GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)
(Deemed to be University, Estd. u/s 3 of UGC Act 1956) VISAKHAPATNAM
***HYDERABAD *BENGALURU**
Accredited by NAAC with 'A+' Grade

REGULATIONS AND SYLLABUS

of

B.Sc (Mathematics ,Electronics and Computer Science)

(W.e.f 2020-21 Admitted batch)

Website: www.gitam.edu

B.Sc (Mathematicss, Electronics and Computer Science) REGULATIONS
(W.e.f. 2020-21 admitted batch)

ADMISSION

1.1 Admission into B.Sc (Maths, Electronics and Computer Science) program of GITAM University is governed by GITAM University admission regulations.

ELIGIBILITY CRITERIA

2.1. A pass in Intermediate with a minimum aggregate of 50% marks / a pass in any with minimum aggregate of 50% marks along with Mathematics ,Physics and Chemistry or equivalent thereof.

2.2. Admission into B.Sc (Mathematics, Electronics and Computer Science)will be based on an All India GITAM Science Admission Test (GSAT) conducted by GITAM University and the rule of reservation, wherever applicable.

CHOICE BASED CREDIT SYSTEM

Choice Based Credit System (CBCS) is introduced with effect from the admitted Batch of 2015-16 based on UGC guidelines in order to promote:

Student Centered Learning Cafeteria approach
Inter-disciplinary learning
Learning goals/ objectives and outcomes are specified leading to what a student should be able to do at the end of the program.

STRUCTURE OF THE PROGRAM

4.1 The Program Consists of

Foundation Courses (compulsory) which give general exposure to a Student in communication and subject related area.

Core Courses (compulsory).

Discipline centric electives which are supportive to the

discipline

give expanded scope of the subject give their disciplinary

exposure nurture the student skills

Open electives are of general nature either related or unrelated to the discipline.

Practical Proficiency Courses, Laboratory and Project work.

4.2 Each course is assigned a certain number of credits depending upon the number of contact hours (lectures/tutorials/practical) per week.

4.3 In general, credits are assigned to the courses based on the following contact hours per week per semester.

One credit for each Lecture / Tutorial hour per week. One credit for two hours of Practical per week.
Eight credits for project if applicable.

4.4 The curriculum of the Four semesters B.Sc. MECS program is designed to have a total of **122** credits for the award of B.Sc. MECS degree.

MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be in English.

REGISTRATION

Every student has to register himself / herself for each semester individually at the time specified by the Institute / University.

7. ATTENDANCE REQUIREMENTS

7.1. A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend that end - semester examination and he/she will not be allowed to register for subsequent semester of study. He/she has to repeat the semester along with his / her juniors.

7.2. However, the Vice Chancellor on the recommendation of the Principal / Director of the Institute/School may condone the shortage of attendance to the students whose attendance is between 66% and 74% on genuine grounds and on payment of prescribed fee.

8. EVALUATION

8.1 The assessment of the student's performance in a Theory course shall be based on two components: Continuous Evaluation (40 marks) and Semester-end examination (60 marks).

8.2 A student has to secure an aggregate of 40% in the course in continuous and semester end examinations the two components put together to be declared to have passed the course, subject to the condition that the candidate must have secured a minimum of 24 marks (i.e. 40%) in the theory component at the semester-end examination.

8.3 Practical/ Viva voce etc. course are completely assessed under Continuous Evaluation for a maximum of 100 marks and a student has to obtain a minimum of 40% to secure Pass Grade. Details of Assessment Procedure are furnished below in Table 1.

Table 1: Assessment Procedure

S. No.	Component of assessment	Marks allotted	Type of Assessment	Scheme of Examination
1	Theory	40	Continuous evaluation	(i) Three mid semester examinations shall be conducted for 15 marks each. The performance in best two shall be taken into consideration. (ii) 5 marks are allocated for quiz. (iii) 5 marks are allocated for assignments.
		60	Semester-end examination	The semester-end examination shall be for a maximum of 60 marks.
	Total	100		
2	Practicals	100	Continuous evaluation	60 marks for performance, regularity, record/ and case study. Weightage for each component shall be announced at the beginning of the semester. 40 marks (30 marks for experiment(s) and 10 marks for practical Viva-voce.) for the test conducted at the end of the Semester conducted by the concerned lab Teacher.
	Total	100		

RETOTALING & REVALUATION

9.1 Retotaling of the theory answer script of the semester-end examination is permitted on request by the student by paying the prescribed fee within one week after the announcement of the results.

9.2 Revaluation of the theory answer scripts of the semester-end examination is permitted on request by the student by paying the prescribed fee within one week after the announcement of the result.

PROVISION FOR ANSWER BOOK VERIFICATION & CHALLENGE EVALUATION:

10.1 If a student is not satisfied with his/her grade after revaluation, the student can apply for, answer book verification on payment of prescribed fee for each course within one week after announcement of revaluation results.

10.2 After verification, if a student is not satisfied with revaluation marks/grade awarded, he/she can apply for challenge valuation within one week after announcement of answer book verification result/ two weeks after the announcement of revaluation results, which will be valued by the two examiners i.e., one Internal and one External examiner in the presence of the student on payment of prescribed fee. The challenge valuation fee will be returned, if the student is succeeded in the appeal with a change for a better grade.

11. SUPPLEMENTARY EXAMINATIONS & SPECIAL EXAMINATIONS:

11.1 The odd semester supplementary examinations will be conducted on daily basis after conducting regular even semester examinations in April/May.

11.2 The even semester supplementary examinations will be conducted on daily basis after conducting regular odd semester examinations during November/December

11.3 A student who has completed his/her period of study and still has "F" grade in final semester courses is eligible to appear for Special Examination normally held during summer vacation.

12. PROMOTION TO THE NEXT YEAR OF STUDY

12.1 A student shall be promoted to the next academic year only if he/she completes the academic requirements of 60% of the credits till the previous academic year.

12.2 Whenever there is a change in syllabus or curriculum he/she has to continue the course with new regulations after detention as per the equivalency established by the BoS to continue his/her further studies.

13. BETTERMENT OF GRADES

13.1 A student who has secured only a pass or second class and desires to improve his/her class can appear for betterment examinations only in 'n' (where 'n' is no.of semesters of the program) theory courses of any semester of his/her choice, conducted in summer vacation along with the Special Examinations.

13.2 Betterment of Grades is permitted 'only once', immediately after completion of the program of study.

REPEAT CONTINUOUS EVALUATION:

14.1 A student who has secured 'F' grade in a theory course shall have to reappear at the subsequent examination held in that course. A student who has secured 'F' grade can improve continuous evaluation marks upto a maximum of 50% by attending special instruction classes held during summer.

14.2 A student who has secured 'F' grade in a practical course shall have to attend Special Instruction classes held during summer.

14.3 A student who has secured 'F' grade in a combined (theory and practical) course shall have to reappear for theory component at the subsequent examination held in that course. A student who has secured 'F' grade can improve continuous evaluation marks upto a maximum of 50% by attending special instruction classes held during summer.

14.4 The RCE will be conducted during summer vacation for both odd and even semester students. Student can register a maximum of 4 courses. Biometric attendance of these RCE classes has to be maintained. The maximum marks in RCE be limited to 50% of Continuous Evaluation marks. The RCE marks are considered for the examination held after RCE except for final semester students.

14.5 RCE for the students who completed course work can be conducted during the academic semester. The student can register a maximum of 4 courses at a time in slot of 4 weeks. Additional 4 courses can be registered in the next slot.

14.6 A student is allowed to Special Instruction Classes (RCE) 'only once' per course.

15. GRADING SYSTEM

15.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.

Table 2: Grades & Grade Points

Sl.No.	Grade	Grade Points	Absolute Marks
1	O (outstanding)	10	90 and above
2	A+ (Excellent)	9	80 to 89
3	A (Very Good)	8	70 to 79
4	B+ (Good)	7	60 to 69
5	B (Above Average)	6	50 to 59
6	C (Average)	5	45 to 49
7	P (Pass)	4	40 to 44
8	F (Fail)	0	Less than 40
9	Ab. (Absent)	0	-

15.2 A student who earns a minimum of 4 grade points (P grade) in a course is declared to have successfully completed the course, subject to securing an average GPA (average of all GPAs in all the semesters) of 5 at the end of the Program to declare pass in the program.

Candidates who could not secure an average GPA of 5 at the end of the program shall be permitted to reappear for a course(s) of their choice to secure the same.

16. GRADE POINT AVERAGE

16.1 A Grade Point Average (GPA) for the semester will be calculated according to the formula:

$$GPA = \frac{[C*G]}{C}$$

Where C = number of credits for the course,
G = grade points obtained by the student in the course.

16.2 To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student's performance in all the courses taken, in all the semesters up to the particular point of time.

16.3 CGPA required for classification of class after the successful completion of the program is shown in Table 3.

Table 3: CGPA required for award of Class

Class	CGPA Required
First Class with Distinction	≥ 8.0*
First Class	≥ 6.5

Second Class	≥ 5.5
Pass Class	≥ 5.0

* In addition to the required CGPA of 8.0 or more the student must have necessarily passed all the courses of every semester in first attempt.

ELIGIBILITY FOR AWARD OF THE B.Sc (Maths, Electronics and Computer Science) DEGREE

17.1 Duration of the program: A student is ordinarily expected to complete B.Sc Maths, Electronics and Computer Science program in six semesters of three years. However, a student may complete the program in not more than four years including study period.
However, the above regulation may be relaxed by the Vice Chancellor in individual cases for cogent and sufficient reasons.

17.2 A student shall be eligible for award of the B.Sc (Maths, Electronics and Computer Science) Degree if he / she fulfills all the following conditions.
Registered and successfully completed all the courses and projects if applicable.
Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of his/her study within the stipulated time.
Has no dues to the Institute, hostels, Libraries, NCC / NSS etc, and No disciplinary action is pending against him / her.

17.3 The degree shall be awarded after approval by the Academic Council.

18. DISCRETIONARY POWER:

Not with standing anything contained in the above sections, the Vice Chancellor may review all exceptional cases, and give his decision, which will be final and binding.

Program Educational Objectives

PEO-1: Acquire knowledge with understanding of various devices
PEO-2: Implement of devices with circuit diagrams for its characteristics
PEO-3: Design of circuits for suitable application
PEO-4: Simulation by development of algorithm or program for output and Compare performance of devices

Program Outcomes

PO-1: To understand the basic circuits and explore the fundamental concepts of electronics

PO-2: To identify, formulate, solve, and analyse the problems in various disciplines of electronics.

PO-3: To carry out experiments to understand the circuits and concepts of Electronics

PO-4: To design and manage electronic systems or processes that conforms to a given specification circuits
PO-5: To use techniques, skills, and modern technological/scientific/software/tools for professional practices

PO-6: Providing a hands-on learning experience such as in designing the circuit and analyzing through simulation

Program Specific Outcomes
PSO-1: Students will understand in detail the concepts of electronics
PSO-2: Students perform experiments independently and individually with different hardware and software compilers
PSO-3: Gain expertise with experiments performed and verify with online resources available performing experiment with simulation
PSO-4: To motivate the students to pursue higher education in reputed institutions and acquire a job efficiently in diverse fields

B.Sc. – Scheme of Instruction

I Semester

B.Sc. (Mathematics, Electronics & Computer Science)

Course Code	Subject	Category	Instruction Hours/week		Credits	Scheme of Instruction		
			L	P		CE	SE	Total Marks
SFC 101	English for Communication– I	AECC	3	0	2	40	60	100
SPH 101	Differential Calculus	CC	4	0	4	40	60	100
SPH 107	Basic Circuit Theory	CC	4	0	4	40	60	100
SPH 109	Object Oriented Programming in C++	CC	4	0	4	40	60	100
LABS								
SPH 121	Differential Calculus Tutorial	PPC	2	0	2	100	--	100
SPH 127	Basic Circuits Lab	PPC	0	4	2	100	--	100
SPH 129	Object Oriented Programming in C++ Lab	PPC	0	4	2	100	--	100

II Semester

B. Sc. (Mathematics, Electronics & Computer Science)

Course Code	Subject	Category	Instruction Hours/week		Credits	Scheme of Instruction		
			L	P		CE	SE	Total Marks
SFC 102	Environmental Science	AECC	3	0	2	40	60	100
SPH 102	Differential Equations	CC	4	0	4	40	60	100
SPH 108	Electronic Devices & Circuits	CC	4	0	4	40	60	100
SPH 110	Data Structures And File Processing	CC	4	0	4	40	60	100
LABS								
SPH 120	Differential Equations Tutorial	PPC	2	0	2	100	--	100
SPH 126	Electronic Devices & Circuits Lab	PPC	0	4	2	100	--	100
SPH 128	Data Structures And File Processing Lab	PPC	0	4	2	100	--	100

III SEMESTER
B. Sc. (Mathematics, Electronics & Computer Science)

Course Code	Subject	Category	Instruction Hours/week		Credits	Scheme of Instruction		
			L	P		CE	SE	Total Marks
SPH 201	Real Analysis	CC	4	0	4	40	60	100
SPH 207	Digital Electronics	CC	4	0	4	40	60	100
SPH 209	Design and Analysis of Algorithms	CC	4	0	4	40	60	100
SFC203	English for Communication– II	AECC	3	0	2	40	60	100
LABS								
SPH 221	Real Analysis Tutorial	PPC	2	0	2	100	--	100
SPH 227	Digital Electronics Lab	PPC	0	4	2	100	--	100
SPH 229	Design and Analysis of Algorithms Lab	PPC	0	4	2	100	--	100
Choose any one								
SSE 275	Logic and sets	SEC	2	0	2	100	--	100
SSE 277	Computer Graphics	SEC	2	0	2	100	--	100
SSE 279	Electrical Circuits and Network Skills - I	SEC	2	0	2	100	--	100

IV SEMESTER
B. Sc. (Mathematics, Electronics & Computer Science)

Course Code	Subject	Category	Instruction Hours/week		Credits	Scheme of Instruction		
			L	P		CE	SE	Total Marks
SPH 202	Algebra	CC	4	0	4	40	60	100
SPH 208	Analog & Digital IC Applications	CC	4	0	4	40	60	100
SPH 210	Operating Systems	CC	4	0	4	40	60	100
LABS								
SPH 220	Algebra Tutorial	PPC	2	0	2	100	--	100
SPH 226	Analog & Digital IC Applications Lab	PPC	0	4	2	100	--	100
SPH 228	Operating Systems Lab	PPC	0	4	2	100	--	100
Choose any one								
SSE 276	Vector calculus	SEC	2	0	2	100	--	100
SSE 278	Number theory	SEC	2	0	2	100	--	100
SSE 280	E-Commerce	SEC	2	0	2	100	--	100
SSE 282	Basic Instrumentation Skills - I	SEC	2	0	2	100	--	100

V SEMESTER
B. Sc. (Mathematics, Electronics & Computer Science)

Course Code	Subject	Category	Instruction Hours/week		Credits	Scheme of Instruction		
			L	P		CE	SE	Total Marks
Choose any one								
SPH361	Matrices	DSE	4	0	4	40	60	100
SPH363	Statics & Dynamics	DSE	4	0	4	40	60	100
SPH365	Linear Algebra	DSE	4	0	4	40	60	100
Choose any one								
SPH371	Microprocessors (Intel 8085)	DSE	4	0	4	40	60	100
SPH373	Electronic communications	DSE	4	0	4	40	60	100
SPH375	Consumer Electronics	DSE	4	0	4	40	60	100
Choose any one								
SPH391	Data Mining	DSE	4	0	4	40	60	100
SPH393	Cryptography	DSE	4	0	4	40	60	100
LABS								
Choose any one (@ corresponding to theory course)								
SPH333@	Matrices Tutorial	PPC	2	0	2	100	--	100
SPH335@@	Statics & Dynamics Tutorial	PPC	2	0	2	100	--	100
SPH337@@@	Linear Algebra Tutorial	PPC	2	0	2	100	--	100
Choose any one ($corresponding to theory course)								
SPH 327$	Microprocessors lab	PPC	0	4	2	100	--	100
SPH 329$$	Electronic Communications lab	PPC	0	4	2	100	--	100
Choose any one (& corresponding to theory course)								
SPH343&	Data Mining Lab	PPC	0	4	2	100	--	100
SPH345&&	Cryptography Lab	PPC	0	4	2	100	--	100
Choose any one								
SSE 375	Theory of Equations	SEC	2	0	2	100	--	100
SSE 377	Probability and Statistics	SEC	2	0	2	100	--	100
SSE 379	Combinatorial Optimization	SEC	2	0	2	100	--	100
SSE 381	Electrical Circuits and Network Skills - II	SEC	2	0	2	100	--	100

VI SEMESTER
B. Sc. (Mathematics, Electronics & Computer Science)

Course Code	Subject	Category	Instruction Hours/week		Credits	Scheme of Instruction		
			L	P		CE	SE	Total Marks
Choose any one								
SPH362	Numerical methods	DSE	4	0	4	40	60	100
SPH364	Complex analysis	DSE	4	0	4	40	60	100
SPH366	Linear programming	DSE	4	0	4	40	60	100
Choose any one								
SPH372	Microcontrollers& Applications	DSE	4	0	4	40	60	100
SPH374	VLSI Design	DSE	4	0	4	40	60	100
Choose any one								
SPH392	Information security	DSE	4	0	4	40	60	100
SPH394	Database applications	DSE	4	0	4	40	60	100
SPH396	Computer networks	DSE	4	0	4	40	60	100
LABS								
Choose any one (@ corresponding to theory course)								
SPH334@	Numerical methods Tutorial	PPC	2	0	2	100	--	100
SPH336@@	Complex analysis Tutorial	PPC	2	0	2	100	--	100
SPH338@@@	Linear programming Tutorial	PPC	2	0	2	100	--	100
Choose any one ($$ corresponding to theory course)								
SPH328$$	Microcontrollers & Applications Lab	PPC	0	4	2	100	--	100
SPH330$$	VLSI design Lab	PPC	0	4	2	100	--	100
Choose any one (& corresponding to theory course)								
SPH346&&	Database Applications Lab	PPC	0	4	2	100	--	100
SPH348&&	Computer Networks Lab	PPC	0	4	2	100	--	100
Choose any one								
SSE 372	Basic instrumentation skills-II	SEC	2	0	2	100	--	100
SSE 378	Graph Theory	SEC	2	0	2	100	--	100
SSE 380	Concepts of Ethical Hacking	SEC	2	0	2	100	--	100

SPH392	**Minor Project: (From Mathematics /Physics/Electronics)**	PPC	0	6	3	100	-	100

B. Sc. (Mathematics, Electronics & Computer Science)

SEMESTER-I
SFC: 101 English for Communication– I

Hours per week: 3
Credits: 2

End Examination: 60 Marks
Sessionals: 40 M

Preamble: This course has been designed to enrich students' listening, speaking, reading and writing, abilities so they can pursue their personal, academic and career goals through the acquisition and improvement of English language skills. Students engage with the text while reinforcing what is learnt.

