Vision of the Department:

The Electronics and communication Engineering Department is looking forward to cater the latest industrial needs to produce skilful engineers who are innovative, entrepreneurial and result oriented.

Mission of the Department:

To provide the students with lifelong learning needed for a productive career on the grounds of ethics, good governance, and quality and to disseminate knowledge by upholding innovative services to provide collective environment, that inspires every stakeholder.

Program Specific Outcomes (PSO):

PSO1	Study and implementing the fundamental concepts of electronics and communication systems.
PSO2	Design, develop and analyze advance model of electronics and communication system

2. Program Outcomes

1. Apply knowledge of mathematics, science, engineering fundamentals and electronics communication and engineering for the solution of engineering problems.
2. Problem analysis- Identify, analyse complex engineering problems reaching substantiated conclusions using basic of electronics engineering & mathematics.

3. Conduct Investigations of complex problems:- Developing presumed concept & providing valid facts behind using experiments, analysis and interpretation of data and synthesis of information.
4. Design and construct a electronic system or process to meet industry, domestic society needs, safety and sustainability.
5. Modelling&implementing complex engineering activities using modern tools & techniques.
6. The engineer and society:- Apply acquired knowledge to address the societal issue in relevance to professional engineering practices.
7. Environment & sustainability:- Understand the impact of professional engineering solutions in environmental contexts and demonstrate knowledge of and need for visible sustainability.
8. Work as professionals in accordance with the norms of electronics practices and commit to social, ethical and professional responsibilities.
9. Individual & Team work:- To inculcate an effective behaviour in leader in diverse team and in multidisciplinary settings.
10. To converse effectively various engineering activity to various modes to all levels of society.
11. Understand and implement project management techniques, tools and methods to finalize.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning. Imparting the ability individual for lifelong learning and working independently in changing technological environment.

3. **PEO"s**

1.To prepare ECE graduates for supporting and leadership roles in multi deplaning domain with ethical values.
2. To prepare ECE graduates with a zeal for continuing, high degrees research and other professional developments.
3. To prepare ECE graduate with entrepreneurial skills and to encourage implementation and services via technical & communicational attributes.

Bachelor of Technology (Electronics & Communication Engineering)

Scheme of Studies/Examination

Semester IV

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs)
			L	T	P	Hours/Week	Theory	Sessional	Practical	Total	
1	AS-206N	Numerical Analysis	4	0	0	4	75	25	0	100	3
2	ECE-202N	Data Structures & Algorithms	3	1	0	4	75	25	0	100	3
3	ECE-204N	Electronics Measurements & Instruments	3	1	0	4	75	25	0	100	3
4	ECE-206N	Electromagnetic Theory	3	1	0	4	75	25	0	100	3
5	ECE-208N	Analog Electronics	3	1	0	4	75	25	0	100	3
6	ECE-210N	Computer Architecture & Organization	3	1	0	4	75	25	0	100	3
7	ECE-212N	Data Structures Lab	0	0	3	3	0	40	60	100	3
8	ECE-214N	Electronics Measurements & Instruments Lab	0	0	3	3	0	40	60	100	3
9	ECE-216N	Analog Electronics lab	0	0	3	3	0	40	60	100	3
		Total	**19**	**5**	**9**	**33**	**450**	**270**	**180**	**900**	
10	MPC-202N	Energy Studies*	3	0	0	3	75	25		100	3

1.MPC-202N is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.

Note: All the students have to undergo six weeks industrial training after IV^{th} *semester and it will be evaluated in* V^{th} *semester.*

	NUMERICAL ANALYSIS					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
4	**0**	**0**	**75**	**25**	**100**	**3 hrs**
Purpose	To acquaint the students with the complete procedure to numerically approximate the solution for different kinds of problems occur in science, engineering and technology whose exact solution is difficult to find.					
Course Outcomes						
CO1	In this section student will learn the methods to find the roots of nonlinear (algebraic or transcendental) equations, and eigen value problem of a matrix that can be obtained numerically where analytical methods fail to give solution.					
CO2	Students will learn to solve a large system of linear equations and matrix inversion by various numerical methods and techniques.					
CO3	Discussion on interpolation will be useful in constructing approximate polynomial to represent the huge amounts of experimental data, and to find the intermediate values. Numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.					
CO4	Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations will be useful in attempting many engineering problem.					

UNIT - I

Solution of Algebraic and Transcendental Equation and Eigen Value Problem: Solution ofalgebraic and transcendental equation by the method of bisection, the method of false position, Newton-Raphson method and Graeffe's Root squaring method. Eigen value problem by power method and Jacobi method.

UNIT-II

Solution of System of Equations and Matrix Inversion: Solution of linear algebraic equation: Gauss elimination and Gauss-Jordan methods- Method of Triangularization and Crout's reduction. Iterative methods: Gauss-Jacobi, Gauss-Seidel and Relaxation methods. Matrix inversion by Gauss - Jordan elimination, Crout's , Doolittle and Choleski Methods.

UNIT-III

Interpolation: Finite Differences, Relation between operators -Interpolation by Newton's forwardand backward difference formulae for equal intervals. Newton's divided difference method and Lagrange's method for unequal intervals.Gauss Central difference formulae, Bessel and Stirling formulae.

Numerical differentiation: Newton's forward difference formula to compute derivatives, Newton'sbackward difference formula to compute derivatives, Derivatives using Central difference formulae, to find the maxima and minima of a tabulated function.

Numerical Integration: by Newton's Cotes formulae, Trapezoidal and Simpson's $1/3^{rd}$and $3/8^{th}$rules, Romberg method.

UNIT-IV

Solution of Ordinary Differential Equation: Single step methods: Taylor series method, Picard'smethod of successive approximation, Euler, Modified Euler's and Improved Euler methods, RungeKutta method of fourth order only. Multistep methods: Milne and Adams– Bashforth methods.

Curve fitting: Introduction, Principle of Least squares, Method of Least squares, Fitting of a straightline, parabola and exponential functions.

References Books:

- M. K. Jain, SRK Iyengar and R.K. Jain, Numerical Methods For Scientific &Engg 6e, New Age International (P) Ltd (2008), ISBN-13:978-8122420012.

- Kendall E. Atkinson, An Introduction to Numerical Analysis, Wiley; 2 edition, (January 17, 1989), ISBN-10: 0471624896 , ISBN-13: 978-0471624899.
- S. C. Chapra and Raymond P Canale, Numerical Methods for Engineers, Tata McGraw Hill, Indian Edition.
- James Scarborough, Numerical Mathematical Analysis, Oxford & IBH Publishing Co. Pvt. Ltd (1950), ISBN 10: 0009780021, ISBN-13:978-0009780021.
- C.F. Gerald and O.P. Wheatley, Applied Numerical Analysis, Addison Wesley; 7 edition (2003), ISBN-13:978-0321133045.

Additional Readings:

- S.S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India Pvt. Ltd. (2007), ISBN-13: 978-8120327610.
- Babu Ram, Numerical Methods, Pearson, ISBN 978-8-317-3221-2.
- P.Thangaraj, Computer Oriented Numerical Methods, PHI, ISBN 978-81-203-3539-4.

Note: The Examiners will set nine questions: first question will be short answer type (covering theentire syllabus) and another eight questions will be set taking two questions from each unit. Students will have to attempt five questions in all; first question will be compulsory and other four questions, selecting one from each unit. All questions will carry equal marks.

