reasoning.

Unit-4 (Quantifying Uncertainty, Learning Systems)

Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Bayes' Rule and Its Use, Representing Knowledge in an Uncertain Domain, Other Approaches to Uncertain Reasoning, Rule-based methods for uncertain reasoning, Representing vagueness: Fuzzy

sets and fuzzy logic, Study of fuzzy logic and Decision trees, Implementation aspects of Decision trees.
Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, The decision tree representation, Expressiveness of decision trees, inducing decision trees from examples.

Unit-5 (Expert Systems)

Introduction, Knowledge acquisition, Knowledge base, Working memory, Inference engine, Expert system shells, Explanation, Application of expert systems.
Fundamentals of Neural Networks: Introduction and research history, Model of artificial neuron, Characteristics of neural networks, learning methods in neural networks, Single-layer neural network system, Applications of neural networks.
Fundamentals of Genetic Algorithms: Introduction, Encoding, Operators of genetic algorithm, Basic genetic algorithm.

Text/Reference Books:

1. Rich, Elaine Knight, Kevin, Artificial Intelligence, Tata McGraw Hill.
2. Luger, George F, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education.
3. Nilsson, Nils J, Artificial Intelligence, Morgan Kaufmann
4. Russell, Stuart J. Norvig, Peter, AI: A Modern Approach, Pearson Education

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VII-Semester

Open Elective EC- 704 (C) Artificial Neural Network

Course Objectives:

- To understand the biological neural network and to model equivalent neuron models.
- To understand the architecture, learning algorithm and issues of various feed forward and feedback neural networks.

Unit 1

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Biological Neuron – Artificial Neural Model - Types of activation functions – Architecture: Feedforward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem. XOR Problem, Multilayer Networks.

Unit 2

Learning: Learning Algorithms, Error correction and Gradient Descent Rules, Learning objective of TLNs, Perceptron Learning Algorithm, Perceptron Convergence Theorem. Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

Unit 3

Supervised Learning: Perceptron learning and Non Separable sets, α-Least Mean Square Learning, MSE Error surface, Steepest Descent Search, μ-LMS approximate to gradient descent, Application of LMS to Noise Cancelling, Multi-layered Network Architecture, Backpropagation Learning Algorithm, Practical consideration of BP algorithm.

Unit 4

S**upport Vector Machines and Radial Basis Function:** Learning from Examples, Statistical Learning Theory, Support Vector Machines, SVM application to Image Classification, Radial Basis Function Regularization theory, Generalized RBF Networks, Learning in RBFNs, RBF application to face recognition.

Unit 5

Attractor Neural Networks: Associative Learning Attractor Associative Memory, Linear Associative memory, Hopfield Network, application of Hopfield Network, Brain State in a Box neural Network, Simulated Annealing, Boltzmann Machine, Bidirectional Associative Memory.

Self-organization Feature Map: Maximal Eigenvector Filtering, Extracting Principal Components, Generalized Learning Laws, Vector Quantization, Self-organization Feature Maps, Application of SOM, Growing Neural Gas.

TEXT BOOKS:

- Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.
- Artificial Neural Networks – B. Yegnanarayana Prentice Hall of India P Ltd 2005
- Neural Networks in Computer Inteligance, Li Min Fu TMH 2003
- Neural Networks -James A Freeman David M S Kapura Pearson Education 2004.
- Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VIII-Semester

EC- 801 Television and Radar Engineering

Course Content:

Unit I : **Basic Television System**

Introduction: Scanning principles: sound and picture transmission, scanning process, camera pick-up devices, video signal, transmission and reception of video signals, brightness perception and photometric quantities, aspect ratio and rectangular scanning, persistence of vision and flicker, vertical resolution, the Kell factor, horizontal resolution and video bandwidth, interlaced scanning.
Composite Video Signal: Lines and scanning, video signal components, horizontal sync and blanking standards, vertical sync and blanking standards, video modulation and vestigial side band signal, sound modulation and inter-carrier system.
Television Standards: Standard channel characteristics, reception of the vestigial side band signals, television broadcast channel, consolidated CCIR system-B standard, various television broadcast systems.
Television Pick-up devices and Cameras: Camera lenses, auto-focus systems, television camera pick-ups, Silicon Vidicon, CCD image sensors, video processing of camera pick-up signal.