Objective:

To develop right pronunciation
To enable students to use English in day-to-day communication To facilitate the use of language without grammatical errors
To expose them to prose and poetry and enable them to learn language through simple literature.
To build advanced vocabulary To improve reading skills

UNIT- I **The eyes are not here – Ruskin Bond**

Pronunciation: Consonants,**Grammar:** Nouns, **Vocabulary:**Roots forms of words**, Spelling:** Correcting wrong spelling, **Punctuation:**Capitalisation,
Conversation and Role Play: Introducing oneself in formal or social contexts,

Learning outcomes:

By the end of the course, the student will be able to:

Develop creative communication skills
Understand and use consonant sounds in phonemic language Use correct spelling and capitalization.
Introduce oneself in the appropriate diction, style and tone.

UNIT- II **Work Brings Solace – APJ Abdul Kalam**

Pronunciation: Monophthongs **Grammar:** Pronouns,
Vocabulary: Prefixes & Suffixes, **Spelling:** using 'un' and 'dis' to complete antonyms**,**
Punctuation: Capitalisation,
Conversation and Role Play: starting a conversation/controlling a conversation**, Learning outcomes:**

By the end of the course, the student will be able to:

perceive the content in the academic text and recognize the organization and purpose of reading a text.
determine the meaning of words using roots, *prefixes, and suffixes*. engage in discussion on everyday topics
. *open* and keep *conversations* going. interrupt and end *conversations* appropriately

UNIT –III **Bangle Sellers – Sarojini Naidu**

Pronunciation: Diphthongs **Grammar:** Helping verbs & auxiliary verbs, **Vocabulary:** Homophones, Homographs, Homonyms **Punctuation:** comma & full stop, **Conversation:** Describing one's college and course of study, **Writing:** Paragraph writing/

Descriptive Writing,

Learning outcomes:
By the end of the course, the student will be able to:

Comprehend and interpret poetic diction
define '*diphthong*'; recognize and identify *diphthongs* in speech and text Demonstrate the use of homophones, homographs, and homonyms in writing. Recognize and use comma and *full stop* in appropriate places in the text.
Speak about his/her course of study and describe the college he/she is studying in with the right diction and tone.
Construct a paragraph on familiar and academic topics using a topic sentence

UNIT -IV **The Merchant of Venice (Extract) – William Shakespear**
Pronunciation: varied pronunciation of some letters of the alphabet**Grammar:** Main verbs Tenses, **Vocabulary:** Collocations, **Punctuation:** Question mark and Exclamation mark, **Conversation:** Leaving a message and taking an appointment

Learning outcomes:
By the end of the course, the student will be able to:

appreciate the varied uses of language in Shakespearean Play
Use present, past and future tenses with appropriate time markers.
Be aware of the different types of collocations and use them appropriately Recognize and use question mark and *exclamation mark* in appropriate places in the text.
Leave a message and take an appointment in a professional manner

UNIT- V **Vocabulary building:** Synonyms, Antonyms, One Word Substitutes, Phrasal Verbs, Idiomatic Expressions, Foreign Phrases

Learning outcomes:
By the end of the course, the student will be able to:

Demonstrate understanding of synonyms and antonyms in active learning Strengthen their vocabulary base in one word substitution
Use phrasal verbs in their day to day communication
Familiarize with commonly used idiomatic expressions and use them correctly Recognize frequently used foreign words and phrases related to areas of immediate relevance.

Text Books:
Part – 1 (English for Enhanced Competence (by Sumit Roy, A.Karunakar, A.Aruna Priya)

Supplementary Reading:
Communicative skills for Technical Students, M. Faratullah. Orient Longman. Rizvi,MAshraf. **Effective**

Technical Communication. McGraw - Hill.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –I
SPH 101: Differential Calculus

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble: Differential Calculus provides information about limits, continuity, differentiation and partial differentiation. The focus of the course is to study the limits and continuity, applications of partial differentiation, tracing of curves in Cartesian coordinates and Polar coordinates and mean value theorem on differentiation.

Objective: To introduce
Basic properties of continuity and differentiation
Partial differentiation and application of Euler's theorem Tracing of curves
and to find tangents and normals Rolle's theorem and mean value theorem
Expansion of the function using taylor's series and Maclaurin's series

UNIT-I
Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem.

Learning Outcomes:
The student will be able to:
Define the basic properties of limits and continuity
Explain different types of discontinuities
Define differentiability of functions and successive differentiation

UNIT-II
Partial differentiation, Euler's theorem on homogeneous functions.

Learning Outcomes:
The student will be able to:
Define partial differentiation
Evaluate problems on partial differentiation
Apply Euler's theorem on homogeneous functions with the help of partial differentiation

UNIT-III
Tangents and normals, Curvature, Asymptotes, Singular points, Tracing of curves, Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates.

Learning Outcomes:
The student will be able to: Define tangents and normals Explain curvature and asymptotes Trace the parametric curves Define polar coordinates

UNIT-IV
Rolle's theorem, Mean Value theorems, Taylor's theorem with Lagrange's and Cauchy's forms of remainder

Learning Outcomes:

The student will be able to:

Explain Rolle's theorem with an application

Explain mean value theorems with some examples

Evaluate Taylor's theorem with Lagrange's and Cauch's forms of remainder

UNIT-V

Taylor's series, Maclaurin's series of sin x, cos x, e^x, log(l+x), $(l+x)^m$, Maxima and Minima, Indeterminate forms.

Learning Outcomes:

The student will be able to: Explain

Taylor's series Explain Maclaurin's series

Evaluate Maxima and minima of a function

Text Books :

Elements of Real Analysis , Shanthi Narayan and Dr. M.D. Raisinghania,S.Chand& Co. A Text Book of B.Sc. Mathematics Volume-II , V.Venkateswara Rao , N Krishna Murthy,

B.V.S.S. Sarma and S. Anjaneya Sastry, S.Chand& Co.

Calculus Single Variable, Howard Anton, Irl Bivens and Stephen Davis,

Calculus and Analytic Geometry, George B. Thomas, Jr. and Ross L. Finney, Pearson Education, 2007, 9th edition.

Course Outcomes:

On completion of the course, the student is able to

1.On completion of the course, the student is able to Applying different type of operators and understanding coordinate systems

2.Understand motion of particles and interpret its conservation laws

3.Realize rigid bodies for its equation of motion

4.Analyze equation of motion of strings and bars

5.Understand the concept of relativity

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –I

SPH 121 Differential Calculus Tutorials

Hours per week: 2 Continuous Evaluation: 100 Marks
Credits: 2

Problems on Limits and Continuity

Problems on Partial differentiation

Problems on Euler's theorem

Problems on Tangents and normals

Tracing of curves

Problems on Rolle's theorm

Problems on Mean value theorems

Problems on Taylor's theorem

Problems on Taylor's and Maclaurin's series

Problems on Maxima and Minima

Course Outcomes:
On successful completion of this course, students will be able to:

Evaluate limits and continuity of a function Solve problems on
partial differentiation
Explain applications of Rolle's theorem, Mean value theorems, Taylor's and Maclaurin's
series
Define maxima and minima of functions

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –I

SPH 107: Basic Circuit Theory

Hours per week: 4
Credits: 4

End Examination: 60 Marks
Sessionals: 40 Marks

Preamble: Objective:

Understanding of Basics of Electronic Circuits and mathematical and graphical solutions to Electrical Circuits.
To explain the basics of Circuit theory and circuit analysis

UNIT -I

A.C Circuit Fundamentals

The sinusoidal voltage and current-Average and R.M.S values- phasor representation- T operator, polar and rectangular forms of complex numbers, AC applied to RC, RL and RLC circuits, concept of impedance-power factor in a.c circuits, numerical problems.

Passive Networks

Concept of ideal as well as practical voltage and current sources, Regulation Kirchhoff's current law – Kirchhoff's voltage law - Method of solving A.C and D.C circuits by Kirchhoff's laws - Loop analysis - Nodal analysis - numerical problems.

Learning Outcomes:

Understanding of the fundamentals of AC, generation of AC and impedance of a circuit Able to solve the currents and voltages in resistive circuit using nodal and mesh analysis
methods

UNIT - II

Network Theorems

Maximum power transfer theorem -Super position theorem - Thevenin's theorem - Norton's theorem - Milliman theorem-Reciprocity theorem- problem solving applications for all the theorems.

Learning Outcomes:

Understand the distribution of currents and voltages in electrical circuits
Able to apply network theorems to solve the resultant currents and voltages in circuit

UNIT - III

RC And RL Circuits

Transient response of RL and RC circuits with step input, Time constants.
Frequency response
of RC and RL circuits, their action as low pass and high pass filters. Passive differentiating and integrating circuits .numerical problems.

Learning Outcomes:

Understand the Switching characteristics of reactive components like Capacitors and Inductors
Understanding the Frequency response of RL and RC networks and their functioning as Filters and wave shaping networks and also able to solve the numerical problems

UNIT - IV

Resonance in Electric Circuits

Resonance in series and parallel R- L- C circuits .Resonant frequency, Q- factor,Bandwidth, selectivity, Comparison of series and parallel resonance, Tank circuit- LCoscillations. Numerical problems.

Learning Outcomes:

Understand the concept of electrical Resonance and their applications
Able to analyze the RLC circuit and obtain graphical solutions for the Resonance of a circuit

UNIT - V

Cathode Ray Oscilloscope

CRT and its working, Electron gun, electrostatic andmagnetostatic deflections. Deflection sensitivity, Fluoroscent screen, CRO block diagram, Measurement of voltage, frequency and phase, Function generator-Block diagram and its description.

Learning Outcomes:

Understand the basic working principle and internal blocks of CRO Instrument Basic understanding of measurement of voltage, current, frequency and phase of waveforms

Course Outcomes:

Understanding of **How** to generate AC and List the parameters and **recall** the concept of impedance (L1).

Apply the concept of Kirchhoff laws to solve the circuit currents and **make use of** network theorems (L3).

Understand **what** is the time response of RC networks and **apply** to solve the transient analysis problems (L1 and L3)

Analysis of RLC series and parallel circuit, understand the frequency selection circuit and **Compare** series and parallel resonance (L4 and L5)

Understanding of **How** the CRO works and **make use of** CRO for measuring the frequency voltage and phase of AC (L1 and L3)

Text Books:

Electric circuits by David A. Bell 7thedition Oxford higher education Robert L Boylestad, "Introductory circuit analysis", Universal Book Stall
Fifth edition,2003.
Circuit analysis byP.Gnanasivam-Pearson education.

References:

Networks, lines&fields by Ryder-PHI
Circuits and Networks-A.Sudhakar and Shyammohan-TMH
Unified electronics (Circuit analysis and electronic devices) by Agarwal-Arora.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –I

SPH 127: Basic Circuits Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

Preamble: Objective: Understand and realize the working of Instruments and Measurement of Voltages and currents in the electrical Circuits and results analysis. To Design and analyze the electrical circuits.

List of Experiments

Measurement of D.C & A.C voltage, frequency using CRO. Thevenin's

theorem - Verification.

Norton's theorem - Verification.

Maximum power transfer theorem - Verification.

CR Circuit - Frequency response (Low pass and High pass) LR Circuit-

Frequency response (Low pass and High pass)

LCR Series resonance circuit - frequency response, Determination of Q and Band width LCR parallel

resonance circuit - frequency response, Determination of Q and Band width. Verification of Kirchhof's

laws.

Course Outcomes:

Understand **How** Filters work, **classify** the filters **Distinguish** the high pass, low pass filters and Series and parallel resonance (L1, L2 and L3).

Make use of CRO for the AC measurements and **apply** the Kirchhoff's laws and Network theorems to solve the currents and voltages (L3).

Analyze the electrical circuits using network theorems (L4).

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –I

SPH 109: Object Oriented Programming in C++

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble: C++ is a general purpose programming language and widely used now a days for competitive programming. It has imperative, object-oriented and generic programming features. C++ runs on lots of platform like Windows, Linux, Unix, Mac etc.

To develop logic through algorithms and flowcharts.

To understand the difference between procedure oriented programming and object oriented programming.

To learn the basic concepts , applications of OOPS and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements;

To develop the ability to implement features of object oriented programming to solve real world problems using Inheritance, data abstraction, encapsulation and Polymorphism.

UNIT- I

Programming Concepts: Algorithm and its characteristics, pseudo code / flow chart Assignment statement, input/output statements, if, if then else statements.

Introduction to structured programming: Data types- simple data types, floating data types, character data types, string data types, arithmetic operators and operator precedence, variables and constant declarations, expressions, operators, preprocessor directives, creating a C++ program.

Learning Outcomes

Show the logic involved in solving a problem through algorithms and flowcharts.(L1) Describe the basic concepts of object oriented programming. (L2)

Develop and run simple C++ programs.(L3)

Choose appropriate data type and operators in programs. (L3)

UNIT- II

Input/output statements, Expressions, Control Structures if and if … else statement, switch and break statements. For, while and do – while, break and continue statement, nested control statements.

Learning Outcomes

By the end of this Unit, the student will be able to Select the
right control structure (L1)

Develop applications by using appropriate concepts. (L3)

UNIT -III

Local and global variables, static and automatic variables, enumeration type, Function Prototyping, Function Overloading, one dimensional array, two dimensional array, character array.

Learning Outcomes

By the end of this Unit, the student will be able to

What is a local variable and what is a Global variable (L1) Explain the need of static and Automatic variables.(L2) Develop the concept of overloading functions.(L2)

Utilize the one dimensional and two dimensional arrays in programming.(L3)

UNIT- IV

Object Oriented Concepts: objects, classes, methods, constructors, Destructor, Abstraction, encapsulation, Overloading Unary Operators, Rules for Operator Overloading.

Learning Outcomes

By the end of this Unit, the student will be able to Illustrate the concept of classes and objects (L3)

Develop real world applications by using appropriate concepts. (L3) Use unary operators for overloading.(L3)

UNIT- V

Inheritance – Single, Multiple, Multi Level, Hierarchical, Hybrid Inheritance,static and dynamic binding, Pointers, Virtual Functions and Polymorphism.

Learning Outcomes

By the end of this Unit, the student will be able to

Explain the need of reusability concept with inheritance.(L2) Summarize different types of inheritance.(L2)

Identify the need of pointer.(L1)

Course Outcomes:

Upon completion of the course, the student is able to

Able to emphasize the special features of C++ language.(L4) Examine the working of Control structures in C++ programs.(L4) Able to develop and implement classes and objects. (L3)

Understand various Inheritance mechanisms, operator overloading ,polymorphism and apply in applications.(L2)

Text Book:

Object Oriented Programming with C++ by E.Balagurusamy, Tata MC Graw Hill, 6th edition, 2013.

Reference Books:

Mastering C++ by Venugopal K R, Rajkumar Buyya , Tata Mc Graw Hill, 2nd edition, 2013.