Lecture	**Topic**
1.	Solution of algebraic and transcendental equation by the method of Bisection.
2.	The method of false position
3.	Newton-Raphson method
4.	Graeffe's Root squaring method
5.	Eigen value problem by power method
6.	Assignment-I
7.	Jacobi method
8.	Gauss elimination method
9.	Gauss- Jordan method
10.	Triangularization method
11.	Crout's reduction method
12.	Gauss-Jacobi method
13.	Gauss-Seidel and Relaxation method
14..	Matrix inversion by Gauss-Jordan elimination
15.	Crout's and Doolittle method
16.	Assignment-II
17.	Choleski method
18.	Finite Differences

19. Interpolation by Newton's forward and backward differences formulae for equal intervals.
20. Newton's divided difference method
21. Lagrange's method for unequal intervals
22. Gauss Central difference formulae
23. Bessel and Stirling formulae
24. Newton's forward difference formula to compute derivatives
25. Newton's backward difference formula to compute derivatives
26. Derivatives using Central difference formulae
27. To find the maxima and minima of a tabulated function
28. Newton's Cotes formulae
29. Trapezoidal and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules
30. Romberg method
31. Assignment-III
32. Taylor series method
33. Picard's method of successive approximation
34. Euler,Euler's modified method and improved Euler method
35. Runge-kutta method of fourth order .
36. Milne and Adams-Bashforth methods.
37. Principle of Least squares
38. Method of Least squares
39. Fitting of a straight line
40. Parabola and exponential fuctions

Tutorial Sheet – 1 (Unit – I)

1) Find a real root of the Equation $x^3 - x - 1 = 0$ by Bisection Method correct to three decimal places.
2) Find real positive root of the equation $x^3 - 26 = 0$ by Bisection Method correct to three places of decimal.
3) Find the real root of the equation $xe^x - 2 = 0$ by Regula Falsi method correct to three places of decimal.
4) Apply Graeffe's root squaring method to determine the approximate roots of the equation $x^3 - 3x^2 - 6x + 8 = 0$
5) Find real root of the equation $x^3 - 5x + 3 = 0$ by Newton-Raphson method correct to three places of decimal.

Tutorial Sheet – 2 (Unit – I)

1) Solve the following equations by Relaxation Method :
$5x - y + z = 10$; $2x + 4y = 12$; $x + y + 5z = -1$

2) Solve the following Equations by Gauss- Seidal Method:

$10x + 2y + z = 9$; $2x + 20y - 2z = -44$; $-2x + 3y + 10z = 22$

3) Use Crout's Triangularization method to solve the following system of equations :

$3x + 2y + z = 4$; $x + y + 3z = 6$; $2x - y + 6z = 10$

4) Find the inverse of the matrix A by Gauss-Jordan method where

$$A = \begin{bmatrix} 8 & 4 & 3 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$$

5) Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 6 \\ 2 & 5 & 15 \\ 6 & 15 & 46 \end{bmatrix}$ by Cholesky's Method.

6) Find the inverse of the matrix A by Gauss-Elimination method where

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & -1 \\ 3 & 5 & 3 \end{bmatrix}$$

Tutorial Sheet – 3 (Unit-III)

1) Prove that $\Delta \log f(x) = \log\left\{1 + \frac{\Delta f(x)}{f(x)}\right\}$

2) Construct Newton's forward interpolation polynomial for the following data:

x :	4	6	8	10
f(x) :	1	3	8	16

Hence evaluate f(5).

3) Given:

x : 1	2	3	4	5	6	7	8
f(x) : 1	8	27	64	125	216	343	512

Find the value of f(7.5).

4) By means of Newton's divided difference formula , find the value of f(8) and f(15) from the following table:

x :	4	5	7	10	11	13
f(x) :	48	100	294	900	1210	2028

5) For the following table of values, find f(3.5) using lagrange's interpolation with quadratic interpolation polynomial.

x :	1	2	3	4
f(x) :	1	8	27	64

6) Apply Bessel's formula to obtain y_{25} , given

$y_{20} = 2854$, $y_{24} = 3162$, $y_{28} = 3544$, $y_{32} = 3998$.

7) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ by Using

i) Trapezoidal Rule

ii) Simpson's one – third rule

iii) Simpson's three- Eighth rule.

Tutorial Sheet – 4(Unit-IV)

1) Solve $\frac{dy}{dx}$ = x + y Using Taylor's series method. Start from x = 1, y = 0, and carry to x = 1.2 with h = 0.1 .
2) Given that $\frac{dy}{dx}$ = 2 + $\sqrt{xy}$ and y = 1 when x = 1. Find approximate value of y at x = 2 in the steps of 0.2 each using Euler's modified method.
3) Apply Runge-Kutta fourth order method to find an approximate value of y when x = 0.2 given that $\frac{dy}{dx}$ = x + y and y = 1 when x = 0.
4) Apply Picard's Method upto third approximation to solve $\frac{dy}{dx}$ = $2y - 2x^2 - 3$ given that y = 2 when x = 0.
5) Using Adams-Bash fourth predictor – corrector method find y(1.4) given that
   $x^2 \frac{dy}{dx}$ + xy = 1
   y(1) = 1, y(1.1) = 0.996, y(1.2) = 0.986, y(1.3) = 0.972
6) Obtain a relation of the form $y = ab^x$ for the following data by the method of least square.

x	2	3	4	5	6
y	8.3	15.4	33.1	65.2	127.2

ECE-202N	Data Structures & Algorithms					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
Purpose	**To familiarize the students with the concepts of C basics, and basic algorithms using data structures such as searching and sorting, operations of linked lists and basics of trees and graphs.**					
Course Outcomes						
CO1	**Students will be able to recall 'C' basics and design basic algorithms using various data structures**					
CO2	**Students will be able to design implement various searching and sorting algorithms on arrays.**					
CO3	**Students will be able to use pointers to perform various operations of linked lists**					
CO4	**Students will be able to understand the basics of trees and Graphs.**					

Unit-I

Overview of 'C': History, Characters used in 'C", Data Types, 'C' Tokens, Structures of 'C' program,Operators and Expressions, Flow of Control, I/O functions, Arrays, Structures, user defined data types **Introduction:** Overview, Concept of Data Structures, Design of suitable Algorithm, Algorithmanalysis

Unit-II

Arrays - Searching and Sorting: Introduction, 1-D arrays - addressing an element in an array, arraytraversal, insertion and deletion, Multi-D arrays, representation of arrays in physical memory, application of arrays, Searching algorithms: linear search, binary search. Sorting algorithms: selection sort, insertions sort, bubble sort, shell sort, merge sort, radix sort (Algorithm and Analysis).

Stacks and Queues: Stacks operations, Applications of Stacks–Arithmetic operations using Infix toprefix and postfix notations, their conversion and evaluation, Queues operations, Circular, Priority queue and Deque.

Unit-III

Pointers: Introduction, Pointer variables, pointers and arrays, array of pointer, pointers and structures,Dynamic allocation

Linked Lists: Introduction, linked lists, operations on linked lists (Creation, Traversing, Searching,Insertion and Deletion), Circular and doubly linked list, Linked Stacks and Linked Queues, Comparison of sequential and linked storage.

Unit- IV

Trees: Binary Trees, representation of trees (Linear and linked), Traversal of binary trees. Types of binary trees: Expression tree, Binary search tree, Heap tree, threaded binary trees.