Unit II : **Colour Television**

Colour fundamentals: mixing of colours and colour perception, chromaticity diagram, colour television camera, colour TV signals and transmission, NTSC, SECAM and PAL system, Trinitron picture tube, automatic degaussing, plasma, LCD displays.
Television transmission and reception: requirement of TV broadcast transmission, design principle of TV transmitters, IF modulation, power output stages, block diagram of TV transmitter, co-channel interference and ghost images during propagation of television signals, antenna requirements for television system, block schematic and function requirements for television receivers, trends in circuit design, colour television receiver.

Unit III : **Digital Television Technology**

Merits of digital technology, fully digital television system, digital television signals, digitized video parameters, digital video hardware, transmission of digital TV signals, bit rate reduction, digital TV receivers, video processor unit, audio processor unit.
Other television systems: Closed Circuit television system (CCTV), Cable television system (CATV), multiplexed analog component encoding television system (MAC TV), High definition television system (HDTV), High definition multiplexed analog component television (HD-MAC TV), High Performance Computer Controlled TV (HPCC TV), 3-D stereoscopic television techniques..

Unit IV : **RADAR**

The Radar range equation, block diagram and operation, performance factors: prediction of range performance, minimum detectable signal, receiver noise, probability density functions, signal to noise ratios. Radar cross section of targets, transmitter power, pulse repetition frequency and range ambiguities, antenna parameters.
The CW radar: the Doppler effect, FM-CW radar.
The Moving Target Indicator (MTI) Radar: delay line cancellers.

Unit V : **Radar Receivers**

The radar receiver, noise figure, mixers, low noise front ends, displays- type A and PPI representations, duplexer and receiver protectors**Other Radar systems:** Synthetic aperture radar, HF over the horizon radar, Air Surveillance Radar (ASR), Bistatic radar.

References:

1. M. Dhake: Television and Video Engineering, 2nd Edition,TMH, New Delhi.
2. M. I. Skolnik: Introduction to Radar Systems, TMH, New Delhi.
3. R. G. Gupta: Television Engineering and Video Systems, TMH, New Delhi.
4. R. R. Gulati: Monochrome and Colour Television, New Age International.
5. Grob and Herndon: Basic Television and Video Systems, McGraw Hill International.
6. P. Z. Peebles, Jr.: Radar Principles, Wiley India Pvt. LTD.
7. Edde: Radar- Principles, Technology Applications, Pearson Education.

List of Experiments:

Section A: Television Engg.

1. (a) To Study the Circuit Description of RF Tuner Section.
(b) To Study the RF Section by Measuring Voltages at Various Test Points.
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for RF Section.
2. (a) To Study the Circuit Description of VIF Tuner Section.
(b) To Study the VIF Section by Measuring Voltages at Various Test Points.
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for VIF Section.
3. (a) To Study the Circuit Description of Video and Chroma Section Tuner Section.
(b) To Study the Video and Chroma Section by Measuring Voltages at Various Test Points
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Video and Chroma Section.
4. (a) To Observe the Horizontal Oscillator and Horizontal Output Section through Various Test Point.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Horizontal Oscillator and Horizontal Output
Section.
5. (a) To Observe the Vertical Oscillator and Vertical Output Section through Various Test Point.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Vertical Oscillator and Vertical Output Section.
6. To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Sound Output Section.
7. To Study the Circuit Description of Audio and Video Section Tuner Section.
8. (a) To Study the System Control Section by Measuring Voltages at Various Test Points.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for System Control Section.