Object Oriented Programming using C++ by B.Chandra, Narosa Publications, 2005.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER II

SPH 129 : Object Oriented Programming in C++ Lab

Hours per week: 4 Continous Evaluation :100 Marks
Credits :2

Write a C++ program to demonstrate the usage of data types & operators. Write a C++

program to demonstrate Class and Object.

Write a C++ program to demonstrate Control structures. Write a C++

program to demonstrate operator overloading.

Write a C++ program to demonstrate function overloading using Arrays. Write a C++

program to demonstrate different types of Arrays.

Write a C++ program to demonstrate Constructors and Constructor overloading. Write a C++

program to demonstrate Copy constructor and Destructor.

Write a C++ program to demonstrate Single Inheritance, Multiple Inheritance.

Write a C++ program to demonstrate Multi level Inheritance, Hierarchal Inheritance. Write a C++

program to demonstrate Pointers.

Write a C++ program to demonstrate Run time polymorphism and Compile time Polymorphism.

Text Book:

Object Oriented Programming with C++ by E.Balagurusamy, Tata MC GrawHill, 6th edition, 2013.

Reference Book:

Mastering C++ by Venugopal K R, Rajkumar Buyya , Tata Mc Graw Hill, 2nd edition, 2013

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER II

SFC 102: Environmental Science

Hours per week: 3 End Examination: 60 Marks
Credits: 2 Sessionals: 40 Marks

Preamble: The dynamic changes in the Environment require as precise understanding to adjust to the changes. This paper provides a base line understanding of Environmental changes problems.

Objectives: To enable student understand importance of environmental science.
To introduce student to ecosystem and its process, sources and effects of Environmental Pollution.
To sensitize student regarding day to day social & environmental issues.

UNIT -I

The multidisciplinary nature of environmental studies: Definition, Scope and Importance, Need for Public awareness.

Natural Resources: Classification, Renewable and Non Renewable Resources.

Renewable Resources: Forest, Water and Energy Resources.

Non Renewable Resources: Mineral, Food and Land resources, (Uses, reasons for over- utilization and effects)

Learning Outcome: By the end of the unit the student
Will understand importance of Environmental Science & Natural Resources

UNIT -II

Eco-system: Structure of an Ecosystem, Producers, consumers and de-composers, Structure of Terrestrial Ecosystems (Forest Ecosystem, Grassland Ecosystem, and Desert Ecosystem) and Aquatic Ecosystems (Pond Ecosystem and Ocean Ecosystem).

Function of an ecosystem: Food chains, food web and ecological pyramids, Energy flow in the ecosystem.

Learning Outcome: By the end of the unit the student Will
appreciate ecosystems and its process

UNIT -III

Environmental Pollution: Causes, effects and control measures of Air, Water, Soil pollution, Thermal pollution and Nuclear hazards and Municipal solid waste management. **Environmental problems:** Global Environmental Problems, Green house effect, Ozone layer depletion, acid rains and Climate change.

National Environmental Problems: Deforestation, Causes and Effects, Environmental Problems associated with dams, mining and environmental effects. **Learning Outcome:** By the end of the unit the student
Will gain knowledge as sources and effects of Environmental Pollution

UNIT -IV

Social Issues and the Environment: Environmental ethics, Issues and possible solutions. Waste land reclamation, Consumerism and waste products.

Environmental Legislation: Environment Protection Act, Air Act, Water Act, Wildlife Protection act and The Biological Diversity Act. Disaster definition, Classification, Disaster Management: Explosion, Earth quake, Hazardous materials spill/release.

Learning Outcome: By the end of the unit the student.
Will get exposure towards social problems and gain understand on environmental legislation.

UNIT -V

Human Population and the Environment: Population growth, variation among nations, Population explosion, Family welfare program. Environment and human health, human rights, value education, HIV/AIDS, Women and Child welfare, Role of information technology in environment and human health.

Learning Outcome: By the end of the unit the student

Will be to explain patterns of population growth and problems associated with it.

Course Outcomes:

Will understand importance of Environmental Science & Natural Resources Will appreciate ecosystems and its process

Will gain knowledge as sources and effects of Environmental Pollution

Will get exposure towards social problems and gain understand on environmental legislation

Will be to explain patterns of population growth and problems associated with it

Text Books:

Text Book of Environmental studies for Undergraduate courses by Erach Bharucha, Orient Black Swan. 2nd edition.

Environmental Science: A Global Concern by William P. Cunningham and Baraba Woodworth Saigo, McGraw-Hill, 8th edition.

A text book of Environmental Science by P. C. Joshi and Namita Joshi, A.P.H. Publishing Corporation.

A text book of Environmental Science by Arvind Kumar, A.P.H. Publishing Corporation.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –II
SPH 102: Differential Equations

Hours per week: 4 End Examination: 60
Credits: 4 Marks
Sessionals: 40 Marks

Preamble: Many physical laws and relations can be expressed mathematically in the form of differential equations. Thus it is natural that this course opens with the study of differential equations and their solutions. Indeed, many engineering problems appear as differential equations. The main objectives of this course are twofold: the study of ordinary differential equations and their most important methods for solving them and the study of modeling.

Objective:
To Identify the type of a given differential equation and apply the appropriate analytical technique for finding the solution of first order and higher degree ordinary differential equations.
To Solve second order and higher order linear differential equations. To Solve non-homogeneous differential equations
To Solve the Simultaneous differential equations and Total differential equations. To formulate first order partial differential equations
To solve the non-linear first order Partial differential equation by Charpit's method To classify second order partial differential equations into elliptic, parabolic and hyperbolic
To transform the second order partial differential equations to Normal forms

UNIT-I
First order exact differential equations. Integrating factors, rules to find an integratingfactor. First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations.
Learning Outcomes:
Distinguish between linear, nonlinear, partial and ordinary differential equations. Recognize and solve an exact differential equation.
Recognize and solve a non-exact differential equation by finding integrating factor.
Recognize and solve First order higher degree equations solvable for x, y, p Evaluate basic application problems described by first order differential equations

UNIT-II
Basic theory of linear differential equations, Wronskian, and its properties.Solving a differential equation by reducing its order. Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation,Simultaneous differential equations, Total differential equations.

Learning Outcomes:

Use the existence theorem for boundary value problems to determine uniqueness of solutions.

Use the Wronskian condition to determine if a set of functions is linearly independent.

Determine the complete solution of a homogeneous differential equation with constant coefficients by examining the characteristic equation and its roots.

Evaluate the complete solution of a non-homogeneous differential equation as a linear combination of the complementary function and a particular solution.

Determine the complete solution of a non-homogeneous differential equation with constant coefficients by the method of undetermined coefficients.

Find the complete solution of a differential equation with constant coefficients by variation of parameters and also solve Cauchy-Euler Equation Evaluate Simultaneous differential equations and total differential equation

Evaluate basic application problems described by second order linear differential equations with constant coefficients.

UNIT-III

Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations

Learning Outcomes:

Recognize the concept of linear and non-linear partial differential equations. Recognize the concept of order and degree of partial differential equations Construct a first order partial equation by elimination of arbitrary constants Construct a first order partial equation by elimination of arbitrary functions of specific functions Construct a first order partial equation by Elimination of Arbitrary Functions Construct a physical or biological model to a first order partial differential equations

UNIT-IV

Linear partial differential equation of first order, Lagrange's method, Charpit's method.

Learning Outcomes:

Distinguish between general solution and complete solution Recognize and solve Lagrange's equation

Find Lagrange's multipliers

Recognize and solve first order non linear partial differential equation by Charpit's method.

Recognize and reduce the first order partial different equation to different forms

UNIT-V

Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.

Learning Outcomes:

. Recognize the second order partial differential equations into elliptic, parabolic and hyperbolic
Construct the different example for elliptic, parabolic and hyperbolic Transform the second order partial differential equations into normal form
Solve basic application problems like one dimensional wave equation and heat equation

Text Books:

A Text Book of B.Sc. Mathematics Volume-I, V.Venkateswara Rao , N Krishna Murthy, B.V.S.S. Sarma and S. Anjaneya Sastry, S.Chand& Company Ltd., New Delhi. Differential Equation , Shepley L. Ross3rd Edition, John Wiley and Sons, 1984 Elements of Partial Differential Equations,Ian N Sneddon, International Edition, 1967, Dover Publications.

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B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –II

SPH 120 Differential Equations Tutorial

Hours per week: 2 Continuous Evaluation: 100 Marks
Credits: 2

Solving first order and first degree differential equations Solving first order

and higher degree differential equations Solving linear differential equations

with constant coefficients Solving differential equations with variation of

parameters Solving Cauchy-Euler equation

Solving Simultaneous differential equations Soving total

differential equations

Formation of first order partial differential equations Problems using

Lagrange's method

Problems using Charpit's method

Classification of second order partial differential equations

Course Outcomes:
On successful completion of this course, students will be able to:

Evaluate first order and first degree differential equations
Solve problems on first order and higher degree differential equations Explain linear differential equations with constant coefficients Explain the methods to solve partial differential equations
Classify second order partial differential equations

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –II

SPH 108: Electronic Devices &Circuits

Hours per week: 4 End Examination: 60
Marks Credits: 4 Sessionals: 40 Marks
Preamble: Understanding of Basics of Electronic Circuits and mathematical and graphical solutions to Electrical Circuits.
Objective: To explain the basics of Electronic devices and applications

UNIT -I

Junction Diodes

PN junction diode - P-N junction theory-depletion region, barrier potential, working in forward& reverse bias condition, Junction capacitance, Diode current equation (no derivation),Effect of temperature on reverse saturation current, V-I Characteristics, Zener and Avalanche Break down, Zener diode - V-I characteristics, regulated power supply using Zener diode, Varactor Diode, Tunnel Diode - Principle, Working& Applications.

Learning Outcomes:

Understanding of Basic Semiconductor physics, doping and formation of PN Junction Understand the V-I characteristics of different types of Junction diodes and Applications

UNIT - II

Bipolar Junction Transistors (BJT)

PNP and NPN transistors, current components in BJT, BJT static characteristics (Input and Output), Early effect, CB,CE,CC Configurations (Cut-off, Active and saturation regions) Determination of h- parameters from the characteristics, Concept of amplification-voltage and currentamplifier.The C.E amplifier-analysis and parameters, Transistor as a switch.

Learning Outcomes:

Understand the Basic Construction and working principle of BJT
Able to Connect the BJTs in different configurations and their analysis as amplifier.

UNIT - III

Field Effect Transistors & UJT:

FET - Construction - Working – Drain &Transfer characteristics -Parameters of FET - FET as an amplifier - MOSFET-Enhancement MOSFET-Depletion MOSFET-Construction& Working-Drain characteristics of MOSFET -Comparison of FET&BJT and JFET &MOSFET. UJT Construction- working, V-I Characteristics.

Learning Outcomes:

Understand the Basic working, V-I characteristics of FETs and their applications and also able to differentiate the BJT, FET and MOSFET.
Understanding the working principle and applications of UJT

UNIT - IV

Photo Electric Devices

Structure and operation, characteristics, spectral response and applications of LDR, Photo Voltaic cell, Photo diode, Photo transistor, LED and LCD.

Learning Outcomes:

Understand the applications of Semiconductor devices as Photo devices Understand the V-I characteristics of Different photo electric devices.

UNIT - V

Power Supplies

Rectifiers - Half wave, full wave and bridge rectifiers - Efficiency - Ripple factor – Regulation.Types of filter- Choke input (Inductor) filter –Shunt capacitor filter -L-Section and π section filters - Three terminal fixed voltage I.C regulators (78XX and 79XX) - Principle and working of switch mode power supplies (SMPS).

Learning Outcomes:

Basic Understanding of AC to DC conversion and different methods of conversion Designing of IC regulated power supply and analysis

Course Outcomes:

Understanding basics of basic semiconductor physics **Recall** previous knowledge, understand **how** the depletion layer forms and **explanation** capability on the working of different diodes characteristics (L1 and L2)

Understanding the basic construction of semi conductor devices like BJT and FET, **classification** of Devices and **compare** the VI characteristics of BJT and FET in different configurations (L2).

Understand the basic optical devices operation and **how** they work, and how to **make use of** photo electronic devices as sensors and **apply** the knowledge in real time applications (L1, L3).

Understand the **classification** of Rectifiers; identify the merits and demerits of different filters. **Apply** the basic rectifier, **Analyze** and compare the working of SMPS (L2 L4).

Text Books:

Electronic Devices and Circuits David A.Bell, Fifth edition. Oxford university press
A.P Malvino, "Principles of Electronics", TMH, 7th edition
T.F. Bogart, Beasley, "Electronic Devices and circuits", Pearson Education, 6th Edition
N.N. Bhargava, D.C Kulshreshta, and S.C Gupta ,"Basic Electronics and Linear Circuits" TMH T.L.Floyd, "Electronic Devices and circuits", PHI, fifth edition
V.K. Metha, "Principle of Electronics", S CHAND Co. New edition
Godse A.P., Bakshi U.A (1st edition), Electronics Devices, Technical Publications rune.

References:

I. Sedha R.S., A TextBook of Applied Electronics, S. Chand & Company Ltd.
Jacob Millman and Christos C. Halkias (2008) Integrated Electronics, Tara Mcgraw-Hill
Robert L. Boylestad, Louis Nashelsky (10th edition). Electron Devices and Circuit Theory, Dorling Kindersley (India Pvt. Ltd.)
Unified Electronics (Circuit analysis and electronic devices) by Agarwal-Arora.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –II

SPH 126: Electronic Devices &Circuits Lab

Hours per week: 6 Continuous Evaluation: 100 Marks
Credits: 2

Preamble: Objective: Understand and realize the working of Semiconductor Devices and graphical representation of V-I Characteristics and also results analysis. To design and obtain the V-I characteristics of Semiconductor devices

List of Experiments

V-I Characteristics of Junction Diode. V-I

Characteristics of Zener Diode.

Regulated Power Supply using Zener Diode. IC Regulated

Power Supply

BJT input and output Characteristics (CE Configuration) and determination of h- parameters.

Characteristics of UJT.

Characteristics of JFET LDR

characteristics

Characteristics of L and π section filters using full wave rectifier.

Course Outcomes:
Understand the characteristics of Basic semiconductor devices and **Analyze** the results (L4)
Make use of IC regulators to **construct** the Regulated power supply (L3 and L4) Able to **identify** the different kind of semiconductor devices, and can be able to distinguish the input and out characteristics and **analyze** the data to get the h-
parapets (L3 and L4)

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –II

SPH 110: Data Structures and File Processing

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble: In the field of Computer Science, data structures provides an efficient way to handle data efficiently. With a single variable it is an unfeasible task to store huge amount of data. Storing data in a file provides a flexible approach where data is stored in a disk.

Objective:

Enable the student to learn about linear and non linear data structures. Understand searching and sorting algorithms.

Learn to store data in a sequential file and access the data. Use direct file access and Indexed sequential file organization.

UNIT-I

Fundamental Concepts: Introduction to Data Structures, Types of Data Structures.

Linear Data Structure Using Sequential Organization: Arrays, Arrays as an Abstract Data Type, Memory Representation and Address Calculation, Class Array, Pros and Cons of Arrays.

Searching and Sorting: Sequential Search, Binary Search, Types of Sorting, General Sort Concepts, Bubble Sort, Insertion Sort, Selection Sort.

Learning Outcomes:

By the end of this Unit, the student will be able to Infer Linear and Nonlinear data structures. (L2)

Apply sequential search and Binary search on data sets. (L2) Infer the general sorting methods. (L4)

Stacks: Concept of Stacks and Queues, Stacks, Stack Abstract Data Type, Representation of Stacks Using Arrays.

Queues: Concept of Queues, Queue Abstract Data Type, Realization of Queues Using Arrays, Circular Queue, Dequeue, Priority Queue.

By the end of this Unit, the student will be able to develop stack using arrays. (L3)

interpret application of stack. (L2) build queue using array. (L3)

make use of circular queue, deque, priority queue. (L3)

UNIT-III

Linked Lists: Introduction, Linked List, Realization of Linked Lists, Dynamic Memory Management, Linked list Abstract Data Type, Doubly Linked List, Circular Linked List. **Trees:** Introduction, Types of Trees, Binary Tree, Binary Tree Abstract Data Type, Realization of a Binary Tree, Binary Tree Traversal.

Learning Outcomes:
By the end of this Unit, the student will be able to
utilize the concept of dynamic memory allocation.(L3) develop doubly linked list, circular linked list. (L3) Inspect Binary tree traversal algorithms. (L4)

Hashing: Introduction, Hash Functions, Collision Resolution Strategies, Extendible Hashing, Dictionary.
Indexing and Multiway Trees: Introduction, Indexing, Types of Search Trees- Multiway Search Tree, B-Tree, B+ Tree.