Graphs: Introduction, Graph terminology, various representations of Graphs, operations: Insertion,Deletion and traversal.

Text Books:

1. Data Structures using C by A. K. Sharma , Pearson Publication
2. Theory & Problems of Data Structures by Jr. SymourLipschetz, Schaum's outline by TMH.

Reference Books:

1. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub
2. Data Structures and program design in C by Robert Kruse, PHI Expert Data Structures with C by R.B. Patel

Note: Question paper template will be provided to the paper setter.

LECTURE PLAN

LECTURE	TOPIC
L1	Overview of 'C':History, Characters used in 'C", Data Types,
L2	'C' Tokens, Structures of 'C' program,Operators and Expressions,
L3	Flow of Control, I/O functions
L4	Arrays, Structures, user defined data types
L5	Introduction**:** Overview, Concept of Data Structures
L6	Design of suitable Algorithm
L7	Algorithmanalysis
L8	Arrays - Searching and Sorting**:** Introduction, 1-D arrays
L9	Arraytraversal, insertion and deletion
L10	Multi-D arrays, representation of arrays in physical memory, application of arrays, Searching algorithms
L11	Searching algorithms: linear search, binary search
L12	Sorting algorithms: selection sort, insertions sort,
L13	bubble sort, shell sort, radix sort (Algorithm and Analysis).
L14	Merge sort,Stacks and Queues:Stacks operations
L15	Applications of Stacks
L16	Arithmetic operations using Infix toprefix and postfix notations
L17	Their conversion and evaluation,
L18	Queues operations, Circular, Priority queue and Deque.
L19	Pointers**:** Introduction, Pointer variables, pointers and arrays
L20	pointers and structures,Dynamic allocation
L21	Linked Lists**:** Introduction, linked lists,
L22	Operations on linked lists (Creation, Traversing, Searching,Insertion and Deletion),
L23	Circular and doubly linked list
L24	Linked Stacks and Linked Queues
L25	Comparison of sequential and linked storage.
L26	Trees:Binary Trees, representation of trees (Linear and linked)
L27	Traversal of binary trees
L28	Types ofbinary trees: Expression tree
L29	Binary search tree, Heap tree, threaded binary trees
L30	Graphs**:** Introduction, Graph terminology
L31	various representations of Graphs
L32	operations: Insertion,
L33	Deletion and traversal.

TUTORIAL SHEET-1

1.Explain all operator in "C"
2. Define 1-D, 2-D array with an example
3. What is structure? How structure variable are accessed?
4. What are formetted and unformettedInput/Output functions?
5. Describe the use of flow control?
6. What is a data structure? Write difference between primitive data structure and non primitive data structure.

TUTORIAL SHEET-2

1. What is an algorithm? What are best case ,average case and worst case Analysis of an algorithm?
2. What are space complexity and time complexity of an algorithm.
3. What is a stack? Explain all basic operations performed on a stack.
4. Convert following infix expression to postfix notation
(A+B)*D+E/(F+G+D)
(A*B)+(C-D)
5. What is Queue? How it is different from stack?

TUTORIAL SHEET-3

1. What is sparse matrix? How do you representssparsematrix?

2. What is priority Queue?Discuss its any application

3.. Write a recursive procedure to perform Binary search

.

4 What is Tree? Define the following terms
a)Degree
b)Depth
c)path
d)Forest
5.Write an algorithm for linear search and Binary Search .Explain which is the best.
6. Write the PUSH and POP procedure for linked implementation of Stack.

TUTORIAL SHEET-4

1. Write an algorithm to insert a node in linked list at the following positions.
i) In the beginning of the list.
ii) After a specified element
iii) Before a specified element
2 Explain the Radix sort using suitable example.
3 Draw the tree from following order Preorder:
G,B,Q,A,C,F,P,D,E,R,H Inorder:
Q,B,k,C,F,A,G,P,E,D,H,R

4. What is a Graph?Differentiate between an undirected and directed graph.

TUTORIAL SHEET-5

1 write an algorithm and Analyse each of the following sorting algorithm
a) Selection sort b)Insertion Sortc)Bubble sort
2 What is the differences between structure and union?Discuss using suitable examples.
3. Explain Depth first Search algorithm and Breadth first algorithm.
4.How a Queue can be implemented using an array and using linked list?
5.Explain Adjacency matrix representation of a graph..Explain path matrix.

TUTORIAL SHEET-6

1 Write an algorithm for merge sort.Write time complexity of merge sort.
2. Write an algorithm for each of the following
   a) In order traversals
   b) Pre order traversals
   c) Post order traversals
3. Explain following terms
   a) De Queue
   b) Circular Queue
   c) Priority Queue
4 How Stack can be implemented using linked list?
5 What are threaded tree and balanced tree?

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BT-4 / M-18

DATA STRUCTURES AND ALGORITHMS

Paper–ECE–202 N

Time allowed : 3 hours] *[Maximum marks : 75*

Note :- Attempt any five questions in all.

1. (a) What is Data Structure? Explain the linear data structures in brief. 7

   (b) What is conditional operator? Write a program which reads marks of five subjects and then prints whether he/she is eligible for distinction or not using conditional operator. The candidate should get minimum 60% marks in each subject and average marks should be at least 75% for distinction. 8

2. (a) Write the algorithm for binary search when data is stored in an array. Analyze the time complexity of binary search in comparison to sequential search. 7

   (b) Apply the merge sort over the given list of elements 65, 70, 75, 80, 85, 60, 55, 50, 45.

   Explain its algorithm with its complexity. 8

3. (a) Write an algorithm for insertion in the circular queue. Also give its applications. 7

   (b) Consider the following arithmetic expression:

   $-A + B - C/A$ where $A=2$, $B=3$, $C = -4$

   (i) Find the value of expression.

   (ii) Convert the expression into postfix form. 2×4

[Turn over

4. (a) Given the single link list containing any type of data, write the algorithm for obtaining:

   (i) The maximum key value

   (ii) Reverse the ordering of data. 2×4

   (b) Write a program to read a magic square matrix, where magic square is a square matrix of integers such that the sum of every row, the sum of every column and sum of each diagonal are equal. 7

5. (a) What is dynamic allocation? Explain the functions used for dynamic memory allocation. 8

   (b) Compare and contrast the sequential and linked storage. 7

6. (a) Write a function that displays all the elements X in binary search tree such that $K_1 \leq X \leq K_2$ where K_1 and K_2 are two values supplied by user. 8

   (b) Write the algorithm for deletion into heap tree. 7

7. (a) The in-order and pre-order travels of the tree are: "BDFAEC", "ABDFCE". Find out the topology of the tree. 8

   (b) Discuss the usage of expression tree. 7

8. (a) Write Breadth first traversal algorithm for any graph. Derive time complexity. How the time complexity of this is different from t he time complexity of depth first search algorithm? 7

   (b) Show that the BFS algorithm visits all the nodes in connected components of undirected graph including starting nodes. 8

ECE-204N	Electronics Measurements and Instruments					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
Purpose	**To familiarize the students with the concepts of Electronics Measurements like measurement of voltage, current & resistance etc.**					
Course Outcomes						
CO1	**Students will learn the techniques of measurement of resistance using different bridges**					
CO2	**AC Bridges & Voltage Indicating & Recording Devices will be introduced to the students**					
CO3	**Students will be able to recognize the functioning of different Analog & Digital Instruments**					
CO4	**Transducers & Data Acquisition Systems will be introduced to the students**					

Unit-I

Measurement and Error: Functional elements and generalized configuration of a measuringInstrument, Characteristics of instruments, errors in measurements and their statistical analysis.