Section B: RADAR

1. Study of Doppler Effect.
2. To Measure Speed of a fan and various Other Objects (Pendulum, Tuning Fork, Plate etc.)
3. To Simulate the Variable Speed of Moving Objects using Velocity Simulator.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VIII-Semester

EC- 802 Digital System Design using VHDL

UNIT 1

INTRODUCTION TO VHDL: VHDL description, combinational networks, modeling flip-flop using VHDL, VHDL model for multiplexer, compliance and simulation of VHDL, codes, modeling a sequential machine, variables, signals and constants, arrays VHDL operators, VHDL functions, VHDL procedures, packages and libraries, VHDL model for a counter. Attributes, transport and inertial delays, operator over loading, multi valued logic and signal resolution, IEEE-1164, standard logic, generic, generates statements, synthesis of VHDL codes.

UNIT 2

DESIGN OF NETWORKS FOR ARITHMATIC OPERATIONS: Design of serial adder with accumulator, state graph for control networks design of binary multiplier, multiplication of signed binary numbers, design of binary divider.

DIGITAL DESIGN WITH SM CHART: state machine charts, derivation of SM charts, realization of SM charts, implementation of dice game, alternative realization of SM charts using microprogramming.

UNIT 3

FLOATING POINT ARITHMETIC: Representation of floating point numbers, floating point multiplication, and other floating point operations.

DESIGNING WITH PROGRAMMABLE GATE ARRAYS AND COMPLEX PROGRAMMABLE LOGIC

DEVICES: Xilinx 3000 series FPGAs, Xilinx 4000 series FPGAs, using one hot state assignment.

UNIT 4

MEMORY MODELS FOR MEMORIES AND BUSES: Static RAM, a simplified 486 bus model, interfacing memory to microprocessor bus

UNIT 5

DESIGN EXAMPLES: UART design, description of MC68HC05 microcontroller, design of microcontroller CPU, and complete microcontroller design.

SUGGESTED BOOKS:

1. Charles H Roth Jr, “Digital System Design using VHDL”, Thomson Learning, 02.

2. Stephen Brown & Zvonko Vranesic, “Fundamentals of digital logic design with VHDL”, TMH, 2nd Ed., 2007.

3. Jhon F Wakerly, “Digital design”, PHI, 4th Ed.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VIII-Semester

Dep Elective EC- 803 (A) Wireless Communications

UNIT 1

SERVICES AND TECHNICAL CHALLENGES: Types of Services, Requirements for the services, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes.

UNIT 2

WIRELESS PROPAGATION CHANNELS : Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Channel Classification, Link calculations, Narrowband and Wideband models, propagation models, Path loss components.

UNIT 3

WIRELESS TRANSCEIVERS: Structure of a wireless communication link, Modulation and demodulation – Quadrature/4-Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels.

UNIT 4

SIGNAL PROCESSING IN WIRELESS SYSTEMS : Principle of Diversity, Macro-diversity, Microdiversity, Signal Combining Techniques, Transmit diversity, Equalizers- Linear and Decision Feedback equalizers, Review of Channel coding and Speech coding techniques.

UNIT 5

ADVANCED TRANSCEIVER SCHEMES

Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, application of Orthogonal Frequency Division Multiplexing in GSM, IS–95, IS-2000 and Third Generation Wireless Networks and Standards

SUGGESTED BOOKS:

1. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.
2. Simon Haykin & Michael Moher, “Modern Wireless Communications”, Pearson Education, 2007.
3. Rappaport. T.S., “Wireless communications”, Pearson Education, 2003.
4. Gordon L. Stuber, “Principles of Mobile Communication”, Springer International Ltd., 2001.
5. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.

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Electronics & Communication Engineering, VIII-Semester

Dep Elective EC- 803(B) Adaptive Signal Processing

UNIT 1

INTRODUCTION: Definition and characteristics, general properties open and closed loop adaptation.

UNIT 2

ADAPTIVE LINEAR COMBINER: General description, input signal and Weight vectors, desired response and error performance function, gradient and minimum mean square, alternative definition of gradient, decorelection of error and input components.

UNIT 3

THEORY OF ADAPTATION WITH STATIONARY SIGNALS: Input correlation matrix, Eigen values and eigenvectors of the correlation matrix, and their geometrical significance. Basic ideas of gradient search methods, gradient search by newton's method and method of steepest descent, gradient component estimation by derivative measurement, effects of gradient noise, on weight vector solution, excess MSE, time constant and mis-adjustment, performance comparison of Newton and S.D. methods.