By the end of this Unit, the student will be able to outline
Hash Functions. (L2)
develop B tree and B+ Trees. (L3)

UNIT-V

Files: Introduction, External Storage Devices, File Organization, Files Using C++, Sequential File Organization, Direct Access File Organization, Indexed Sequential File Organization. (10)

Learning Outcomes:
By the end of this Unit, the student will be able to
experiment with sequential file organization and random file organization. (L3) demonstrate indexed sequential file organization. (L2)

To illustrate array data structure and perform searching and sorting. (L2)
To write programs to create, insert, delete and display the elements of stack, queue, linked list. (L2)
To develop tree and perform traversals. (L3)
To utilize sequential and direct access files. (L3)

Text Books:
Data Structures Using C++ by Varsha H. Patil, Oxford University Press,2012.

Reference Books:
Data Structures and Algorithms in C++, Adam Drozdek, Cengage Learning,3rd Edition, 2006.
Data Structures and Algorithms in C++, Brijendra Kumar Joshi, Tata McGraw Hill,2010.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –III

SPH 128 : Data Structures and File Processing Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

Write a C++ program to convert a sentence from lower case to to upper case , count number of vowels and delete blank spaces.

Write a C++ program to implement Stack operations. Write a C++ program to implement queue operations..

Write a C++ program to implement the operations in Linked list

Write a C++ program to concatenate two files and copy the contents of one file to another file.

Write a C++ program program for direct access of records in a file.

Write a C++ program to implement field organization using length indicator. Write a C++ program for fixed length field organization.

Write a C++ program for index access of records in a file.

Write a C++ program for accessing records in a file using index(record organization).

Write a C++ program to print a line if it contains more than 80 characters. Write a C++ program for reading and writing contents to a file from console. Write a C++ program to reverse the contents of the given file.

Write a C++ program to search for a given record using sequential search Write a C++ program to search for a given record using simple Hashing. Write a C++ program to sort records in a file.

Text Books:

Data Structures Using C++ ,
Varsha H. Patil, Oxford University Press,2012.

Reference Books:

Data Structures and Algorithms in C++ ,

Adam Drozdek, Cengage Learning,3rd Edition,2006.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –III

SPH 201: Real Analysis

Hours per week: 4 End Examination: 60
Credits: 4 Marks
Sessionals: 40 Marks

Preamble: Real Analysis studies the behaviour of real numbers, functions, sequences, series and sets on the real line. The focus of the course is to study the properties of fields of real numbers, convergence/divergence of sequences, series of numbers and functions.

Objective:

To introduce
basic properties of fields of real numbers sequences and
discuss about their convergence infinite series and the tests of
convergence
Alternating series, absolute and conditional convergence of infinite series Point wise and
uniform convergence of sequence and series of functions

UNIT-I

Finite and infinite sets, examples of countable and uncountable sets. Real line, bounded sets, suprema and infima, completeness property of R, Archimedean property of R, intervals. Concept of cluster points and statement of Bolzano-Weierstrass theorem.

Learning Outcomes:

The student will be able to:
Define and recognize the basic properties of field of real numbers
Find suprema and infima of sets Discuss the cluster
points of sets

UNIT-II

Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof).

Learning Outcomes:

The student will be able to: Define sequences
and its properties Verify the convergence of sequence
Prove fundamental theorems on convergence

UNIT-III

Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series.

Learning Outcomes:

The student will be able to:
Define Infinite series and its properties Discuss the
convergence of Geometric series Verify the convergence of series

UNIT-IV

Root test, Ratio test, alternating series, Leibnitz's test (Tests of Convergence without proof). Definition and examples of absolute and conditional convergence.

Learning Outcomes:

The student will be able to:

Define alternating series

Explain the absolute and conditional convergence of the series Explain the Root, Ratio and Leibnitz's test

UNIT-V

Sequences and series of functions, Pointwise and uniform convergence. M -test,Statements of the results about uniform convergence and integrability anddifferentiability of functions, Power series and radius of convergence.

Learning Outcomes:

The student will be able to:

Define sequence and series of functions

Understand the difference between point wise and uniform convergence Apply M-test

Course Outcomes:

On successful completion of this course, students will be able to:

Write precise proofs

Recognize convergent, divergent, bounded, Cauchy and monotone sequences and their properties

Calculate the infima, suprema and limit points of a set

Recognize alternating, conditionally and absolutely convergent series Apply the ratio, root, Leibnitz's test

Test the pointwise and uniform convergence of sequences and series of functions

Text Books:

Calculus Vol.I : One Variable Calculus, with an Introduction to Linear Algebra, Tom. M. Apostol, published by John Wiley and Sons (Asia) P. Ltd., 2002.

Introduction to Real Analysis" by Robert.G. Bartle and Donald. R Sherbert, John Wiley and Sons(Asia) Ltd., 2000.

Intermediate Real Analysis, Emanuel Fischer ,Springer Verlag, 1983.

Elementary Analysis: The Theory of Calculus, Kenneth A. Ross, Springer Verlag, 2003.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –III

SPH 221: Real Analysis Tutorial

Hours Per Week :2 Continuous Evaluation:100 Marks Credits :2

Finding supremum and infimum of a set Finding limit

points of a set

Problems on sequences

Problems on Cauchy convergence Problems on

monotonic sequence Problems on infinite series

Convergence or divergence of Geometric series Convergence or

divergence using comparison test Convergence or divergence of

p-series

Problems on root test Problems on Ratio test

Problems on alternating series

Course Outcomes:
On successful completion of this course, students will be able to:

Calculate the infima, suprema and limit points of a set.
Apply tests to verify the convergence or divergence of sequences.
Verify the convergence, divergence, absolute convergence , conditional convergence of infinite series.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –III

SPH-207: Digital Electronics

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks
Preamble: This course was introduced to explain the concepts of Digital

Electronics Objective: To explain the basics of Digital circuits

UNIT- I
Number Systems and Codes
Decimal, Binary, Octal, Hexa Decimal numbers, conversion from one to another-codes, BCD, excess 3, gray codes conversion from one to another - Error detection codes**.**

Learning Outcomes:
To analyze the number systems
Solve the different number conversions

UNIT - II
Boolean Algebra And Theorems
Basic & Universal logic gates - Boolean Identities - Boolean theorems De Morgan's Theorem sum of products, products of sums expressions, simplification by Karnaugh Map method, simplification based on basic Boolean theorems - don't care conditions.

Learning Outcomes:
Analyzing of Universal gates Simplification of
Karnaugh maps

UNIT – III
Combinational Digital Circuits
Arithmetic Building blocks, Half & Full Adders and Half & Full Subtractions, BCD adders - multiplexers, De-multiplexers, encoders, decoders - Characteristics for Digital ICs -RTL, DTL, TTL, ECL CMOS (NAND & NOR Gates).

Learning Outcomes:
To design combinational circuits Explains the
logic families

UNIT- IV
Sequential Digital Circuits
Flip-flops, RS, Clocked SR, JK, D, T, Master-Slave Flip flop -Conversion of Flip flops – shift registers - ripple counters - synchronous counters and asynchronous counters (4-bit counter).

Learning Outcomes:
Analyze the various sequential circuits
To design the synchronous and asynchronous counters

UNIT- V

Memory Devices

ROM Organization - PROM Organization – PLA (Programmable Logic Array) - PAL (Programmable Array Logic) - Realization of functions using PROM

Learning Outcomes:

To construct the memory devices

To explain the programmable logic devices

Course Outcomes:

Learn the number systems in digital systems (L2) Acquire the knowledge on simplification gates (L5) Learn about the designing of combinational circuits (L4) Learn about the designing of sequential circuits (L4) Learn the basics of organization of memory devices (L3)

Textbooks:

R.P. Jain, "Modem digital Electronics", 3rd Edition, TMH, 2003. Puri, V.K., Digital Electronics, Tata McGraw Hill,2nd Edition,2011

Marris mano M., Computer System Architecture, 2nd Edition, Prentice Hall, 1998

Malvino and Leach, Digital Principles and applications, McGraw Hill, 1996, 4th Edition

Reference Books:

Millman 1. Micro Electronics, McGraw Hill International Book Company, New Delhi. Morris Mano M., "Digital Logic and Computer Design" PHI, 2005.

Godse A.P., Digital Electronics, Technical Publications.

Unified Electronics (Digital Electronics and Microprocessors) by Agarwal- Agarwal

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –III

SPH 227: Digital Electronics Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

Preamble: Objective: This course was designed to construct and verify Digital circuits The student analyze and design the Digital circuits

List of Experiments

Verification of I C (basic) logic Gates Universality

of NAND & NOR Gates.

Verification of Boolean laws using NAND Gates (Associative, Commutative & Distributive

Laws)

Study of RS, D, T and JK Flip-Flops with IC's

Half and Full Adders using Simple & NAND Gates.

6.4-bit binary parallel adder and Subtractor IC 7483 using PSPICE simulation Study of7490

BCD Counter - MOD Counters using PSPICE simulation.

BCD to Seven segment decoder 7447/7448 using PSPICE simulation.

Course Outcomes:

After the completion of this course, the student will be able to design the electronic circuits (L3 and L4)

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –III

SPH 209: Design and Analysis of Algorithms

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble: Design and Analysis of Algorithm is very important for designing algorithm to solve different types of problems in the branch of computer science and information technology. This course deals the fundamental concepts of Designing Strategies, Complexity analysis of Algorithms, followed by problems on Graph Theory and Sorting methods.

Objectives:

To rephrase algorithms. (L2)
To demonstrate sorting techniques.(L2) To emphasize graph traversals. (L3)
To illustrate challenges in numeric algorithms. (L2)

UNIT –I

Introduction: Algorithm Specification, Performance Analysis, Randomized Algorithms- Las Vegas, Monte Carlo Algorithm Definition, RQuick Sort.

Sorting Techniques: Selection Sort, Bubble Sort, Insertion Sort, Heap Sort, Shell Sort, Linear Search.

Learning Outcomes:

By the end of this Unit, the student will be able to
Specify algorithms and analyze performance of algorithm. (L2) To develop sorting techniques. (L5)

UNIT - II

Divide and Conquer: General Method, Binary Search, Finding maximum and minimum, Merge Sort, Quick Sort, Strassen's Matrix Multiplication.

Basic Graph Traversal Techniques- Breadth First Search, Depth-First Search.

Learning Outcomes:

By the end of this Unit, the student will be able to examine divide and conquer method. (L4) adopt BFS and DFS algorithms. (L3)

UNIT- III

Greedy Method: General Method, Knapsack Problem, Minimum Cost Spanning Trees- Kruskal's , Prim Algorithms, Single Source Shortest Paths.

Learning Outcomes:

By the end of this Unit, the student will be able to make use of
minimum cost spanning trees. (L4)
explain Krushkl's, Prims and single source shortest path algorithm. (L2)

UNIT – IV

Dynamic Programming: General Method, All pairs Shortest Paths, Travelling Salesperson Problem.

Transform and Conquer: Multiplication of Large Integers, Horners Rule and Binary Exponentiation, Computing the least common multiple, counting paths in a graph, Reduction of Optimization Problem. (Anany Levitin chapter -6)

Learning Outcomes:

By the end of this Unit, the student will be able to elaborate

Travelling salesman problem. (L4)

solve Horners rulw and binary exponentiation, computer LCM. (L3)

UNIT – V

Input Enhancement in String Matching: Horspools Algorithm, Boyer- Moore Algorithm.

Limitations of Algorithm Power : Lower-Bound Arguments, Trivial Lower Bounds, Information-Theoretic Arguments, Adversary Arguments, Problem Reduction

Decision Trees: Decision Trees for Sorting, Decision Trees for Searching a sorted Array

P, NP, and NP-Complete Problems : Basic Concepts, P and NP Problems, NP-Complete Problems, Challenges in Numeric Algorithms (Anany Levitin – 11th chapter)

Learning Outcomes:

By the end of this Unit, the student will be able to

model Horspools Algorithm, Boyer- Moore Algorithm. (L4) choose

decision tree for sorting. (L3)

Course Outcomes:

Upon completion of the course, the student is able to Learn to

analyze performance of algorithm.(L2)

solve a given problem recursively dealing with sub-problems.(L3) learn to solve

notorious computational problems. (L4)

Text Books:

Fundamentals of Computer Algorithms – Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Second Edition, 2008, University Press,

Introduction to the Design and Analysis of Algorithms, ,Anany Levitin, 3rd Edition 2012, Pearson (Unit- IV,V)

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –III

SPH 229: Design and Analysis of Algorithms Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

List of Experiments

Write a C++ program to implement Bubble sort. Write a C++ program to implement Insertion Sort. Write a C++ program implement Selection Sort.

Write a C++ program to implement Quick Sort. Write a C++ program to implement Merge Sort. Write a C++ program to implement Shell Sort.

Write a C++ program to Find Maximum and Minimum using Divide and Conquer. Write a C++ program to implement Strassen's Matrix Multiplication.

Write a C++ program to implement Breadth First Search, Depth First Search. Write a C++ program on Knapsack Problem.

Write a C++ program to find Minimum Cost Spanning Tree. Write a C++ program to find All pairs Shortest Path.

Write a C++ program to find Single Source Shortest Path.

Write a C++ program to evaluate an expression using Horner's Rule.

Write a C++ program to perform string matching – Horspools or Boyer- Moore algorithm.

Text Books:

Fundamentals of Computer Algorithms – Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Second Edition, 2008, University Press,
Introduction to the Design and Analysis of Algorithms, ,Anany Levitin, 3rd Edition 2012, Pearson (Unit- IV,V)

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –III

SFC 203: English for Communication– II

Hours per week: 3
Credits: 2

End Examination: 60 Marks
Sessionals: 40 Marks

Preamble: This course has been designed to help students acquire English language skills for professional development. The students will be exposed to aspects of English language through some very interesting texts. Each unit of the book carries a very extensive and relevant explanation on pronunciation, grammar, vocabulary, spelling, punctuation, spoken dialogues, writing and reading.

Objective:

To introduce students to Prosodic features for right speech
To enable students to use English in day-to-day communication To build up their confidence in the usage of English
To expose them to Group Discussion sessions
To develop their written communicative competence To make them interview ready

UNIT- I **The Open Window: Saki (H.H.Munro)**

Pronunciation: Syllabification**, Grammar:** Non-infinite verbs, **Vocabulary:** Simile & Metaphor**, Spelling:** using 'ie' or 'ei', **Punctuation:** semi-colon, **Conversation:** Asking for advice/information,

Learning outcomes:

By the end of the course, the student will be able to:
Improve their speaking ability in English both in terms of fluency and comprehensibility.
Heighten their awareness of correct usage of English grammar in writing and speaking.
Attain and enhance competence in the four modes of literacy: LSRW. Utilize phonetic dictionary symbols to continue to improve pronunciation. Punctuate quoted statements, sentences and questions correctly.

UNIT- II **The Voice of Humanity – Rabindranath Tagore**

Pronunciation: Word Stress, **Grammar:** Adjectives, **Vocabulary:** Oxymoron & Hyperbole**, Spelling:** using 'able' and 'ible', **Punctuation:** Colon & dash, **Group Discussion Learning outcomes:**

By the end of the course, the student will be able to:
To use newly acquired vocabulary in classroom activities. Develop independent learning strategies and study skills. Have the ability to communicate effectively with others. Understand the rules of word stress
Acquire the skills needed for a G.D and participate efficiently.

UNIT –III **If – Rudyard Kipling**

Pronunciation: Sentence Stress**, Grammar:** Articles, **Vocabulary:** Portmanteau and loan words**, Spelling:** using suffixes, **Punctuation:**Hyphen & dash, **Oral Presentation**

Learning outcomes:

By the end of the course, the student will be able to:

Demonstrate command of the conventions of Standard English punctuation, and spelling when writing.

Enable to discuss literary texts from various theoretical and critical perspectives. Formulate ideas and connections between literary concepts and themes.

Establish a deeper appreciation of cultural diversity by introducing them to poetry. acquire effective presentation skills

UNIT -IV **Riders to the Sea – JM Synge**

Pronunciation – Intonation**, Grammar:** Adverbs, **Vocabulary:** Palindromes**, Spelling:** completing tables with nouns, verbs, adjectives, adverbs **Punctuation:** Inverted comma, **Conversation/Role play:** Appearing for a job interview/conducting a job interview

Learning outcomes:

By the end of the course, the student will be able to:

Collaborate with peers for role-playing, story analysis, and presentation planning. Use comparative forms of high frequency adjectives and adverbs.

Apply sentence mechanics and master spelling of high frequency words.

Demonstrate increased understanding of English syntax and grammatical elements for effective writing.

Understand and use intonation in spoken language. Develop the skills needed for attending an interview

UNIT- V Academic Writing: Letter Writing, Paragraph Writing, Essay Writing, Resume Preparation, Dialogue Writing, Precis

Learning outcomes:

By the end of the course, the student will be able to:

Develop outlines, clusters, lists, or other graphic organizers to organize ideas for writing

Format various types of writing such summaries, personal letters, formal letters and narrative, descriptive, and expository paragraphs on a variety of topics Develop own creativity and enhance their writing skills

Paraphrase text appropriately.

Write effective introductions and conclusions for paragraphs. Prepare a persuasive resume.