Measurement of Resistance: Wheat stone bridge, Carey-Foster Bridge, Kelvin double bridge,Measurement of Insulation resistance.

Unit-II

A-C Bridges: Maxwell Inductance bridge. Maxwell Inductance Capacitance Bridge,Anderson's Bridge, Hay's Bridge, De-Sauty's Bridge, Schering's bridge and Wein's bridge.

Voltage Indicating and Recording Devices: Analog voltmeters and Potentiometers, Self balancingpotentiometer and X-Y recorders, Galvanometers - Oscillographs, Cathode - Ray Oscilloscopes, Magnetic Tape Recorders.

Unit-III

Electronic Instruments: Wave analyzer, Distortion meter: Q-meter. Measurement of Op-Ampparameters.

Digital Instruments: Digital Indicating Instruments, Comparison with analog type, digital displaymethods, digital methods of time and frequency measurements, digital voltmeters.

Unit-IV

Transducers: Classification of Transducers, Strain Gauge, Displacement Transducers - CapacitiveTransducers, LVDT, Piezo-electric Transducers, Temperature Transducers – resistance thermometer, Thermocouples and Thermistors, Liquid level measurement Low pressure (vacuum) measurement.

Data Acquisition Systems: A to D and D to A converters, Analog and Digital Data AcquisitionSystems, Multiplexing, Spatial Encoders, Telemetry.

Text Book:

1. A Course in Electrical and Electronics Measurements and Instrumentation: A.K. Sawhney; DhanpatRai& Sons.

Reference Books:

1. Electronics Instrumentation and Measurement Techniques: Cooper W.D &Helfrick A.D.; PHI
2. Doeblin E.O., Measurement Systems: Application & Design, McGraw Hill.

Note: Question paper template will be provided to the paper setter.

Electronics and Communication Department
Electronics Measurements and Instruments
ECE-204N

Lesson Plan:

L1. Introduction to measurement and instrumentation
L2. Generalized configuration of measuring instrument
L3. Characteristics of instruments
L4. Errors in measurements and their statistical analysis
L5. Errors in measurements and their statistical analysis (cont.)
L6. Wheat-stone bridge
L7. Carey-Foster bridge
L8. Kelvin double bridge
L9. Measurement of insulation resistance
L10. Maxwell Inductance bridge
L11. Capacitance bridge
L12. Anderson's bridge
L13. Hay's bridge
L14. De-Sauty's bridge
L15. Schering bridge
L16. Wein's bridge
L17. Introduction to analog voltmeter and potentiometers
L18. Self-balancing potentiometers
L19. X-Y recorder
L20. Galvanometers
L21. Cathode Ray Oscilloscopes
L22. Magnetic tape recorders
L23. Wave analyzer
L24. Distortion meter
L25. Q-meter
L26. Measurement of op-amp parameters
L27. Introduction to digital indicating instruments
L28. Digital display methods
L29. Time and frequency measurements
L30. Digital voltmeter
L31. Transducers, Strain gauge
L32. Displacement transducers – capacitive transducers
L33. LVDT, Piezo-electric transducer
L34. Temperature transducers – Resistance transducers
L35. Thermocouple and Thermister
L36. Liquid level measurement, low pressure measurement
L37. ADC, DAC
L38. Analog and Digital data acquisition
L39. Spatial encoders, Telemetry

Tutorial sheet – 1

Q1. Describe the functional element of measuring instrument?
Q2. What are different types of errors?
Q3. Draw and explain following bridges
   (i) Carey-Foster bridge
   (ii) Kelvin double bridge

Tutorial sheet – 2

Q1. Draw and explain following bridges
   (i) Maxwell inductance bridge
   (ii) Anderson's bridge

Q2. Draw and explain analog voltmeter
Q3. Explain self-balancing potentiometer
Q4. Explain Cathode Ray Oscilloscope

Tutorial Sheet – 3

Q1. Explain Wave Analyzer
Q2. What is Q-meter? Explain in detail.
Q3. Explain one method to measure frequency.
Q4. Explain digital voltmeter

Tutorial Sheet – 4

Q1. How to measure displacement? Explain
Q2. Explain LVDT
Q3. Give details of digital data acquisition.
Q4. Draw and explain spatial encoder.

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Printed Pages : 2

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BT-4 / M-18

ELECTRONIC MEASUREMENTS AND INSTRUMENTS

Paper–ECE–204N

Time allowed : 3 hours] *[Maximum marks : 75*

Note :- *Attempt any **five** questions by selecting at least **one** from each unit.*

Unit–I

1. (a) Explain Carey Foster Bridge method for measurement of Resistance.

   (b) Explain the methods for the measurements of Insulation resistance. 15

2. Write short note on

   (a) The major functional elements of measuring instruments and characteristics of Instruments.

   (b) The various errors that come across during measurement. 15

Unit–II

3. (a) Explain X-Y recorder and magnetic tape recorder.

   (b) Explain CRO with the help of suitable diagram.

4. With circuit and suitable equations explain the working of Hay's Bridge and De-Sauty's Bridge. 15

[Turn over

Unit–III

5. (a) Compare Digital indicating Instruments with Analog type.

   (b) Explain digital methods of time and frequency measurements. 15

6. Draw the circuit diagram of Q meter. Explain its operations and Control. Also explain the procedure to measure Q of a coil from Q meter. 15

Unit–IV

7. With suitable diagrams explain the working of A/D and D/A convertor. 15

8. Write short note on 15

   (a) Strain Gauge

   (b) Thermocouples and Thermistors.

ECE-206N	Electromagnetic Theory					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
Purpose	**To familiarize the students with the concepts of Electric & Magnetic Fields and make them understand the phenomenon of propagation of electromagnetic waves.**					
Course Outcomes						
CO1	**Basics of electrostatics including dielectric properties will be covered.**					
CO2	**Basics of magneto-statics and Maxwell's equations will be covered.**					
CO3	**Fundamentals of Uniform plane waves and their propagation in different mediums will be covered.**					
CO4	**Fundamentals of Transmission Lines and different modes of wave propagation in waveguides will be covered.**					

Unit-I

Electric Field and Current: Introduction to Vectors:Addition, Subtraction, Multiplication &Differentiation. Coordinate Systems: Rectangular, Cylinderical& Spherical. Coulomb's law. Electric Field Intensity, Electric Potential,Field of a Line Charge, Field of a Sheet of Charge, Electric Flux Density,Electric Dipole, Current Density, Continuity of Current, Gauss's Law and Applications, Electric Field Behaviour in Dielectrics, Boundary Conditions at Interface between Two Dielectrics, Method of Images,Capacitance of Two Wire Line, Poisson's and Laplace's Equations, Uniqueness Theorem.

Unit-II

Magnetic Field and Maxwell Equations: Biot - Savart Law. Ampere's law, Magnetic Vectorpotentials, Force on a moving charge, Differential Current Element, Force and Torque on a Closed Circuit, Magnetic Boundary Conditions, the Magnetic Circuit,Faraday's Law, Maxwell's Equations in Point and Integral form for Free space, Good Conductors &Lossy Dielectric for Sinusoidal Time Variations& Static Fields, Retarded potentials.