UNIT 4

ADAPTIVE ALGORITHMS: Least mean square algorithm, convergence, learning curve noise in Weight vector misadjustment and performances of LMS algorithms, sequential regression algorithm, adaptive recursive LMS algorithm, random search algorithm.

RECURSIVE LEAST SQUARE ALGORITHM: Preliminaries, matrix inversion lemma, exponentially weighted RLS algorithm, update recursion for the sum of weighted error squares, convergence analysis of RLS algorithm

UNIT 5

ADAPTIVE FILTER STRUCTURES: Lattice structures, all poles and all zeroes versions, adaptive lattice predictor. Lattice LMS algorithms, and lattice SER algorithms, adaptive filters with orthogonal signals, DFT and lattice preprocessors.

ADAPTIVE FILTER APPLICATIONS: (i) Adaptive modeling and systems identification. (ii) Inverse adaptive modeling, equalization and deconvolution

SUGGESTED BOOKS:

1. Adaptive Signal Processing, Widrow and Stearns, Pearson Education
2. Adaptive Filter Theory, Simon Haykin, Pearson Education

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VIII-Semester

Dep Elective EC- 803(C) Telecommunication Switching Systems

UNIT 1

INTRODUCTION: Message switching, circuits switching, functions of a switching system, register translator- senders, distribution frames, crossbar switch, a general trunking. Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Bi-phase, Differential Encoding, Time Division Multiplexing (T1 carrier system CCIT and DS lines) Time Division Multiplex Loops and Rings.

UNIT 2

DIGITAL SWITCHING: Switching functions, space division switching, multiple stage switching, nonblocking switches, blocking Probabilities DCS hierarchy, integrated cross connect equipment, digital switching in environment, zero loss switching.

UNIT 3

TELECOM TRAFFIC ENGINEERING: Network traffic load and parameters, grade of service and blocking probability, Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

UNIT 4

NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT: Timing Recovery, Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization, U.S. Network Synchronization, Network Control, Network Management.

UNIT 5

DIGITAL SUBSCRIBER ACCESS: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. HD-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL.

Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.

DSL Technology: ADSL, Cable Modem, Traditional Cable Networks, HFC Networks, Sharing, CM & CMTS and DOCSIS. SONET: Devices, Frame, Frame Transmission, Synchronous Transport Signals, STS I, Virtual Tributaries and Higher rate of service.

SUGGESTED BOOKS:

1. Tele communication switching system and networks - Thyagarajan Viswanath, PHI, 2000.
2. Digital telephony - J. Bellamy, John Wiley, 2nd edition, 2001.
3. Data Communications & Networks - Achyut. S.Godbole, TMH, 2004.
4. Principles of Communication Systems – H. Taub & D. Schilling , TMH, 2nd Edition, 2003.
5. Telecommunication switching, Traffic and Networks - J E Flood, Pearson Education, 2002

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New Scheme of Examination as per AICTE Flexible Curricula
Electronics & Communication Engineering, VIII-Semester
Dep Elective EC- 803(D) SDN and Cognitive radio Networks

UNIT I
INTRODUCING SDN
SDN Origins and Evolution – Introduction – Why SDN? - Centralized and Distributed Control and Data Planes - The Genesis of SDN
UNIT II SDN ABSTRACTIONS
How SDN Works - The Openflow Protocol - SDN Controllers: Introduction - General Concepts - VMware - Nicira - VMware/Nicira - OpenFlow-Related - Mininet - NOX/POX - Trema - Ryu - Big Switch Networks/Floodlight - Layer 3 Centric - Plexxi - Cisco OnePK

UNIT III
SDN in the Data Center - SDN in Other Environments - SDN Applications - SDN Use Cases - The Open Network Operating System 3