Text Books:

Part – 2 (English for Enhanced Competence (by Sumit Roy, A.Karunakar, A.Aruna Priya)

Supplementary Reading:

Communicative skills for Technical Students, M. Faratullah. Orient longman

Rizvi,MAshraf. **Effective Technical Communication.** McGraw - Hill.

B. Sc. (Mathematics, Electronics & Computer Science)

SEMESTER –III

SSE 275: Logic and Sets

Credits: 2 Continuous Evaluation: 100 Marks

Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators.

Propositional equivalence: Logical equivalences.

Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.

Sets, subsets, Set operations, the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set.
Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections.

Relation: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation.

Text Books:

Discrete and Combinatorial Mathematic, Ralph P. Grimaldi and B.V. Ramana Pearson Education, 1998.
Naïve Set Theory,Paul R. Halmos , Springer, 1974. Theory of Sets,
E. Kamke ,Dover Publications, 1950.

Course Learning Outcomes:

On successful completion of this course, students will be able to:

Explain propositional calculus
Evaluate problems on predicate functions
Explain different types of sets and operations on sets Define relation between two sets
Explain different types of relations

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –III
SSE 277: Computer Graphics

Credits :2 Continuous Evaluation:100 Marks

Preamble: Computer graphics is regarded as a branch of computer science that deals with the theory and technology for computerized image synthesis. The task of composing image on a computer is essentially a matter of setting pixel values. The field of computer graphics is characterized by rapid changes in hoe the technology is used in everyday applications and by constant evolution of graphics systems.

Course Objectives:

To familiarize with Raster Scan and Random Scan Systems. To know
about line drawing algorithms.
To learn about polygon filling algorithm. To
understand ant aliasing techniques.

UNIT- I

Development of Computer Graphics, Raster Scan and Random Scan graphics storages, display processor and character generators, color display techniques.

Learning Outcome:

By the end of this Unit, the student will be able to
Show raster scan and random scan graphics storage. (L1) Explain display
processor. (L1)
Outline colour display techniques. (L3)

UNIT- II

Cathode Ray Tube (CRT)basics, Refresh Display, Direct View Storage Tube(DVST , Interactive input/output devices).

Outline CRT display. (L2) Explain DVST.
(L3)
Narrate interactive input output devices. (L2)

UNIT-III

Points, lines and curves, Scan conversion, Line-Drawing Algorithms, Circle and Ellipse Generation.

Learning Outcome:

By the end of this Unit, the student will be able to Know about
scan conversion algorithms.(L3) Describe Line drawing
Algorithms. (L2)
Explain Circle generation and Ellipse generation algorithms. (L2)

UNIT- IV

Conic-section generation, polygon filling, anti aliasing.

Learning Outcomes:

By the end of this Unit, the student will be able to Understand
Conic Section generation. (L2) Learn polygon filling
algorithms. (L2) Choose anti aliasing techniques. (L3)

UNIT - V

Two-dimensional viewing, Coordinate systems, linear transformations, line and polygon clipping algorithms.

Learning Outcomes:

By the end of this Unit, the student will be able to Learn two
dimensional viewing. (L3) Make use of Coordinate systems.
(L4)
Select line and Polygon clipping algorithms. (L3)

Differentiate raster scan and random scan systems. Identify the
CRT and DVD display.
Know about line generation and Polygon filling algorithms.

Text Book:

1. Computer Graphics ,Amarendra N Sinha, Arun D Udai, Tata McGraw Hill, 2008.

Reference Books :

Computer Graphics, D. Hearn and M.P. Baker, Prentice–Hall of India, 2nd Ed., 2004. Procedural Elements in Computer Graphics , D.F. Rogers, TMH, 2nd Ed., 2001.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –IV
SPH 202: Algebra
End Examination: 60 Marks
Sessionals: 40 Marks

Hours per week: 4
Credits: 4

Preamble: This course aims to provide basic concepts of Abstract algebra. The focus of the course is to study the fundamental properties of Groups and its kind.

Course Objectives:

To introduce groups, subgroups, permutation and cyclic groups with examples To discuss the fundamental properties of Groups, sub groups etc
To study the structure preserving mappings, homomorphism and isomorphism, its properties.
To increase mathematical maturity, including writing their own proofs

UNIT – I

Groups: Binary Operation – Algebraic structure – semi group-monoid – Group definition and elementary properties Finite and Infinite groups – examples – order of a group. Composition tables with examples.

Learning Outcomes:

The student will be able to:
Explain algebraic structures
Verify group properties of a given algebraic structure Define order of a group and order of an element

UNIT – II

Subgroups: Complex Definition – Multiplication of two complexes Inverse of a complex- Subgroup definition – examples-criterion for a complex to be a subgroups. Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

Co-sets and Lagrange's Theorem :

Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange's Theorem.

Learning Outcomes:

The student will be able to:
Define and explain the properties of complexes, subgroups and co-sets
Explain the index of a subgroups with examples Prove Lagranges theorem

UNIT –III

Normal Subgroups: Definition of normal subgroup – proper and improper normal subgroup– Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Sub group of index 2 is a normal sub group – simple group – quotient group – criteria for the existence of a quotient group.

Learning Outcomes:

The student will be able to:
Explain normal subgroups and its properties
Define quotient groups and criteria for the existence of a quotient group.

UNIT – IV

Homomorphism : Definition of homomorphism – Image of homomorphism elementary properties of homomorphism – Isomorphism – aultomorphism definitions and elementary properties–kernel of a homomorphism – fundamental theorem on Homomorphism and applications.

Learning Outcomes:

The student will be able to:

Discuss the structure preserving mappings

Prove the properties of Homomorphism and Isomporphism Define Kernal of Isomorphism and its properties

UNIT –V

Permutations and Cyclic Groups: Definition of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

Cyclic Groups :

Definition of cyclic group – elementary properties – classification of cyclic groups.

Learning Outcomes:

The student will be able to:

Define and give examples of permutation and cyclic groups

Perform permutation multiplication Find generators of cyclic group

Prove fundamental properties of permutation and cyclic groups

Course Outcomes:

On successful completion of this course, students will be able to:

Write abstract mathematical proofs in logical manner Verify group properties for the given algebraic structure Prove fundamental theorems of group theory

Explain the use of order of an element and group in finding generators of the group Discuss the structure preserving mappings and its importance

Text Books:

A Text Book of B.Sc. Mathematics Volume-I
V.Venkateswara Rao, N Krishna Murthy, B.V.S.S. Sarma and S. Anjaneya Sastry, S.Chand & Company Ltd., New Delhi.
A First Course in Abstract Algebra, John B. Fraleigh, Narosa Publishing house. Modern Algebr, M.L. Khanna, Jai Prakash Nath.
A First Course in Abstract Algebra, John B. Fraleigh ,7th Edition, Pearson, 2002.
Algebra, Micheal Artin, 2nd Edition, Pearson, 2011.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –IV

SPH 220: Algebra Tutorial

Hours per week: 2 Credits: 2 Continuous Evaluation: 100 Marks

Problems on Groups Problems on

subgroups

Problems on co-sets and Lagrange's theorem Problems on

normal subgroups

Problems on quotient group

Problems on homomorphism of groups Problems on

isomorphism of groups Problems on permutation

multiplication Problems to find inverse of a permutation

Problems on cyclic permutation and transposition Problems on cayley's

theorem

Problems on cyclic groups

Course Outcomes:
On successful completion of this course, students will be able to:

Verify group properties of given algebraic structure
demonstrate the subgroups, normal subgroups, quotient groups with examples
Recognize the structure preserving mappings Find the
generators of a group
Discuss about permutations and their product

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –IV

SPH 208: Analog & Digital IC Applications

Hours per week: 4
Credits: 4
Preamble: Objective:

End Examination: 60 Marks
Sessionals: 40 Marks This course was introduced to understand the analog and digital applications
To Know the internal operations of analog and digital circuits

UNIT- I
Operational Amplifiers
Basic differential amplifier-Op-Amp supply voltages - IC identification - Internal blocks of Op- Amp, Op-Amp parameters-offset voltages and currents-CMRR-Slew rate, Virtual ground, Op- Amp as a voltage amplifier - Inverting amplifier - non-inverting amplifier - Voltage follower

Learning Outcomes:
To understand the Functional blocks of Op Amp To demonstrate the working of Op Amp parameters

UNIT - II
OP-AMP Circuits
Summing amplifier - Differential amplifier - Op-amp frequency response - Comparator- Integrator-Differentiator - Triangular Wave generators - Square Wave generators - Active filter (Basics) – Low pass filter - High pass filter - Band pass filter, IC 555 applications - Astable, Mono stable and Schmitt trigger

Learning Outcomes:
To illustrate the Op Amp applications
To analyze the filters and timer applications

UNIT – III
Combinational &Sequential Circuits
Design of code converter: BCD to 7 segments, Binary/ BCD to Gray, Gray to Binary / BCD, Design of counters using state machine: asynchronous and synchronous counters, Modulo-n counter, presettable binary up/down counter, Design of Universal shift register

Learning Outcomes:
To design and analyze the combinational circuits To design the sequential counters

UNIT- IV
Data Converters
Key Features, Advantages and applications of Digital to Analog Converters: Weighted resistive network and R-2R ladder type. Key Features, Advantages and Applications Specific selection of Analog to Digital Converters: Staircase, Ramp Type, Single Slope and dual slope, Successive approximation and Flash type.

Learning Outcomes:
To illustrate the functioning of data converters To understand
different types of data converters

UNIT- V
Digital System Interfacing And Applications
Digital system interfacing of LEDs and Multi digit Seven segment LED display Driver. Interface considerations for ADC / DAC with digital systems.Applications of counters: Digital clock, Auto-parking system, Applications of shift registers: Time delay generator, parallel to serial converter, serial to parallel converter, UART and serial Key board encoder.

Learning Outcomes:
To understand the functional block diagram of Digital Systems To discuss the
applications of Digital systems

Course Outcomes:
Learn the basics of Op Amps (L3) Understands the
applications of Op Amps (L2)
Analyze the combinational and sequential circuits (L6) Learn about the
types and operation of data converters ((L4) Understand the interfacing
concepts of digital systems (L2)

Text Books:

G.K.Kharate - Digital electronics-Oxford university press Floyd Thomas L
Digital FundamenZtals Pearson Education Microelectronic circuits by
Sedra&Smith-6th'edition-Oxford
Electronic Devices and Circuits David A.Bell, Fifth edition, Oxford university press

Reference Books:
Allen Mottershead, Electronic Devices and Circuits-an Introduction - Prentice Hall. Mithal G.K.,
Electronic Devices and Circuits, Khanna Publishers.
Donald L.Schillling, Charles Belove, Discrete and Integrated Electronic Circuits, McGraw Hill.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –IV

SPH 226: Analog & Digital IC Applications Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

Preamble: Objective: This course was designed to perform analog and digital circuits

The student will be able to understand the designing of analog and digital circuits

List of Experiments

OP-AMP -Inverting and Non-inverting amplifiers.

OP-AMP - Sine Wave Generator (weinbridge oscillator) Binary to

Grey and Grey to binary code converter Design of 4-bit priority

encoder

OP-AMP - Square wave generator using PSPICE simulation Schmitt

Trigger using IC 555 timer using PSPICE simulation

Study of presettable binary up/down counter using PSPICE simulation. Design and

verification of 4-bit ripple counter. Using PSPICE simulation. OP-AMP integrator and

differentiator.

AstableMultivibrator –determination of frequency (using IC-555)

Course Outcomes:
After the completion of this course, the student will be able to design the circuits in operational amplifiers (L4 and L2)

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –IV

SPH 210: Operating Systems

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble: operating systems is an essential part of any computer science education. This field is undergoing rapid change, as computers are now prevalent in virtually every arena of day-to-day life—from embedded devices in automobiles through the most sophisticated planning tools for governments and multinational firms.

To cover both traditional PC and server operating systems, as well as operating systems for mobile devices.
To enlighten the concepts of distributed operating system, system calls and system programs.
To explain process scheduling algorithms.
To introduce memory management techniques. To give an
over view of mass storage structure.

UNIT-I

Introduction

What Operating Systems do. Computer-System Architecture, Operating-System Structure, Operating-System Operations, Distributed Systems, Special-purpose Systems, Computing Environments.
System Structures: Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs. Operating-System Structure.

define what the operating system is.((L2)
what is the role of operating system in the computational environment. (L1) what is the structure of operating system. (L1)

UNIT-II

Process Management

Process Concept, Process Scheduling, Operations on Processes.
Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling algorithms.

Learning Outcomes:

By the end of this Unit, the student will be able to understand
process scheduling. (L2)
explain process scheduling algorithms.(L2)

UNIT-III

Process Coordination

Synchronization: Background, The Critical-Section Problem.
Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention.

Learning Outcomes:

By the end of this Unit, the student will be able to Summarize the methods to handle dead locks.(L3) Learn how to avoid dead lock condition. (L1)

UNIT-IV

Memory Management

Memory-Strategies: Background, Swapping, Contiguous memory Allocation, Paging, Segmentation. Virtual-Memory Management: Background, Demand Paging, Copy-on-write, page Replacement.

Learning Outcomes:

By the end of this Unit, the student will be able to explain
contiguous memory.(L3)
elaborate concept of paging.(L3)
summarize virtual memory management, demand paging. (L3)

UNIT-V

File Management

File Systems: File Concept, Access Methods, Directory and Disk Structure. Secondary- Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling.

Learning Outcomes:

By the end of this Unit, the student will be able to
spell the concept of file system, access methods.(L1) make use of mass storage structure. (L3)

Course Outcomes:

Upon completion of the course, the student is able to
understand the concepts of distributed operating system, system calls and system programs.(L3) explain process scheduling algorithms.(L3) relate memory management techniques.(L3) understand mass storage structure. (L2)

Text Book:

Operating System Concepts
Abraham Silberschatz,Peter B. Galvin, Greg Gagne, 8th Edition ,2011

Reference Books:

A.S. Tanenbaum, Modern Operating Systems, 3rd Ed., Prentice-Hall of India, 2008
Operating Systems: Internals And Design Principles William Stallings, Prentice Hall Of India, 5th Edition, 2006.
Operating Systems: A Modern Approach Gary Nutt, Addison Wesley, 3rd Edition,2004.
Operating Systems: A Concept Based Approach D.M.Dhamdhere, Tata Mcgraw-Hill, 2nd Edition, 2007.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –IV

SPH 228: Operating Systems Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

List of Experiments:

Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.

Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date. Usage of following commands: chmod, grep, tput (clear, highlight), bc.

Write a shell script to check if the number entered at the command line is prime or not.

Write a shell script to modify "cal" command to display calendars of the specified months.

Write a shell script to accept a login name. If not a valid login name display message –"Entered login name is invalid".

Write a shell script to display date in the mm/dd/yy format.

Write a shell script to display on the screen sorted output of "who" command along with the total number of users .

Write a shell script to display the multiplication table of any number. Write a shell script to find the sum of digits of a given number.

Write a shell script to find the factorial of a given number.

Write a shell script to check whether the number is Armstrong or not.

Text Books:

Unix Shell Programming
Stephan G Kochan, Patrick Wood, Sams,3rd Edition,2003.

Introduction to Unix and Shell Programming
M.G. Venkateshmurthy, Pearson, 1st Edition, 2005.

3. Unix Concepts and Applications, Sumitabha Das, 4th Edition, TMH, 2006.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –IV

SSE 276: Vector Calculus

Credits: 2 Continuous Evaluation: 100 Marks

Limits of vector point functions
Scalar valued and vector valued point functions, limits, Directional derivatives along co- ordinate axis, along any line.

Vector differentiation
Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Tangent vector of a curve, Unit tangent vector, Principle normal, curvature, Binormal, Torsion, Frenet -Serret formulae and applications

Vector identities
Gradient, Divergence, Cur, their geometrical interpretations and Successive operations

Line , surface and Volume integrals
Line Integral, Surface Integral, Volume Integral

Stokes theorem, Gauss divergence theorem and applications, Greens Theorem and applications.

Text Books:

A Text Book of Vector Calculus, Shanti Narayan, S. Chand &
Company Pvt. Ltd., New Delhi.
Vector Calculus, R. Gupta, Laxmi Publications.
Calculus and Analytic Geometry George B. Thomas, Jr. and Ross L. Finney, Pearson Education, 2007, 9th edition.
Calculus Single Variable Howard Anton, Irl Bivens and Stephen Davis, John Wiley and Sons, Inc., 2002.
Vector Calculus, Paul C. Matthews, Springer Verlag London Limited, 1998.

Course Outcomes:
On successful completion of this course, students will be able to:

Define limit of vector function
demonstrate the vector differentiation with examples
define gradient of a scalar function, divergence and curl of a vector function explain line, surface and volume integrals
evaluate applications on Stokes theorem, Gauss divergence theorem, and Greens theorem

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –IV
SSE 278: Number Theory

Credits :2 Continuous Evaluation:100 Marks

Division algorithm, Lame's theorem, linear Diophantine equation, fundamental theorem of arithmetic.