Unit-III

The Uniform Plane Wave: Plane Waves & its Properties, Wave Equation for Free Space andConducting Medium, Propagation of Plane Waves in LossyDielectrics,GoodDieletrics& Good Conductors. The Poynting Vector and Power considerations, Skin Effect, Reflection of Uniform Plane Waves (Normal & Oblique Incidence).

Unit-IV

Transmission Lines and Waveguides: The Transmission Line Equations, GraphicalMethods, Smith chart, Time-domain and Frequency- domain Analysis, Reflection in Transmission Lines, SWR. TE, TM, TEM waves, TE and TM modes in Rectangular and Circular Waveguides, Cut-off & Guided Wavelength, Wave Impedance and Characteristic Impedance, Dominant Modes, Power Flow in waveguides, Excitation of Waveguides, Dielectric Waveguides.

Text Books:

1. Hayt W H., Engineering Electromagnetics, Tata McGraw Hill, 6th Edition.

References Books:

1 Jordan E C &Balmain K G, Electromagnetic Waves and Radiating Systems, PHI.2 David K. Chang, Field and Waves Electromagnetics, Addison Wesley.

Note: Question paper template will be provided to the paper setter.

L1	Introduction to Vectors: Addition, Subtraction
L2	Multiplication & Differentiation
L3	Coordinate Systems: Rectangular,
L4	Cylindrical
L5	Spherical
L6	Coulomb's law, Electric field intensity, Electric potential, Field of a line charge
L7	Field of a sheet of charge, Electric Flux Density, Electric Dipole
L8	Current Density, Continuity of current
L9	Gauss Law and Applications
L10	Electric field behaviour in dielectrics
L11	Boundary Conditions at interface between two dielectrics
L12	Methods of Images, Capacitance of Two wire line
L13	Poisson's and Laplace's equations, Uniqueness theorem
L 14	Biot -Savart law. Ampere's law,
L 15	Magnetic vector potentials, force on a moving charge,
L 16	Differential current element, force and torque on a closed circuit,
L 17	The boundary conditions, the magnetic circuit,
L 18	Faraday's law, Maxwell's equations in point form and integral form
L19	Good Conductors &Lossy Dielectric for Sinusoidal Time Variations& Static Fields
L20	Retarded potentials
L 21	Plane wave & its properties
L 22	Wave Equation for free space and conducting medium
L23	Propagation of plane waves in Lossy Dielectrics
L 24	Good Dielectrics and Good Conductors
L 25	Poynting vector and power considerations
L26	Skin Effect
L 27	Reflection of Uniform Plane Waves (Normal Incidence)
L 28	Reflection of Uniform Plane Waves (Oblique Incidence)
L29	The Transmission line equations
L30	Graphical methods

L 31	Smith chart
L 32	Time-domain and frequency-domain analysis
L33	Reflection in Transmission Lines
L34	SWP,TE
L35	TM, TEM waves,
L 36	TE and TM modes in rectangular waveguides
L 37	TE and TM modes in circular waveguides
L 38	Cut-off and guide wavelength
L 39	Wave impedance and characteristic impedance,
L40	Dominant modes
L41	power flow in waveguides
L42	Excitation of waveguides
L43	Dielectric waveguides

Tutorial Sheet 1

Q1.State and explain Gauss law physically and mathematically with the help of applications.
Q2.How the method of images will be helpful in calculating electric field without the knowledge of actual charge distribution.
Q3.Derive Poisson and Laplace equation and write them in cylindrical coordinates system and prove Uniqueness theorem.
Q4. Derive the expressions for capacitance of two wire line.

Tutorial Sheet 2

Q1.Write short note on: Magnetic vector potential and retarded Potential.
Q2. Obtain magnetic boundary conditions and interface of two different media.
Q3.With the help of application explainBiot-Savarts Law.
Q4. Write Maxwells equation in point and integral form for free space and good conductors.

Tutorial Sheet 3

Q1.What do you mean by plane wave and its properties.
Q2. Derive the wave equation for free space and conducting medium.
Q3.What is Poynting Theorem and explain its significance? Derive the expression for pointing vector.
Q4.Explain Skin effect and derive expression for skin depth.
Q5. Derive expression for reflection coefficient for plane waves.

Tutorial Sheet 4

Q1.Write short note on smith chart and its applications.
Q2. Derive expression for transmission line equation.
Q3. Explain the concept of TE and TM modes in rectangular and circular waveguides.
Q4.Explain cut off frequency and wavelength of a rectangular waveguide.
Q5.Write short note on power flow in waveguides.

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BT-4 / M-18

ELECTROMAGNETIC THEORY

Paper–ECE–206 N

Time allowed : 3 hours] *[Maximum marks : 75*

Note :- *Attempt any five questions by selecting at least one from each unit.*

Unit-I

1. What do you understand by boundary conditions? Explain with suitable Expressions boundary conditions for electric field. 15

2. (a) State and explain the Gauss's law. Explain the applications of Gauss's law with Example.

   (b) Write short note on Uniqueness Theorem. 15

Unit- II

3. (a) Find the magnetic flux density at a point due to current flowing in a conductor.

   (b) Find the magnetic flux density at a point on the axis of a circular loop of radius 'b' that carries direct current I. 15

4. (a) Starting with Ampere's law, derive Maxwell's equation in integral form. Obtain the corresponding relation by applying the Stoke's theorem.

   (b) Derive the Maxwell's equations from Faraday's law of electromagnetic induction. 15

Unit- III

5. Derive the wave equations from the Maxwell's equations for conducting medium. Also find the expression of attenuation and phase shift constant of wave propagating in conducting medium. 15

6. Find the expression of Energy in electromagnetic wave in terms of Electric field and Magnetic field. 15

Unit- IV

7. (a) Explain the reflection coefficient and voltage standing wave ratio of a transmission line.

   (b) Write short note on Graphical Methods of Transmission line Analysis. 15

8. Write short note on :

   (a) Cut-off & Guided Wavelength in waveguide.

   (b) Wave Impedance and Characteristic Impedance 15

Unit- III

5. Derive the wave equations from the Maxwell's equations for conducting medium. Also find the expression of attenuation and phase shift constant of wave propagating in conducting medium. 15

6. Find the expression of Energy in electromagnetic wave in terms of Electric field and Magnetic field. 15

Unit- IV

7. (a) Explain the reflection coefficient and voltage standing wave ratio of a transmission line.

   (b) Write short note on Graphical Methods of Transmission line Analysis. 15

8. Write short note on :

   (a) Cut-off & Guided Wavelength in waveguide.

   (b) Wave Impedance and Characteristic Impedance 15

ECE-208N	Analog Electronics					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
Purpose	**To familiarize the students with the concepts of various models of BJT's and FET's, multistage amplifiers, concept of feedback and its topologies, oscillators and detail of operational amplifiers with its applications.**					
Course Outcomes						
CO1	**To understand the concept of various amplifiers using BJT and FET and various transistor models**					
CO2	**Describe the frequency response of multistage amplifiers and the detailed concept of feedback topologies.**					
CO3	**To understand the concept of Barkhausen criteria of oscillation and various RC and LC oscillators and their frequency of oscillation.**					
CO4	**To understand the concept of Operational amplifier and its various applications such as current mirror, Schmitt trigger and various op-amp parameters.**					

Unit -I

Amplifier Models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier. Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers.