UNIT IV

Reconfigurable Wireless communication Systems, Digital Radio Processing. Concept of Cognitive Radio: Cognitive Radio Bands, Spectrum policy, Application of Cognitive radio, Cognitive radio network design, spectrum coexistence in Cognitive radio network

UNIT – V:

Carrier Sensing, Routing, Flow Control. Cooperative Communications and Networks: Information Theory for Cooperative Communications, Cooperative Communications, Cooperative Wireless Networks. Cognitive Radio Communications: Cognitive Radios and Dynamic Spectrum Access, Analytical Approach and Algorithms for Dynamic Spectrum Access, Fundamental Limits of Cognitive Radios, Mathematical Models toward Networking Cognitive Radios. Spectrum Sensing in Cognitive Radio Networks.

REFERENCES
1. Software Defined Networks: A Comprehensive Approach by Paul Goransson and Chuck Black, Morgan Kaufmann Publications, 2014
2. SDN - Software Defined Networks by Thomas D. Nadeau & Ken Gray, O'Reilly, 2013
3. Software Defined Networking with OpenFlow By SiamakAzodolmolky, Packt Publishing, 2013
4. Feamster, Nick, Jennifer Rexford, and Ellen Zegura. "The road to SDN: an intellectual history of programmable networks." ACM SIGCOMM Computer Communication Review 44.2 (2014): 87-98.
5. GS Tomar and A Bagwari "Introduction to Cognitive Radio Networks and Application, CRC Press 2016

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VIII-Semester

Open Elective EC- 804 (A) Industrial Automation Technologies

Unit I

Automation, Role of PLC ,SCADA and IoT in Industrial Automation System, Design in automation system, relays, Scope of Automation field , Ethernet, RS232. Profibus DP, Signal Types, Comparison of PLC & PC, How does a PLC work, Applications of PLC, Different types of PLC's ,Specifications of PLC, Onboard/ Inline IO's, Memory allocation in PLC, scan time. Hardware details, Wiring & Connection Techniques, Safety measures for handling the PLC, Diagnosis of PLC status & other hardware connected to PLC, Industrial Sensors: Classification and type of sensors preferred in Automation, Characteristics of various proximity sensors like inductive, capacitive, magnetic, photoelectric and ultrasonic.

Unit II

Introduction: Hydraulics, Important basic terms, Industrial Hydraulics, Basic physical properties, Comparisons of Drives, Basic elements, commonly used symbols, Circuit symbols, Principle of Energy Conversion, Functional Groups in a Hydraulic System, Functionality of a Hydraulic System,Main functions of Hydraulic fluids, Requirements of Hydraulic fluids, Types of Hydraulic Fluids, Selection of Hydraulic fluid for an applications, Functions and Operating principle Different types of Hydraulic pumps and its selection, Design and operation of Hydraulic Cylinder, Types of cylinder

Unit-III

Pressure control valves, Directional Control Valves, Flow Control Valves , Accessories: Accumulator, Filter Introduction to Electro – Hydraulics: Solenoids, Function and operating principle of a relay, Relay as a logical switch, Symbols of most important switching elements (NO an NC), Signal storage concept, Electrical interlocking concept, Electrical ladder diagram, Momentary-contact limit switches

Unit-IV

Introduction to pneumatics: Pneumatics, Important basic terms Characteristics of Industrial Pneumatics, advantages and limitations, Comparisons of Pneumatics over other technology like Hydraulics, Electrical/ Electronic and Mechanical drives (Systems Comparison), Applications, circuits: Basic elements, commonly used symbols, Circuit symbols. Compressed Air Preparation. Compressor Unit, Drying of Compressed Air, Distribution of Compressed air, Filter, Pressure control valve, lubricator, air dryer

Unit-V

Direction Control Valve: Design Principle, Symbols, Operations, 3/2 Directional control valve, Manual operated, 5/2 Directional control valve, pneumatically operated, 5/3 Directional control valve, electrically operated, Pressure Valve, Flow Control Valves, Pneumatic cylinders, Introduction to Electro-Pneumatics: Electro – mechanical Relays, Symbols of electrical components like switch, contacts, solenoid, relay, LED etc, NO and NC contacts, magnetic proximity switch working principle, Electrical signal storage, Electrical ladder diagram, Logic flow diagram, Solenoid working principle, Solenoid operated valves, Advantages of solenoid operated valves over manual valves.