Prime counting function, statement of prime number theorem.

Goldbach conjecture, binary and decimal representation of integers, linear congruences, complete set of residues.

Number theoretic functions, sum and number of divisors, totally multiplicativefunctions, definition and properties of the Dirichlet product.

The Möbius inversion formula, the greatest integer function, Euler's phi-function.

Text Books:

Elementary Number Theory, David M.Burton, Tata McGraw-Hill,2007 6th edition. Applications of Abstract Algebra with MAPLE, Richard E. Klima, Neil Sigmon and
Ernest Stitzinger, CRC Press, Boca Raton, 2000.
Beginning Number Theory Neville Robbins, Jones and Bartlett publications, 2nd edition.

Course Outcomes:
On successful completion of this course, students will be able to:

Define division algorithm
Demonstrate the fundamental theorem of arithmetic Explain prime number theorem
Explain complete set of residues
Evaluate problems using Möbius inversion formula Define Euler's phi-function

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –IV
SSE 280 : E-Commerce

Credits :2 Continuous Evaluation:100 Marks

Introduction to E-Commerce- E-Commerce Business models and Concepts-Technology Infrastructure for E-commerce, The Internet and World Wide Web, E-Commerce Infrastructure, Building an E-Commerce website, Security and Payment .

Business Concepts and Social Issues-E-Commerce marketing Concepts, E-Commerce Marketing Communications, Ethical ,Social and Political Issues in E-commerce.

E-Commerce in Action – Online Retailing and Services, Online Content and Media, Social Networks, Auctions and Portals.

Text Books:

Kenneth C.Laudon, Carol GuercioTravere, E-Commerce:Business, Technology, Society, 4th Edition, Pearson ,2008
P.T. Joseph, E-Commerce: An Indian Perspective, Prentice-Hall of India, 2007.
E.M. Awad, Electronic Commerce from Vision to Fulfillment, 3rd Ed., PrenticeHall of India, 2006
Scott Bonneau, Tammy Kohl, Jeni Tennison, Jon Duckett and Kevin Williams, XML Design Handbook, Wrox Press Ltd., 2003.
Michael Cheshar, Ricky Kaura, and Peter Linton, Electronic Business and Commerce, Springer, 2003.
W.J. Pardi, XML in Action: Learn to Quickly Create Dynamic, Data-driven Sites with the Web's Hottest New Technology, Prentice Hall of India, 1999.
P. Weill and M.R. Vitale, Place to Space: Migrating to eBusiness Models, Harvard Business School Press, 2001.
D. Whiteley, E-commerce: Strategy, Technologies and Applications, Tata McGraw-Hill Edition, 2001.
M. Fitzgerald, Building B2B Applications with XML: A Resource Guide, John Wiley and Sons, Inc., 2001.

B.Sc. (Mathematics, Electronics and Computer Science)
SEMESTER –IV
SSE 282 : INSTRUMENTTION SKILLS -I

Preamble: This course was designed to know the basics of instrumentation

Objective: Hands on experience

No.of hrs/week:2 Credits: 2

Unit – I

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects, Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance, Specifications of a multimeter and their significance.

Learning Outcomes

To know the principles of instruments
To understand the operation of multimeter

Unit – II

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/Multimeter and their significance

Learning Outcomes

To know the advantages of electronic meters over convential meters To understand the block diagrams of electronic meters

Unit – III

AC milli voltmeter: Type of AC milli voltmeters: Amplifier-rectifier, and rectifier- amplifier. Block diagram ac milli voltmeter, specifications and their significance.

Learning Outcomes

To discuss the types of millivoltameters To Know the operation of voltmeter

Unit – IV

Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only–no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition, Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance

Learning Outcomes

To understand the operation of CRO To discuss the functional units of CRO

Unit – V

Use of CRO: For the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes, Digital storage Oscilloscope: Block diagram and principle of working.

Learning Outcomes

To study the operation of Digital oscilloscope To understand the
working of CRO
The test of lab skills will be of the following test items: Use of

anoscilloscope.

CRO as a versatile measuringdevice.

Circuit tracing of Laboratory electronicequipment,

Course Outcomes

Learn the basic principles of instruments (L3) Understand the functionality of

electronic meters (L2) Learn the types and operation of voltmeters (L4)

Able to know the functioning of CRO (L5) Learn the operation of

digital CRO (L2)

Laboratory Exercises:

To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance.

To observe the limitations of a multimeter for measuring high frequency voltage and currents.

Measurement of voltage, frequency, time period and phase angle usingCRO. Using a Dual Trace

Oscilloscope.

Reference Books:

A text book in Electrical Technology -B L Theraja -S Chand andCo. Digital Circuits and systems,

Venugopal, 2011, Tata McGrawHill.

Logic circuit design, Shimon P. Vingron, 2012, Springer.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – V
SPH 361: Matrices

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble : Matrix mathematics applies to several branches of science, as well as different mathematical disciplines. This course aims to provide basic concepts of vector spaces, matrix form of basic geometric transformations. The focus of the course is to study the fundamental properties of matrices and applications of matrices in geometry, physics, chemistry, combinatorics and statistics.

To introduce vector spaces and subspaces
To discuss the fundamental properties of matrices , eigen values and eigen vectors To study the rank of a matrix and its applications
To know the applications of matrices in geometry, physics, chemistry, combinatorics and statistics

UNIT I

R, R^2, R^3 as vector spaces over R. Standard basis for each of them. Concept of Linear Independence and examples of different bases.Subspaces of R^2, R^3.

Learning Outcomes:

The student will be able to:
Define vector spaces over a field and subspaces
Learn the concept of linear independence of vectors and linear dependence of vectors Define different bases of vector spaces

UNIT II

Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigen values and eigen vectors for such transformations and eigen spaces as invariant subspaces.

Learning Outcomes:

The student will be able to:
Define translation, dilation, rotation, reflection Evaluate eigen values and eigen vectors of a matix Explain eigen spaces as invariant subspaces

UNIT III

Types of matrices. Rank of a matrix. Invariance of rank under elementary transformations. Reduction to normal form, Solutions of linear homogeneous andnon-homogeneous equations with number of equations and unknowns upto four.

Learning Outcomes:

The student will be able to:
Explain different types of matrices
Evaluate rank of matrix using various methods
Explain solutions of linear and non-homogeneous equations

UNIT IV

Matrices in diagonal form.Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix.

Learning Outcomes:

The student will be able to:

Explain reduction of matrices to diagonal form

Evaluate inverse of a matrix using elementary row operations Explain rank of a matrix using different methods

UNIT V

Solutions of a system of linear equations using matrices.Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.

Learning Outcomes:

The student will be able to:

Explain solutions of a system of linear equations using matrices

Evaluate system of linear equations

Explain the applications of matrices in Geometry, Physics, Chemistry, combinatorics and statistics

Text Books:

Introduction to Algebra, A.I. Kostrikin, Springer Verlag, 1984.

Linear Algebra, Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Prentice Hall ofIndia Pvt. Ltd., New Delhi, 2004.

Schaum's Outline of Matrix Operations: Theory and Problems of Matrix Operations Richard Bronson, Tata McGraw Hill,1989.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – V

SPH 333: Matrices Tutorial

Hours per week: 2 Continuous Evaluation: 100Marks
Credits: 2

Problems on vector spaces

Problems on linear independence and dependence of vectors Problems on

eigen values and eigen vectors

Find rank of a matrix Reduction to

normal form

Solutions of linear and nonlinear homogeneous equations Reduction to

diagonal form

Computation of matrix inversion using elementary row operations

Course Outcomes:
On successful completion of this course, students will be able to:

Define vector space
Differentiate linear independent and linear dependent of vectors Evaluate eigen values and eigen vectors of a matrix
Find rank of a matrix using different methods Solve linear and nonlinear homogenous equations

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – V

SPH 365: Linear Algebra

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble : Linear algebra applies to several branches of science, as well as different mathematical disciplines. This course aims to provide basic concepts of matrices, rank of a matrix and consistency of matrices. The focus of the course is to study the fundamental properties of matrices, applications of matrices ,vector spaces and inner product spaces.

To define rank of a matrix and its applications
To evaluate eigen values and eigen vectors of a matrix
To study vector spaces, subspaces, basis of a vector spaces and dimension of a vector space
To know the linear transformations of a vector space, product of linear transformations To define inner product space

UNIT I
Matrices I
Rank of a matrix, Elementary transformations, normal form ,Echelon form , Rank of product of matrices ,System of homogeneous equations,Linear equations, Null space and nullity of matrices
Learning Outcomes:
The student will be able to:
Define rank of a matrix
Evaluate rank of a matrix using normal form and echelonform Define rank of product of matrices
Explain the method to solve system of homogeneous equations

UNIT II
Matrices II
Condition for consistency, Crammers' rule,Characteristic values and characteristic vectors, Cayley-Hamilton theorem ,Inverse of a matrix using Cayley- Hamilton theorem, Minimal polynomial of a matrix.

Learning Outcomes:
The student will be able to: Explain consistency of matrices Evaluate Crammer's rule
Explain characteristic values and characteristic vectors of a matrix Evaluate minimal polynomial of a matrix

UNIT III

Linear Algebra -I

Vector spaces, General properties of vector spaces, Vector subspaces, Algebra of subspaces, linear combination of vectors. Linear span, linear sum of two subspaces, Linear independence and dependence of vectors, Basis of vector space, Finite dimensional vector spaces, Dimension of a vector space, Dimension of a subspace.

Learning Outcomes:

The student will be able to:

Define vector spaces and vector subspaces with examples
Explain linear combination of vectors Explain basis of vector space
Explain dimension of a vector space

UNIT IV

Linear Algebra - II

Linear transformations, linear operators, Range and null space of linear transformation, Rank and nullity of linear transformations, Linear transformations as vectors, Product of linear transformations, Invertible linear transformation.

Learning Outcomes:

The student will be able to:

Explain the concepts of linear transformations and linear operators
Evaluate range and null space of linear transformation Explain rank and nullity of linear trasformations

UNIT V

Inner product spaces

Inner product spaces, Euclidean and unitary spaces, Norm or length of a vector, Schwartz inequality, Orthogonality, Orthonormal set, complete orthonormal set, Gram - Schmidt orthogonalisation process.

Learning Outcomes:

The student will be able to:

Define inner product spaces, Euclidean and unitary spaces
Explain orthogonality, orthonormality of sets Explain Gram-Schmidt orthogonalisation process

Text Books:

A Text Book of B.Sc. Mathematics Volume-III, V.Venkateswara Rao , N Krishna Murthy, B.V.S.S. Sarma and S. Anjaneya Sastry, S.Chand & Co.

Linear Algebra, A.R. Vasishtha and J.N. Sharma, Krishna Prakashan Media (P) Ltd.

Linear Algebra Kenneth Hoffman and Ray Alden Kunze, Pearson Education (low priced edition), New Delhi.

Linear Algebra, Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Prentice Hall of India Pvt. Ltd., 4th edition New Delhi, 2007.

Rings and Linear Algebra, Pundir, Pundir, PragathiPrakashan

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – V

SPH 337: Linear Algebra Tutorial

Hours per week: 2 Continuous Evaluation: 100Marks
Credits: 2

Find rank of a matrix

Reduction to normal form and Echelon form Problems

on eigen values and eigen vectors Problems on

Cayley-Hamilton theorem

Find inverse of a matrix using Cayley-Hamilton theorem Problems on

Vector spaces

Problems on subspaces

Problems on Linear independence and dependence of vectors Problems on Basis

of vector space

Problems on dimension of a vector space Problems on linear

transformations Problems on inner product spaces

Course Outcomes:
On successful completion of this course, students will be able to:

Define vector space
Differentiate linear independent and linear dependent of vectors Evaluate eigen values and eigen vectors of a matrix
Find rank of a matrix using different methods
Solve problems on subspaces and dimension of a vector space Define inner product space

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – V

SPH 371: Microprocessors (Intel 8085)

Hours per week: 4 — End Examination: 60 Marks
Credits: 4 — Sessionals: 40 Marks
Preamble: This course was introduced to understand the basics of Microprocessors (Intel 8085)
Objective: To understand the architecture and then programme it.

UNIT- I
Architecture of 8085 Microprocessor
Functional block diagram of Intel 8085-Register structure-multiplexing & De-multiplexing of address / data bus - Control Signal Generation and status signals - 8085 pin-out diagram & functions - Interrupts - Priority Concept
Instruction Set of 8085 -Instruction set classification - addressing modes

Learning Outcomes:
To understand the Functional block diagram of Intel 8085 To know the 8085 pin-out diagram

UNIT - II
Memory
Instruction cycle - machine cycle - T-state -Timing diagrams for Opcode FetchCycle Memory Read, Memory Write, I/O Read, I/O Write, - Functional explanation for RAM, ROM, EPROM, EEPROM

Learning Outcomes:
Must know different types of memory Must draw the timing diagrams

UNIT – III
Programming 8085
Addition & subtraction(16-bit), multiplication, division, largest, smallest, block data transfer (all 8-bit data), Binary to BCD, BCD to Binary, Binary to ASCII, ASCII to Binary, BCD to ASCII, ASCII to BCD (all 8-bit data) - Stack & Subroutines Concept - time delay using single and double register & calculations – Debugging program

Learning Outcomes:
1.Able to write arithmetic and logical programmes
To apply Stack & Subroutines Concepts in writing the programmes
UNIT- IV
INTERFACING MEMORY
2K X 8, 4K X 8 ROM, RAM to 8085, interfacing an I/O portion Memory Mapped I/O and I/O Mapped I/O - Difference between I/O mapped and Memory Mapped I/O.

Learning Outcomes:
Able to understand, how to interface the memory
Lists the Differences between I/O mapped and Memory Mapped I/O

UNIT- V

Microprocessor Applications

Programmable peripheral devices (8255, 8253)- Pin functions, Different Modes & Block Diagram - Keyboard and Display Interface 8279 (Architecture) - Simple temperature controller- Simple traffic light controller-stepper motor control interface.

Learning Outcomes:

To understand the Programmable peripheral devices

To apply the written programs to control external interfacing devices

Course Outcomes:

Learn the architecture of 8085, its pin diagram **(L2)**.

Learn about the microprocessors and the organization of microprocessor based systems **(L1)**.

Acquire knowledge of microprocessor and their role in I/O port programming and their interface with peripherals **(L5)**.

Learn about analog to digital and digital to analog convertors **(L4)**. Learn basics of programming and other microprocessors **(L3).**

Text Books

Ramesh S. Gaonakar, Microprocessor Architecture, Programming andApplication with the 8085-PenramLnternational Publishing,Mumbai.

Ram, Fundamentals of microprocessors and microcomputers - Dhanpat Rai Publications, NewDelhi

MicroprocessorsMicrocontrollersbyN.Senthilkumar,M.Saravanan&S.Jeevananthan, 1st edition, Oxford press (Helpful for interfacing applications)

4. Microprocessors & Microcontrollers by B.P.Singh, Galgotia publicationsPvt.Ltd.

References

Mathur A.P., Introduction to Microprocessors. (3rd edn., Tata McGraw, New Delhi, Leventhal L.A., Microprocessor Organisation and Architecture, Prentice Hall India. Microprocessor lab premier by K.A.Krishnamurthy

B. Sc. (Mathematics, Electronics & Computer Science)

SEMESTER –V

SPH 373: Electronic Communications

Hours per week: 4
Credits: 4
End Examination: 60 Marks
Sessionals: 40 Marks

Preamble: To explain role of signal parameters in communication.

Objective: The student will understand various techniques for propagation of information

UNIT I

Basics of Communication Systems and Noise

Block diagram of communication system. Types of Electronic Communication systems: Simplex, Duplex. Analog /Digital Signals. Basis in Noise - Thermal, Shot noise Bit rate, Baud rate, Bandwidth and signal to Noise Ratio. Frequency spectrum in communications **Learning Outcomes:**
To introduce the nomenclature of signals and explain communication system (L2)

UNIT II

Amplitude Modulation

Need for modulation. Amplitude modulation, Modulation index, frequency spectrum, generation of AM (balanced modulator,), Amplitude Demodulation (diode detector), other forms of AM: Double side band suppressed carrier, DSBSC generation (Balanced modulator), Single side band suppressed carrier, SSBSC generation (Filter method, phase cancellation method, third method), SSB detection, Introduction to other forms of AM (Pilot carrier modulation, Vestigial side band modulation).

Learning Outcomes:
To illustrate generation and detection of AM systems (L2)

UNIT III

Angle Modulation

Frequency and phase modulation, modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM (Direct and indirect methods), FM detector (Slope detector, balanced slope detector, PLL).Comparison between AM, FM and PM.

Learning Outcomes:
To outline generation and detection of Angle modulation systems (L2)

UNIT IV

Transmitters & Receivers

Transmitters: Communication channels for AM and FM broadcast, AM transmitter: Lowlevel and high level modulation, FM transmitter.