Unit -II

Transistor Frequency Response: High frequency transistor models, frequency response of singlestage and multistage amplifiers, cascode amplifier. Various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues.

Feedback Topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedbackon gain, bandwidth etc., calculation with practical circuits, concept of stability, gain margin and phase margin.

Unit -III

Oscillators: Review of the basic concept, Barkhausen criterion for oscillators,type of RC oscillators : RC phase shift oscillator , Wien bridge oscillator , LC oscillators : Hartley oscillator, Collpit oscillator , Clapp oscillator ,555 Timer as a monostable and astablemultivibrator.

Unit -IV

Op-Amp Applications: Schmitt trigger and its applications. Current mirror: Basic topology and itsvariants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load. Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR. OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages.

Text Books:

1. Electronic Devices and Circuits by Millman and Halkias, McGraw Hills, New Delhi

Reference Books:

1. Operational Amplifiers and Linear Integrated Circuits by Ramakant A Gayakwad,PHI.
2. A.S. Sedra&K.C.Smith, Microelectronics Circuits, Oxford University Press
3. Robert L. Boylestad& Louis Nashelsky, Electronic Devices & Circuit Theory,Pearson

Note: Question paper template will be provided to the paper setter.

Lecture No.	Topic
1.	Voltage amplifier, current amplifier
2.	Trans-conductance amplifier& trans-resistance amplifier
3.	Biasing scheme for BJT
4.	Biasing scheme for FET
5.	Bias- stability , various configuration such CE/CS
6.	CB/CG , CC/CD & their features
7.	Small signal analysis
8.	Low frequency transistor model
9.	Estimation of voltage gain, input resistance, output resistance
10.	Design procedure for particular specification
11.	Low frequency analysis of multistage amplifier
12.	High frequency transistor model
13.	Frequency response of single stage amplifier
14.	Multistage amplifier
15.	cascade amplifier
16.	Various classes of operation Class-A
17.	Class-B
18.	Class-AB
19.	Class-C
20.	Power efficiency & linearity issues
21.	Voltage series feedback
22.	Current series feedback
23.	Voltage shunt , Current shunt
24.	Effect of feedback on gain , bandwidth etc.
25.	Calculation with practical circuit
26.	Concept of stability
27.	Gain margin & phase margin
28.	Review of basics concept : Barkhausen criterion for oscillator
29.	RC phase shift oscillator
30.	Wein bridge oscillator
31.	Hartlay oscillator
32.	Collipts oscillator , Clapp oscillator
33.	555 Timer as Monostable&Astablemultivibrator
34.	Schmitt trigger & its application
35.	Current mirror: basic topology& its variants
36.	Output resistance & minimum sustainable volatge
37.	Minimum usable load
38.	Differential amplifier
39.	Basic structure & principle of operation, Calculation of differential gain
40.	Common mode gain, CMRR & ICMR
41.	Op -amp design
42.	Design of differential amplifier for a given specification
43.	Design for gain stages & output stages

Tutorial Sheet 1

Q1.Explain various configurationsfor BJT& MOSFET.
Q2 Explain voltage divider biasing for BJT in detail.
Q3.Explain self biasing for FET in detail.
Q4. Caculate voltage gain ,currentgain,input resistance and output resistance for BJT.
Q5. Explain Frequency response for multi stage amplifier..

Tutorial Sheet 2

Q1.What are the linearity issues in class B &Coperations?.
Q2.What is Cascade amplifier and it's applications?
Q3.Explain Voltage shunt amplifier in detail
Q4. Analyze the effect of feedback on any practical amplifier circuit.

Tutorial Sheet 3

Q1.Explain Barkhausen criteria for sustained oscillation.
Q2. Explain RC & LC Oscillator with example.
Q3.Explain the working of 555 timer and it's application.
Q4. Explain monostable and astable mode of a multivibrator.

Tutorial Sheet 4

Q1.What is current mirror.Explainit's VI Characteristics.
Q2. Explain the operation of differential amplifier.
Q3. Describe CMRR & ICMR.
Q4. What are the various design specification of an operational amplifier.

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BT-4 / M-18

ANALOG ELECTRONICS

Paper–ECE–208 N

Time allowed : 3 hours] *[Maximum marks : 75*

Note :- *There are total **Eight** questions. The candidate is required to attempt **five** questions selecting **one** question from each unit.*

Unit–I

1. (a) Explain common collector configuration and its characteristic with suitable block diagram. 7

   (b) Discuss low frequency model of BJT and its derivation. 8

2. (a) Define current gains α and β. How are they related? 8

   (b) A transistor has current gain of 0.99 when used in common base (CB) configuration. How much will be the current gain of this transistor in common emitter (CE) configuration? 7

Unit–II

3. (a) A class B amplifier using a supply of Vcc=30V and driving a load of 16 determine maximum input power, output power and transmission dissipation. 7

   (b) Explain with neat sketches, how power amplifiers are classified. 8

4. (a) Explain feedback topology and write expression for gain of topology. 8

(b) An amplifier without feedback has a voltage gain of 50, input resistance of 1 KΩ and output resistance of 2.5 KΩ. Calculate the input resistance of the current-shunt negative feedback amplifier using the above amplifier with a feedback factor of 0.2 7

Unit–III

5. (a) Discuss the Barkhausen stability criteria of oscillator. 7

(b) In a transistor Colpitt's oscillator we have L=100μH, L_{RFC}= 0.6mH, C_1 = 0.001μF. find (a) Operating Frequency (b) Feedback Fraction (c) minimum gain to sustain oscillation and emitter Resistance if Rc = 2.5kΩ. 8

6. Explain working of RC phase shift oscillator. In an RC phase shift oscillator, if $R_1 = R_2 = R_3$ = 200KΩ and $C_1 = C_2 = C_3$ = 100 pico farad. Find (a) the frequency of oscillations. (b) Draw a circuit using complementary symmetry and discuss its advantages. 15

Unit–IV

7. Discuss dual input and unbalanced output differential amplifier and calculate its input and output resistance and its CMRR. 15

8. Explain the following: 15

(a) Schmitt Trigger

(b) Current Mirror

ECE-210N	Computer Architecture & Organization					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**1**	**0**	**75**	**25**	**100**	**3 Hr.**
Purpose	**To familiarize the students with the concepts of basic structure of computer hardware & software, Control & processor design and memory & system organisation.**					
Course Outcomes						
CO1	**To understand the concept of basics of computer hardware & software**					
CO2	**To understand the concept of control design & processor design**					
CO3	**To familiarize with the concept of various memory systems.**					
CO4	**To familiarize with the concept of system organisation.**					

Unit-I

Basic Structure of Computer Hardware and Software: Introduction to basic computer architecture,register transfer, bus and memory transfers, arithmetic, logic and shift micro operations.

Central Processing Unit: Introduction, general register organization, stack organization, instructionformats, addressing modes, data transfer and manipulation, program control, RISC, Macros and Subroutines.

Unit-II

Control Design: Micro programmed control, control memory, address sequencing, micro programexample, design of control unit, Hardwired Control: design methods, Multiplier Control Unit, CPU Control unit.