References:

1. Industrial Instrumentation, Control and Automation, S. Mukhopadhyay, S. Sen and A. K. Deb, Jaico Publishing House, 2013
2. Programmable logic controller, Dunning, Delmar
3. Pneumatic Systems: Principles and Maintenance, S R Majumdar, TMH 1996
4. Hydraulic Control Systems, Herbert E. Merritt, Wiley, 1991

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VIII-Semester

Open Elective EC- 804 (B) Machine Learning

Course Objectives:

In this course we will study the basic component of an intelligence system i.e. machine learning, their functions, mechanisms, policies and techniques used in their implementation and examples.

Course Learning Outcomes:

1. List various approaches of Machine Learning.
2. Describe machine learning algorithms to solve the real world problems
3. Develop Hypothesis and machine learning models
4. Identify appropriate models for solving machine learning problems.
5. Apply learning techniques to solve real world machine learning problems.
6. Evaluate and interpret the results of the algorithms.

Course Content:

Unit I: Introduction: What Is Machine Learning?, Why Use Machine Learning? ,Types of Machine Learning Systems, Supervised/Unsupervised Learning, Batch and Online Learning, Instance-Based Versus Model-Based Learning, Hypothesis generation, Main Challenges of Machine Learning, Data sets and Testing and Validating.

Unit II: Concept Learning: Introduction to Concept Learning, Concept Learning Task, Notation, Inductive Learning Hypotheses, Concept Learning as Search: Generic-to-Specific Ordering of Hypotheses, Finding a Maximally Specific Hypotheses, Version Spaces, Candidate-Elimination Algorithms.

Unit III: Classification: MNIST Training a Binary Classifier, Performance Measures, Measuring Accuracy Using Cross-Validation, Confusion Matrix, Precision and Recall Precision/Recall Tradeoff, The ROC Curve, Multiclass Classification, Error Analysis, Multi label and Multi output classification.

Unit IV: Training Models: Linear Regression, The Normal Equation, Computational Complexity, Gradient Descent, Polynomial Regression, Learning Curves, Regularized Linear Models, Logistic Regression, Estimating Probabilities, Training and Cost Function, and Decision Boundaries.

Unit V: Support Vector Machines Linear SVM Classification, Soft Margin Classification, Nonlinear SVM Classification, Polynomial Kernel, Adding Similarity Features, Gaussian RBF Kernel, Computational Complexity, SVM Regression, Decision Function and Predictions, and The Dual Problem.

Unit VI: Decision Trees Training and Visualizing a Decision Tree, Making Predictions, Estimating Class Probabilities, The CART Training Algorithm, Computational Complexity, Gini Impurity or Entropy, Regularization of hyper parameters, and Random Forests.

Unit VII: Dimensionality Reduction: The Curse of Dimensionality, Main Approaches for Dimensionality Reduction, Projection, Manifold Learning, PCA, Preserving the Variance, Principal Components, Choosing the Right Number of Dimensions.

Unit VIII: Unsupervised Learning Techniques: Clustering, K-Means, Limits of K-Means, Using clustering for image segmentation, Using Clustering for Pre-processing and for Semi-Supervised Learning.

Unit IX: Introduction to Neural Networks: From Biological to Artificial Neurons, Biological Neurons, Logical Computations with Neurons, The Perceptron, Multi-Layer Perceptron and Backpropagation.

Text/Reference Books:

1. Machine Learning, TOM M MITCHELL, TMH
2. Introduction to Machine Learning, 2nd Ed, Ethem Alpaydin, The MIT Press Cambridge, Massachusetts,London, England.
3. Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Ed, Aurelien Geron, O'RIELLY.

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New Scheme of Examination as per AICTE Flexible Curricula

Electronics & Communication Engineering, VIII-Semester

Open Elective EC- 804 (C) Underwater Communication