Receivers: Receiver parameters, sensitivity, selectivity and fidelity, Super Heterodynereceiver, AM receivers, FM receivers. Frequency division multiplexing.

Learning Outcomes:
To explain various modulation levels of transmitters and receivers (L2)

UNIT V

Electromagnetic Interference and

Sampling theorem, Pulse Amplitude Modulation (PAM), Time Division Multiplexing (TDM), Pulse Width Modulation (PWM) and Pulse Position Modulation(PPM), Pulse Code Modulation, Differential Pulse Code Modulation, Delta Modulation, Adaptive DeltaModulation.

Learning Outcomes:
To explain digital communication systems (L2)

Course Outcomes

To introduce the nomenclature of signals and explain communication system (L2) To illustrate generation and detection of AM systems (L2)
To outline generation and detection of Angle modulation systems (L2) To explain various modulation levels of transmitters and receivers (L2) To explain digital communication systems (L2)

Text Books:

1.H. Taub and D. Schilling, Principles of Communication Systems, TMH (1999) 2.W.Tomasi, Electronic Communication Systems,Pearson Education (2004) 3.L.E.Frenzel, Communication Electronics, Principle and Applications, TMH (2002)
4.L. W. Couch II, Digital and Analog Communication Systems, Pearson Education (2005)

Reference Books:

S.Haykin, Communication Systems, Wiley India (2006)
G. Kennedy and B. Davis, Electronic communication systems, TMH(1999)
R. P. Singh and S. D. Sapre, Communication Systems: Analog and Digital, TMH
L. E. Frenzel, Communication electronics: Principles and applications. TMH
T.G. Thomas and S. Chandra Sekhar, Communication theory, TMH (2006)

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –V
SPH 327: Microprocessors Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

Preamble: Objective: This course was designed to perform arithmetic, logical and interfacing programs The student will be able to understand then applies the written programs.

List of Experiments

Addition & Subtraction (8 &16-bits) Multiplication & Division
(8 -bit)
Largest & Smallest number in the given array. Ascending &
Descending order.
Binary to ASCII & ASCII to Binary, BCD to ASCII & ASCII toBCD. Block Transfer ofData.
Waveform generation using DAC interface. Stepper motor interface.

Course Outcomes:
After the completion of this course, the student will be able to write the programs to control basic devices **(L2 and L3)**

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –V
SPH 329: Electronic Communications Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

Preamble: To illustrate various modulation for generation and detection of signals

Objective: The student will realize importance of various communication systems

List of Experiments

Amplitude Modulation and Demodulation. Frequency Modulation and Demodulation Pulse Amplitude Modulation
Pulse Width Modulation Pulse Position Modulation Pulse Code Modulation
AM modulation and Demodulation FM modulation and Demodulation Calculation of EMI Components

Course Outcomes

To interpret various modulation methods for communication (L2 and L5)

B. Sc. (Mathematics, Electronics & Computer Science)

SEMESTER –V

SPH 391: Data Mining

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble: Data mining techniques addresses the major latest techniques of discovering knowledge from a data warehouse. They contain algorithms for discovering association rules, decision trees, clustering neural networks, genetic algorithms.

To make the student to understand the major tasks performed in data mining. To infer the statistical perspective of data mining.

To identify the clustering algorithms.

UNIT I

Introduction

Basic Data Mining Tasks, Classification, Regression, Time Series Analysis, Prediction, Clustering, Summarization, Association Rules, Data Mining Versus Knowledge Discovery in Databases.

Learning Outcomes:

By the end of this Unit, the student will be able to Outline the data mining tasks. (L2)

Make use of prediction, Clustering, Summarization. (L3)

UNIT II

The Development of Data Mining

Data Mining Issues, Social Implication of Data Mining, Data Mining from a Database, Perspective Data Mining Techniques, Statistical Perspectives of Data Mining, Similarity Measures, Decision Trees.

Learning Outcomes:

By the end of this Unit, the student will be able to Outline Perspective data mining techniques. (L2) Apply similarity measure in clustering. (L3) Develop Decision tree. (L3)

UNIT III

Classification

Issues in Classification, Statistical Based Algorithms, Distance Based Algorithms, Decision Tree Based Algorithms.

Learning Outcomes:

By the end of this Unit, the student will be able to Illustrate Statistical Based Algorithms. (L3) Make use of distance based algorithms. (L3) Examine Decision tree based algorithms. (L4)

UNIT IV

Clustering

Introduction, Similarity and Distance Measures, Outliers, Hierarchical Algorithms, Partitional Algorithms, Minimum Spanning Tree, Squared Error Clustering Algorithm, K- Means Clustering, Nearest Neighboring Algorithm.

Learning Outcomes:

By the end of this Unit, the student will be able to Choose
Hierarchical Algorithms.(L1) Summarize Partitional
Algorithms. (L2)
Organize clusters using K-Means Algorithm. (L3)

UNIT V

Association Rule: Introduction, Large Item Sets, Basic Algorithms, Apriori Algorithm, Sampling Algorithm, Partitioning, Parallel & distributed algorithms, Data parallelism, Task parallelism.

Learning Outcomes:

By the end of this Unit, the student will be able to Explain
Apriori Algorithm. (L2)
Identify Parallel and Distributed algorithms. (L3)

Course Outcomes:

Upon completion of the course, the student is able to relate the steps
in knowledge discovery process. (L2) identify perspective data
mining techniques. (L4) examine the data mining techniques. (L3)

Data Mining- Introductory and Advanced topics, Margaret H.Dunham, Pearson Education, sixth impression, 2009.
Data mining Techniques, Arun K. Pujari, University Press, 2001. Introduction to Data mining with Case Studies, G.K.Gupta, PHI India, 2006.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –V
SPH 393: Cryptography

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble: Cryptography is the cornerstone of computer and communications security. Its foundation is based on various concepts of mathematics such as number theory, computational-complexity theory. The course explains how programmers and network professionals can use cryptography to maintain the privacy of computer data.

To brief the security goals, security services and mechanisms. To outline different Ciphers.
To explain different data encryption techniques. To brief public Key encryption algorithms.
To outline message authentication and Hash functions.

UNIT I

Introduction

Security Goals- Confidentiality, Integrity, Availability, Attacks- Attacks Threatening Confidentiality, Attacks Threatening Integrity, Attacks Threatening Availability, Passive Versus Active Attacks, Services And Mechanism - Security Services, Security Mechanisms, Relation Between Services And Mechanisms, Techniques- Cryptography, Steganography .

Learning Outcomes:

By the end of this Unit, the student will be able to

Spell security Goals.(L1)
Differentiate between Passive attacks and Active attacks.(L1) Identify the relationship between Services and Mechanisms. (L2)

UNIT II

Traditional Symmetric Key Ciphers

Introduction- Kerckhoff's Principle, Cryptanalysis, Categories Of Traditional Ciphers, Substitution Ciphers- Mono Alphabetic Ciphers, Poly Alphabetic Ciphers, Transposition Ciphers- Keyless Transposition Ciphers, Keyed Transposition Ciphers, Combining Two Approaches.

Learning Outcomes:

By the end of this Unit, the student will be able to

Discover Traditional Ciphers. (L3) Able to perform Crypta analysis. (L3)

UNIT III

Data Encryption Techniques

Algorithms For Block And Stream Ciphers, Symmetric Key Encryption, Data Encryption Standard (DES), Advanced Encryption Standard.

Learning Outcomes:

By the end of this Unit, the student will be able to

Understand Block and Stream Ciphers. (L3) Summarize Data Encryption Standards. (L2)

UNIT IV

Algorithms for Public Key Encryption RSA, DH Key Exchange, Digital Signatures. **Learning Outcomes:**

By the end of this Unit, the student will be able to Explain RSA Encryption Algorithm. (L3) Infer Digital Signature. (L3)

UNIT V

Message Authentication and Hash Functions

SHA, WHIRLPOOL .

Learning Outcomes:

By the end of this Unit, the student will be able to

Analyze message Authentication. (L3) Appraise SHA, WHIRLPOOL. (L5)

Text Books:

Cryptography and Network Security, Behrouz A. Forouzan, TMH, Special Indian Edition, 2007 (Unit I and Unit II)

Cryptography and Network Security Principles and Practices, William Stallings, PHI, 4th Edition, 2006.(Unit III, Unit IV and Unit V)

Reference Books:

Cryptography and Network Security, William Stallings, Pearson Education, 4th Edition, 2006 Cryptography and Network Security, Atul Kahate, Tata McGraw-Hill, New Delhi, 2003

Course Outcomes:

By the end of the course the student is able to

Know the importance of security goals, security services and mechanisms. Distinguish between plain text and Cipher text.

Know RSA public Key encryption algorithm. Explain message authentication and Hash functions

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – V
SPH343: Data Mining Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

List of Experiments:

Introduction to the Weka machine learning toolkit Performing data preprocessing for data mining in Weka Classification using the Weka toolkit

Performing clustering in Weka Association rule analysis in Weka Data mining Case Study

B. Sc. (Mathematics, Electronics & Computer Science)

SEMESTER – V

SPH 345: Cryptography Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

List of Experiements:

Study of various cryptographic techniques. Problems on Substitution

techniques.

Problems on Transposition techniques. Introduction to Unix, Vi

Editor.

Usage of the following commands in unix: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, cd.

Usage of following commands in unix : cal, cat(append), cat(concatenate), mv, cp, man, date.

Implement Substitution technique Implement Transposition

technique. Study of Open SSL.

Implement Symmetric key Algorithm – DES using open SSL. Implement Asymmetric key

Algorithm – RSA using open SSL. Implement Hash Algorithm – SHA using open SSL.

Text Books:

1.Cryptography and Network Security by Behrouz A. Forouzan, TMH, Special Indian Ed. 2007. 2.Unix Concepts and Applications ,Sumitabha Das, 4th Edition, TMH,2006.

Reference Books:

Introduction to Unix and Shell Programming M.G. Venkateshmurthy, Pearson, 1st Edition, 2005.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – V
SSE 375: Theory of Equations

Credits Continuous Evaluation:100

General properties of polynomials, Graphical representation of a polynomials, maximum and minimum values of a polynomials

Quadratic Equations, General properties of equations, Descarte's rule of signs positive and negative rule,

Relation between the roots and the coefficients of equations. Symmetric functions, Applications symmetric function of the roots.

Transformation of equations.Solutions of reciprocal and binomial equations.

Algebraic solutions of the cubic and biquadratic.Properties of the derived functions.

Text Books:

W.S. Burnside and A.W. Panton, The Theory of Equations,
Dublin University Press, 1954.
C. C. MacDuffee, Theory of Equations, John Wiley & Sons Inc., 1954.

Course Outcomes:
On successful completion of this course, students will be able to:

Explain properties of polynomials and graphical representation Explain
quadratic equations
Differentiate between roots and the coefficients of equations Explain
tansformation of equations
Solve cubic and biquadratic equations.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – V
SSE 377: Probability and Statistics

Credits Continuous Evaluation:100

Meaning and Scope of the Statistics Introduction, Frequency distribution, Graphic representation of a frequency distribution, measures of central tendency , measures of dispersion, coefficients ofdispersion, moments, skewness, kurtosis

Introduction, meaning of correlation, Karl Pearson s coefficient of correlation, rank correlation.Linear regression, Curve fitting, fitting of straight line, fitting of second degree parabola.

Probability **:** Introduction, definition, axiomatic approach to probability, probability- mathematical notation, probability function, law of addition of probabilities, multiplication law of probability and conditional law of probability, independent events, Baye s theorem.

Random variables and distribution functions: One and two dimensional random variables (discrete and continuous).

Probability distribution: Discrete distributions Binomial, Poisson distributions and their properties and applications.

Text Books:

Fundamentals of Mathematical Statistics S.C. Gupta and V.K. Kapoor, Sultan Chand & Sons
Statistical Methods Combined Edition (Volumes I & II) N G Das, McGraw Hill, 2008,1st edition.
Statistical Methods: Concepts, Application and Computation, Y.P. Aggarwal, Sterling Publishers, 1998.
Introduction to Mathematical Statistics, Robert V. Hogg, Joseph W. Mckean, Allen Thornton Craig, Pearson Education, Asia, 2007.
Mathematical Statistics with Applications, Irwin Miller and Marylees Miller, Pearson Education, Asia, 2006,7th edition.
Introduction to Probability Models, Sheldon M. Ross, Academic Press, IndianReprint, 2007, 9th edition.

Course Outcomes:

On successful completion of this course, students will be able to:

Explain measures of central tendency Explain
measures of dispersion
Differentiate between correlation coefficient and regression Define
probability
Differentiate discrete probability distribution and continuous probability distribution

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B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – V
SSE 379: Combinatorial Optimization

Credits :2 Continuous Evaluation:100 Marks

Introduction
Optimization problems, neighbourhoods, local and global optima, convex sets and functions, simplex method, degeneracy; duality and dual simplex algorithm, computational considerations for the simplex and dual simplex algorithms-Dantzig-Wolfe algorithms.

Integer Linear Programming
Cutting plane algorithms, branch and bound technique and approximation algorithms for travelling salesman problem.

Text Books:

Combinatorial Optimization: Algorithms and Complexity by C.H. Papadimitriou and K. Steiglitz, Prentice-Hall of India, 2006
Optimization by K. Lange, Springer, 2004.
Linear Programming and Network Flows by Mokhtar S. Bazaraa, John J. Jarvis and Hanif **D.** Sherali, John Wiley and Sons, 2004.
Operations Research: An Introduction by H.A. Taha, 8th Ed., Prentice Hall, 2006.

Course Outcomes:
On successful completion of this course, students will be able to:

Explain formulation of mathematical problem for given business problem Explain simplex method to solve linear programming problem Differentiate between simplex and dual simplex algorithms
Explain integer linear programming

B. Sc. (Mathematics, Electronics & Computer Science)

SEMESTER – V

SSE 381: ELECTRICAL CIRCUITS AND NETWORKS SKILLS –II

No. ofhrs/week: 2 **Credits: 2**

Credits: 4 Sessionals: 40 Marks

Preamble: This course was introduced to understand the skills in electrical circuits

Objective: To analyze the skills in electrical circuits and network

UNIT- I

Electric Motors: Single-phase, three-phase &DC motors. Basic design. Interfacing DC or AC sources to control heaters & motors. Speed &power of ac motor.

Learning Outcomes:

To understand single and three phase motors To know the
Speed &power of ac motor

UNIT - II

Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources

Learning Outcomes:

To understand the fundamentals of solid state devices To know the
response of these devices

UNIT – III

Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal. Surge protection. Interfacing DC or AC sources to control elements (relay protection device)

Learning Outcomes:

Able to know about relays and fuses
To understand the DC or AC sources to control elements

UNIT- IV

Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage,

Learning Outcomes:

Able to understand the types of conductors and cables To identify the
losses across the cables

UNIT- V

Power in DC and AC circuits. Insulation. Solid and stranded cable. Conduit. Cable trays.
Splices:
wirenuts, crimps, terminal blocks, split bolts, and solder. Preparation of extension board

Learning Outcomes:

1. To understand various cables and their insulation

2. To know, how to solder the electrical components

Course Outcomes:

To understand single and three phase motors**(L2)**.

To understand the fundamentals of solid state devices (L1). Able to know about relays and fuses**(L5)**.

To identify the losses across the cables**(L4)**.

Text Books:

A text book in Electrical Technology- B L Theraja -S Chand & Co. A text book of

Electrical Technology -A K Theraja

Performance and design of AC machines -M G Say ELBS Edn.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – VI
SPH 362: Numerical Methods

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble: Numerical analysis is the study of algorithms that use numerical approximation for the problems of mathematical analysis. Numerical analysis naturally finds application in all fields of engineering and the physical sciences. Numerical analysis can only be applied to real-world measurements by translation into digits; it gives approximate solutions within specified error bounds.

Objective: The course is framed to extend the student's knowledge about understanding numerical techniques to solve various categories of problems. It will also help in developing deep understanding of the approximation techniques and problem solving capabilities.

UNIT-I

Errors in Numerical Computations: Errors and their accuracy, Mathematical Preliminaries, Errors and their Analysis, Absolute, Relative and Percentage Errors, A general error formula, Error in a series approximation.

Learning Outcomes:

After studying this unit the student can

Understand the different types of errors in numerical computation Know the rules to round off a given number

Understand a general error formula and also error in a series approximation

UNIT-II

Solution of Algebraic and Transcendental Equations: The bisection method, The iteration method, The method of false position, Newton Raphson method, Generalized.

Learning Outcomes

After studying this unit the student can

Understand the usage of intermediate value theorem in locating the roots of an equation

Understand the techniques of bisection method, iteration method, method of false position and also Newton-Raphson method and generalized Newton-Raphson method to find a real root of the given equation.