Processor Design: Decimal arithmetic unit–BCD adder, BCD subtraction, decimal arithmeticoperations, ALU design, Forms of Parallel processing classification of Parallel structures, Array Processors, Structure of general purpose Multiprocessors.

Unit-III

Memory Organization:

Memory hierarchy, main memory, auxillary memory, associative memory,cache memory, virtual memory, memory management, hardware multiprocessor architectures and their characteristics, interconnection structures, Random access memories: semiconductor RAMS, Serial – access Memories – Memory organization, Main Memory Allocation.

Unit-IV

System Organization:

Pipeline and Vector Processing: Parallel processing, pipelining, arithmetic pipeline, instruction pipeline, RISC pipeline, vector processing, array processors, Input-output Organisation: Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupt,DMA, IOP serial communication.

Text Books:

1. Morris Mano, “Computer System Architecture”, PHI.
2. J.F. Heys, “Computer Organization and Architecture”, TMH.

Reference Books:

1. J. Hennessy and D. Patterson, Computer Architecture A Quantitative Approach, 3rd Ed, Morgan Kaufmann, 2002.

Note: Question paper template will be provided to the paper setter.

LECTURE PLAN

Lecture	Topic
L1	Introduction to basic computer architecture
L2	Register transfer, bus and memory transfers
L3	Arithmetic, logic and shift micro operations
L4	Central Processing Unit: Introduction
L5	General register organization, stack organization
L6	Instruction formats, addressing modes
L7	Data transfer and manipulation
L8	Program control
L9	RISC, Macros and Subroutines.
L10	**Control Design**: Micro programmed control
L11	Control memory, address sequencing
L12	Micro program example, design of control unit
L13	Hardwired Control: design methods
L14	Multiplier Control Unit, CPU Control unit
L15	**Processor Design:** Decimal arithmetic unit – BCD adder, BCD subtraction
L16	Decimal arithmetic operations
L17	ALU design
L18	Forms of Parallel processing classification of Parallel structures
L19	Array Processors, Structure of general purpose Multiprocessors
L20	**Memory Organization:** Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory
L21	Memory management
L22	Hardware multiprocessor architectures and their characteristics, Interconnection structures
L23	Random access memories: semiconductor RAMS
L24	Serial access Memories
L25	Memory organization, Main Memory Allocation.
L26	**System Organization:** Pipeline and Vector Processing: Parallel processing
L27	Pipelining, arithmetic pipeline, instruction pipeline
L28	RISC pipeline, vector processing, array processors
L29	Input-output Organisation: Peripheral devices, input-output interface
L30	Asynchronous data transfer, modes of transfer
L31	Priority interrupt
L32	DMA, IOP serial communication.

Tutorial Sheet 1

Q1. Explain Flynn's classification of computers.

Q2. Perform the (+21)+(-16) and (-23)+(+13) arithmetic operations using 2's complement representation for negative numbers

Q3. What is register transfer language? With suitable examples, explain the representation of instructions in register transfer language and assembly language.

Q4. What is a stack? Discuss its organization.

Q5. Write micro operations for ADD R1, R2.

Tutorial Sheet 2

Q1. Define microinstruction and microprogram. Write an example for microprogram.

Q2. What is hardwired control? Discuss its advantages and disadvantages.

Q3. What is sequencer? Mention its functions.

Q4. Design a 4-bit adder/subtractor circuit and explain its function.
Q5. Design a digital circuit that performs the four logic operations of AND, OR, Exclusive-OR and NOT. Show the logic diagram of one typical stage

Tutorial Sheet 3

Q1. Explain the memory hierarchy with neat diagram.
Q2. What is meant by paging? Explain paging technique with an example.
Q3. What is the need for memory in computers? Discuss different types of memories.
Q4. Explain the Cache memory? Explain how blocks of main memory are addressed through the cache blocks.
Q5. Explain the auxiliary memory

Tutorial Sheet 4

Q1. List and briefly explain various input-output data transfer schemes.
Q2. What is an Input–Output Processor (IOP)? Discuss its use.
Q3. What is parallel processing? What are its advantages? Explain.
Q4. Explain the implementation of instruction pipelining

Tutorial Sheet 5

Q1. Draw the flowchart for Booth's algorithm for multiplication of signed 2's complement numbers and explain with an example.
Q2. With a neat diagram, describe DMA transfer in a computer system.
Q3. With examples explain the Data transfer, Logic and Program Control Instructions.
Q4. What are the various addressing modes? Give suitable examples of each.

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BT-4 / M-18

COMPUTER ARCHITECTURE AND ORGANISATION

Paper–ECE–210N

Time allowed : 3 hours] *[Maximum marks : 75*

Note :- *Attempt any **five** questions, selecting at least **one** question from each unit.*

Unit–I

1. (a) What is micro operation? Explain in detail with the help of any micro operation example. 5

   (b) What is tri state buffer? What is its significance? Explain in detail a bus system using tri state buffer. Also explain how binary addition-subtraction can be done with the help of single circuit with the help of neat diagram. 10

2. What is an instruction Format? Give example. Discuss in detail two address, one address and zero address instructions by taking example of your choice. Also state why Stack addressing is called as Zero addressing. 15

Unit–II

3. What is Hardwired control? Discuss its multiplier control unit and CPU control unit in detail. 15

4. What is an Array Processor? Discuss the structure and forms of general purpose Multiprocessors. 15

Unit–III

5. What are Semi conductor memories? Differentiate between static RAM and dynamic RAM. Also discuss advantages and disadvantages of both. 15

6. Write short notes on:- 15

   (a) Associative Memory

   (b) Virtual Memory

Unit–IV

7. What is Pipelining? Discuss what is Arithmetic pipelining. Calculate the speedup ratio if tp = 20 ns, k = 4 segments and executes n = 100 tasks in a sequence. 15

8. What is DMA? Discuss in detail with the help of DMA controller and DMA transfer. 15

ECE-212N	Data Structures Lab					
Lecture	**Tutorial**	**Practical**	**Practical**	**Sessional**	**Total**	**Time**
0	**0**	**3**	**60**	**40**	**100**	**3 Hr.**

Course Outcomes	
CO1	**Students will be able to recall 'C' basics and design basic algorithms using various data structures**
CO2	**Students will be able to design implement various searching and sorting algorithms on arrays.**
CO3	**Students will be able to use pointers to perform various operations of linked lists**
CO4	**Students will be able to understand the basics of trees and Graphs.**

List of Experiments:

1. Write a program to print a 2D array.
2. Write a program to find the factorial of an n^{th} number using recursion.
3. Write a program to print Fibonacci sequence.
4. Using clock() function of time.h header file, compare the timings of linear search and binary search for an 1D array of 1000 elements
5. Compare the timings of the following sorting algorithm
    a. Bubble sort
    b. Selection sort
    c. Insertion sort
6. Implement stacks using arrays for the following user defined functions
    a. Size of stack
    b. Number of elements in the stack
    c. Pop with underflow check
    d. Push with overflow check
7. Implement queues using arrays for the following user defined functions
    a. Size of queue
    b. Number of elements in the queue
    c. Insert an element with overflow check
    d. Delete an element with underflow check
8. Implement linked list for the following user defined functions
    a. Create a node and Insert an element
    b. Delete an element and its node
    c. Find the location of a given value
    d. Print the list in forward or reverse order
9. Traverse a tree and print the elements in
    a. Preorder
    b. Post order
    c. In order
10. Traverse a graph and print the elements using
    a. Depth first search
    b. Breadth first search

ECE-214N	Electronics Measurements and Instruments Lab					
Lecture	**Tutorial**	**Practical**	**Practical**	**Sessional**	**Total**	**Time**
0	**0**	**3**	**60**	**40**	**100**	**3 Hr.**
Course Outcomes						
CO1	**To measure the unknown inductance and capacitance using various AC bridges.**					
CO2	**To measure the unknown frequency using different frequency bridges.**					
CO3	**To understand the concept of caliberation of energy meter and B-H curve of different magnetic materials.**					
CO4	**To understand the concept conversion of voltmeter into ammeter using potentiometer.**					

List of Experiments:

1. To measure the unknown Inductance in terms of capacitance and resistance by using Maxwell's Inductance bridge.
2. To measure unknown Inductance using Hay's bridge.
3. To measure unknown capacitance of small capacitors by using Schering's bridge.
4. To measure 3-phase power with 2-Wattmeter method for balanced and unbalanced bridge.
5. To measure unknown capacitance using De-Sauty's bridge.
6. To measure unknown frequency using Wein's frequency bridge.
7. To measure unknown low resistance by Kelvin's Double bridge.
8. To test the soil resistance using Meggar (Ohm meter).
9. To calibrate Energy meter using standard Energy meter.
10. To plot the B-H curve of different magnetic materials.
11. To calibrate the Voltmeter using Crompton Potentiometer.
12. To convert the Voltmeter into Ammeter using Potentiometer.
13. Insulation testing of cables using Digital Insulation Tester.

ECE-216N	Analog Electronics Lab					
Lecture	**Tutorial**	**Practical**	**Practical**	**Sessional**	**Total**	**Time**
0	**0**	**3**	**60**	**40**	**100**	**3 Hr.**
Course Outcomes						
CO1	**To design and calculate the gain , frequency response etc of the various configuration of transistor amplifier.**					
CO2	**Describe the frequency response of and test the performance of various LC and RC oscillators.**					
CO3	**To understand and design the various applications of 555 timer such as astable andmonostablemultivibrator.**					

List of Experiments:

1. To Design a simple common emitter (CE) amplifier Circuit using BJT and find its gain and frequency response.

2. To Design a differential amplifier using BJT and calculate its gain and frequency response

3. To design RC coupled Single stage BJT amplifier and determination of the gain ,frequency response, input and output impedances.

4. To design a BJT Emitter follower and determination of the gain, input and output impedances .

5. To design and test the performance of BJT-RC Phase shift Oscillator for $f0 \leq 10$ KHz.

6. To design and test the performance of BJT – Hartley Oscillators for RF range $f0 \geq 100$KHz.

7. To design and test the performance of BJT – Colpitt Oscillators for RF range $f0 \geq 100$KHz.

8. To design an astablemultivibrator using 555 timer.

9. To design a monostablemultivibrator using 555 timer.

10. To design Schmitt trigger using op-amp and verify its operational characteristics.

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MPC-202N	Energy Studies (B.Tech All Branches Semester III/IV)					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
3	**-**	**-**	**75**	**25**	**100**	3
Purpose	**To make the students conversant with the basics concepts and conversion of various form of Energy**					
Course Outcomes						
CO1	**An overview about Energy , Energy Management, Audit and tariffs**					
CO2	**Understand the Layout and working of Conventional Power Plants**					
CO3	**Understand the Layout and working of Non Conventional Power Plants**					
CO4	**To understand the role of Energy in Economic development and Energy Scenario in India**					

UNIT-I

Introduction: Types of energy, Conversion of various forms of energy, Conventional and Non-conventional sources, Need for Non-Conventional Energy based power generation.
Energy Management: General Principles of Energy Management, Energy Management Strategy.
Energy Audit & Tariffs: Need, Types, Methodology and Approach.

UNIT-II

Conventional Energy sources: Selection of site**,** working of Thermal, Hydro, Nuclear and Dieselpower plants and their schematic diagrams & their comparative advantages- disadvantages.

UNIT-III

Non Conventional Energy sources: Basicprinciple, site selection and power plant layout of Solarenergy, photovoltaic technologies, PV Systems and their components, power plant layout of Wind energy, layout of Bio energy plants ,Geothermal energy plants and tidal energy plants.

UNIT-IV

Energy Scenario: Lay out of power system, Role of Energy in Economic development, energydemand, availability and consumption, Commercial and Non-commercial energy, Indian energy scenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future.

Text Books:

1. Energy Studies-Wiley and Dream tech India
2. Soni, Gupta, Bhatnagar: Electrical Power Systems – DhanpatRai& Sons
3. NEDCAP: Non Conventional Energy Guide Lines
4. G.D. Roy :Non conventional energy sources
5. B H Khan :Non Conventional energy resources - McGraw Hill
6. Meinel A B and Meinal M P,Addison :Applie
7. d Solar Energy- Wesley Publications
8. George Sutton :Direct Energy Conversion – McGraw

Lecture Plan

S.No.	
L1	Types of energy, Conversion of various forms of energy
L2	Conventional and Non conventional sources, Need for non conventional energy based power generation
L3	Energy Management: General Principles of Energy Management, Energy management Strategy
L4	Energy Audit: Need, Types, Methodology & Approach
L5	Selection of site, working of thermal power plant their schematic diagrams &
L6	their comparative advantages, disadvantages
L7	Selection of site, working of Hydro power plant their schematic diagrams &
L8	their comparative advantages, disadvantages
L9	Selection of site, working of Nuclear power plant their schematic diagrams &
L10	their comparative advantages, disadvantages
L11, L12	Selection of site, working of Diesel power plant their schematic diagrams & their comparative advantages, disadvantages
L13	Basic principle, site selection of solar energy power plant
L14	Photovoltaic technologies, PV Systems and their components
L15	Wind energy power plant
L16	Bio energy power plant
L17	Geo Thermal energy power plant
L18	Tidal energy power plant
L19	MHD power plant
L20	Layout of power system, Role of energy in Economic development
L21	Energy demand, availability and consumption
L22	Commercial and non commercial energy
L23	Indian energy scenario
L24	Long term energy scenario, energy pricing
L25	Energy sectors reforms in India
L26	Energy strategy for the future
L27	Revision
L28	Revision
L29	Last year papers discussion
L30	Last year papers discussion

Tutorial Sheets -1

1. What do you mean by conventional & non -conventional sources of energy . Explain with example.
2. Explain the General Principles of Energy Management.
3. What are the various forms of energy? How the conversion of energy from one place to other takes place.
4. Write a note on Energy Audit & Tariffs.

Tutorial Sheets -2

1. Explain the working of Thermal and Nuclear Power Plant.
2. Sketch the schematic of Diesel power plant and also discuss it's working.
3. Compare Thermal, Hydro, Nuclear and Diesel power plants.

Tutorial Sheets -3

1. What are the various factors influencing the selection site for the power plants.

2. Explain PV Systems and their components.
3. Discuss the power plant layout of wind energy and bio energy plant.
4. Wite a note on Geothermal energy plants and tidal energy plants

Tutorial Sheets -4

1. Discuss the role of energy in economic development.
2. What do you mean by energy demand .Discuss it's availability and consumption.
3. Elaborate energy strategy for the future in India
4. Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Commercial and Non-commercial energy, Indian energy scenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future