UNIT-III

System of Simultaneous Equations: Direct methods, Gauss Elimination Method, LU decomposition; Iterative Methods**:** Gauss-Jacobi, Gauss-Siedel and SOR iterative methods. **Learning Outcomes**

After studying this unit the student can

Understand the direct methods such as Gauss elimination method and LU decomposition method to solve the given system of equations

Understand the iterative techniques such as Gauss-Jacobi, Gauss-Siedel and SOR iterative methods to solve the given system of equations numerically

UNIT-IV

Lagrange and Newton Divided difference interpolation: linear and higher order,

Finite difference Operators: Newton forward and backward Interpolations, Central Difference Interpolation Formulae, Gauss's central difference formulae, Stirling's central difference formula, Bessel's Formula

Learning Outcomes

After studying this unit the student can Understand the problem of interpolation

Know the interpolation techniques when the nodes are evenly spaced Know the interpolation techniques when the nodes are unevenly spaced

UNIT-V

Numerical differentiation: forward difference, backward difference and central Differences.

Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule

Learning Outcomes

After studying this unit the student can

Understand the problem of numerical differentiation and numerical integration Know the techniques for numerical differentiation with finite difference operators Know the techniques of Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule

Text Books:

Introductory Methods of Numerical Analysis" by S.S.Sastry published by Prentice Hall of India Pvt. Ltd., New Delhi. (Latest Edition)

"Higher Engineering Mathematics" by B.S. Grewal published by Khanna Publishers "Mathematical Methods" by G. Shanker Rao published by I.K. International Publishing House Pvt. Ltd.

"Finite Differences and Numerical Analysis" by H.C Saxena published by S. Chand and Company, Pvt. Ltd., New Delhi.

Course Outcomes:

Able to understand the numerical techniques for various category of problems Able to develop algorithms for approximation techniques

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – VI
SPH 364: Complex Analysis

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble: Complex analysis is the branch of mathematical analysis that investigates functions of complex numbers and it is known as the theory of functions of a complex variable. Complex analysis naturally finds application in all fields of engineering and the physical sciences. Complex analysis can be applied to real-world problems

Objectives: To introduce
Basic properties of complex numbers Cauchy-
Riemann equations Analytical functions
Contours and their properties
Expansion of the function using taylor's series

UNIT-I
Limits, Limits involving the point at infinity, continuity.Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings.
Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability.
Learning Outcomes:
The student will be able to:
Define limits and continuity
Explain properties of complex numbers
Evaluate problems using Cauchy Riemann equations
Explain differentiation formulas and conditions for differentiability

UNIT-II
Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function, derivatives of functions.
Learning Outcomes:
The student will be able to:
Define analytical function with examples
Evaluate analytical functions for exponential, logarithmic, and trigonometric Explain derivatives of functions

UNIT-III
Definite integrals of functions.Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals.
Learning Outcomes:
The student will be able to:
Explain definite integrals of functions
Describe contours, contour integrals and its properties
Evaluate problems on upper bounds for moduli of contour integrals

UNIT-IV
Cauchy-Goursat theorem, Cauchy integral formula,Liouville's theorem and the fundamental theorem of algebra.Convergence ofsequences and series, Taylor series and its examples.

Learning Outcomes:

The student will be able to:

Explain Cauchy Goursat theorem and its applications Explain Cauchy integral formula with applications Evaluate problems on convergence of sequences and series Explain Taylor's series with examples

UNIT-V

Laurent series and its examples, absolute and uniform convergence of power series.

Learning Outcomes:

The student will be able to:

Evaluate problems on Laurent series Explain absolute convergence of power series Explain uniform convergence of power series

Text Books:

Complex Analysis for Mathematics and Engineering,
John H. Mathews and Russell W. Howell ,Jones and Bartlett Publishers, 5th edition.

Complex Variables and Applications James Ward Brown and Ruel Vance Churchill Mc Graw-Hill Higher Education, 8th edition.

Complex Analysis ,Joseph Bak and Donald J. Newman, Springer- Verlag New York, Inc., New York, 1997,2nd edition.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – VI
SPH 366: Linear Programming

Hours per week: 4
Credits: 4

End Examination: 60 Marks
Sessionals: 40 Marks

Preamble: Linear programming is a mathematical technique for maximizing or minimizing a linear function of several variables, such as output. Linear programming is a part of operations research. Linear programming finds application in all fields of engineering, physical sciences and life sciences. Linear programming can be applied to solve real world problems.

Course Objectives:

To introduce formulation of linear programming model
To discuss the methods to solve linear programming problems
To study the optimality and unboundedness in a linear programming problem To know the applications of sensitivity analysis

Unit-I

Linear Programming Problems, Graphical Approach for Solving some Linear Programs.Convex Sets, Supporting and Separating Hyperplanes.

Learning Outcomes:

The student will be able to:
Formulate linear programming model for a business problem Explain graphical approach to solve linear programming problem Evaluate problems on convex sets
Explain about hyperplanes

Unit-II

Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format

Learning Outcomes:

The student will be able to:
Explain simplex method to solve linear programming problem Evaluate optimality and unboundedness in a linear programming problem Evaluate problems using simplex algroithm

Unit-III

Introduction to artificial variables, two-phase method, Big-M method and their comparison.

Learning Outcomes:

The student will be able to:
Solve problems on two phase method
Explain problems on Big-M method
Compare two phase method and Big-M method

Unit-IV

Duality, formulation of the dual problem, primal- dual relationships, economic interpretation of the dual.

Learning Outcomes:

The student will be able to:

Explain duality and formulation of the dual problem
Differentiate primal- dual problems
Explain economic interpretation of the dual problem over primal problem

Unit-V

Sensitivity analysis.

Learning Outcomes:

The student will be able to:

Study the uncertainty in the output of a mathematical model which can be divided and allocated to different sources of uncertainty in its inputs
Provide examples using sensitivity analysis Apply sensitivity analysis on various problems

Text Books:

Operations Research" by S.D. Sharma , Kedarnath and Ramnath Co.
Linear Programming and Network Flows, Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali , John Wiley and Sons, India, 2004, 2nd edition.
Introduction to Operations Research,Frederick S. Hiller and Gerald J. Lieberman TataMcGraw Hill, Singapore, 2004, 8th edition.
Operations Research: An Introduction, Hamdy A. Taha , Prentice-HallIndia, 2006, 8th edition.

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B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –VI
SPH 372: Microcontrollers & Applications

Hours per week: 4
Credits: 4

End Examination: 60 Marks Sessionals: 40 Marks

Preamble: Objective:

This course was introduced to understand the basics of Microcontroller and its applications
To understand the architecture and then programme it

UNIT- I

8051Architecture

Introduction to Microcontroller - Comparison of Microcontroller& Microprocessor-8051 Microcontroller - Block diagram - I/O pins, ports and circuits - External memory - Counter and Timers -Serial data I/O - Interrupts

Learning Outcomes:

To understand the Functional block diagram of 8051 To know the 8051's I/O pin-out diagram

UNIT - II

8051 Instruction Set

Classification of instruction set-Addressing Modes – Logical operation: Byte level - Bit level-Rotate and Swap operation.**ARITHMETIC OPERATIONS**- Instructions affecting flags - Incrementing and Decrementing - Addition -Subtraction - Multiplication and Division
- Example Programs

Learning Outcomes:

1. To learn the classification of instruction set and addressing modes
2. Must understand the arithmetic operations

UNIT – III

Jump and Call Instruction

Introduction - The Jump and Call program Range- Jumps: Bit - Byte Unconditional: Calls and Subroutine -Interrupts and Returns – Example programs. Time delay generation and calculation, Timer/Counter programming, accessing a specified port terminal and generating a rectangular waveform.

Learning Outcomes:

Able to know the range of jumps
To understand the time delay generation and calculation for waveform generation

UNIT- IV

Interfacing

Keyboards - Displays - Stepper motor - ADC & DAC

Learning Outcomes:

Able to understand, how to interface external devices Writing programs for interfacing devices

UNIT- V

Introduction to Other Microcontrollers

6509 - PIC controllers -6575 series - Introduction to Embedded Systems.

Learning Outcomes:

To understand the functional block diagram of 6509

To know, what is an embedded system and its applications

Course Outcomes:

Learn the architecture of 8051, its pin diagram**(L2)**.

Learn about the microcontrollers and the organization of microcontroller based **systems** (L1).

Acquire knowledge of microcontrollers and their role in I/O port programming and their interface with peripherals**(L5)**.

Learn about analog to digital and digital to analog convertors**(L4)**. Learn basics of programming and other controllers**(L3)**

Text Books:

Kenneth 1. Ayala, "The 8051 Microcontroller, Architecture, Program and Application" Pen ram International.

Muhammed Ali Mazidi, Janice GillispieMazidi "The 8051 Microcontroller and Embedded Systems" -Low PriceEdition.

Microprocessors & Microcontrollers by N. SenthiIkumar, M. Saravanan & S. Jeevananthan,1edition. Oxford press (Helpful for interfacingapplications)

Microcontrollers: Theo & App by Ajay V. Deshmuk Tata McGraw-Hill Education, 2005.

References:

Programming and customizing the 8051 Microcontroller- byMykePredko-TMH Design with Microcontrollers by-J.B.PeatmaTMH

Microcontroller Hand Book, INTEL,2008.

Microprocessor, Microcontroller & Applications by D.A Godse A.P Godse Technical Publications 2008.

B. Sc. (Mathematics, Electronics & Computer Science)

SEMESTER –VI

SPH 374: VLSI Design

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble: This course was designed to learn the basics of VLSI technology

Objective: To understand various technologies of VLSI design

UNIT- I

CMOS Technology

brief History-MOS transistor, Ideal I-V characteristics, C-V characteristics, Non ideal I-V effects, DC transfer characteristics - CMOS technologies, Layout design Rules, CMOS process enhancements, Technology related CAD issues, Manufacturing issues.

Learning Outcomes:

To understand the MOS technology To know the technology related issues

UNIT - II

Circuit Characterization and Simulation

Delay estimation, Logical effect and Transistor sizing, Power dissipation, Interconnect, Design margin, Reliability, Scaling- SPICE tutorial, Device models, Device characterization, Circuit characterization, Interconnect simulation.

Learning Outcomes:

To studyvarious device models Must understand the simulation

UNIT – III

Combinational and Sequential Circuit Design

Circuit families -Low power logic design - comparison of circuit families - Sequencing static circuits, circuit design of latches and flip flops, Static sequencing element methodology- sequencing dynamic circuits – synchronizers

Learning Outcomes:

Able to know the low power logic design To understand the circuit design

UNIT- IV

CMOS Testing

Need for testing- Testers, Text fixtures and test programs- Logic verification- Silicon debug principles- Manufacturing test - Design for testability - Boundary scan.

Learning Outcomes:

Able to understand, how to test devices To know how to handle the text fixtures

UNIT- V

Specification Using Verilog HDL

Basic concepts- identifiers- gate primitives, gate delays, operators, timing controls, procedural assignments conditional statements, Data flow and RTL, structural gate level switch level modeling, Design hierarchies, Behavioral and RTL modeling, Test

Benches, Structural gate level description of decoder, equality detector, comparator, priority encoder, half adder, full adder, Ripple carry adder, D latch and D flip flop.

Learning Outcomes:

To understand the basic concepts of VHDL language

To develop the design skills by writing the VHDL programmes

Course Outcomes:

To understand the MOS technology**(L2)** Must understand the simulation process **(L1**).

Able to know the low power logic design**(L5)**. Learn the basics of programming**(L3)**

Learn by writing the VHDL programmes**(L4)**.

Text Books:

Weste and Harris: CMOS VLSI DESIGN (Third edition) Pearson Education. 2.Uyemura J.P: Introduction to VLSI circuits and systems, Wiley.

References:

D.A Pucknell& K. Eshraghian Basic VLSI Design, Third edition, PHI Wayne Wolf, Modern VLSI design, Pearson Education

M.J.S. Smith: Application specific integrated circuits, Pearson Education J.Bhasker: Verilog HDL primer, BS publication

Ciletti Advanced Digital Design with the Verilog HDL, Prentice Hall of India

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –VI
SPH 392: Information Security

Hours per week: 4
Credits: 4

End Examination: 60 Marks
Sessionals: 40 Marks

Preamble:
Information security (IS) is designed to protect the confidentiality, integrity and availability of computer system data from those with malicious intentions. Confidentiality, integrity and availability are sometimes referred to as the CIA Triad of information security. This course gives an overview of security issues, cryptography and public key encryption methods.

Objectives:
To introduce critical characteristics of Information. To emphasize the need for security.
To elaborate security threats.
To explain classical encryption techniques.

UNIT I
Introduction to Information Security
Introduction, The History of Information Security, What Is Security? Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing Components, Balancing Information Security and Access.
Learning Outcomes:
By the end of this Unit, the student will be able to

Familiarize with the history of information security.

Understand balance between information security and information acess.

UNIT II
Approaches to Information Security Implementation
The Systems Development Life Cycle, The Security Systems Development Life Cycle, Security Professionals And The Organization, Is It An Art Or A Science? Information Security Terminology. **The Need For Security**: Introduction, Business Needs First, Threats, Attacks.
Learning Outcomes:
By the end of this Unit, the student will be able to

Illustrate Security System Life Cycle. (L2)
Know the difference between a threat and an attack. (L2)

UNIT III
Overview of Security
Protection Versus Security, Aspects Of Security – Data Integrity, Data Availability, Privacy, Security Problems, User Authentication. **Security Threats:** Program Threats, Worms, Viruses, Trojan horse, Trap Door, Stack and Buffer Overflow. **System Threats:** Intruders, Communication Threats-Tapping and Piracy.

Learning Outcomes:
By the end of this Unit, the student will be able to

Distinguish Protection and Security. (L3) Identify different security threats. (L2) Explain the System Threats. (L2)

UNIT IV

Cryptography: Classical Encryption Techniques, Substitution and Transposition Techniques. Symmetric Key Algorithms: Data Encryption Standard, Advanced Encryption Standards.

Learning Outcomes:

By the end of this Unit, the student will be able to

Take part of classic Encryption Techniques. (L4) Construct Symmetric Key Algorithms. (L3)

UNIT V

Public Key Encryption: RSA, Diffie Hellman Key Exchange, ECC Cryptography, Digital Signatures.

Message Authentication: MAC, Hash Functions. Message Digests, SHA, WHIRLPOOL.

Learning Outcomes:

By the end of this Unit, the student will be able to

Demonstrate Public Key Encryption. (L2) Label Message Authentication. (L1)

Text Books:

Principles of Information Security By Michael E. Whitman And Herbert J.Mattord, Thomas India Edition, 2011.

Cryptography And Network Security Principles and Practices By William Stallings Prentice- Hall Of India ,4th Ed, 2006.

Reference Books:

Computer Security: Art And Science, Mathew Bishop, Addison-Wesley, 2003.

Computer Security Principles And Practice By William Stallings, Lawrie Brown, 2/E, Pearson, 2012.

Course Outcomes:

By the end of the course the student is able to Identify critical characteristics of Information. The necessity of security.

Name different security threats.

Know classical encryption techniques. Perform Message Authentication

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –VI
SPH 394 : Database Applications

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble

Database management has evolved from a specialized computer application to a central component of a modern computing environment. The knowledge about database systems has become an essential part of an education in computer science.

To explain the purpose of data base system. To design data base.
To build ER model. To write SQL queries.
To write application programs in JSP

Introduction: Database-Systems Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture.

After completion of this unit, student will be able to understand database, data storage and querying.(L3) Know about transaction management.(L2)

Database Design and E-R Model: Overview, Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features, Other Aspects of Data Design. **Introduction to Relational Model:** Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Operations.

After completion of this unit, student will be able to learn entity, relationship.(l1)
write database schema.(L2) perform relational operations. (L3)

Unit -III

SQL: Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub queries, Modification of the Database. **Intermediate SQL:** Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization.

Learning Outcomes:

After completion of this unit, student will be able to to perform aggregate functions.(L4)
to execute schemas .(L4)

Unit – IV

Advanced SQL: Functions and Procedures, Triggers, Advanced Aggregate Features. **Query Processing:** Steps In Query Processing, Measures Of Query Cost, Selection Operation – Basic Algorithm, Selection Using Indices, Selections Involving Comparisons, Implementation of Complex Selections, Sorting, Join Operation – Nested Loop Join, Block Nested Loop Join, Evaluation of Expressions.

Learning Outcomes:
After completion of this unit, student will be able to to
implement triggers.(L5)
to execute nested loops.(L5)

Unit – V

Application Design and Development: Application Programs and User Interfaces, Web Fundamentals, Servlets and JSP, Application Architecture, Rapid Application Development, Application Security, Encryption and its applications.

Learning Outcomes:
After completion of this unit, student will be able to Develop
application programs and user interface.(L4) Understand encryption
and its applications.(L3)

Course Outcomes:
Upon completion of the course, the student is able to Know
about data base and its architecture. (L2) Learn transaction
management.(L2)
Use SQL Queries in retrieving data from data base. (L4)

Text Book:

Database System Concepts, 6th Edition,Avi Silberschatz, Henry F. Korth ,S. Sudarshan
Tata McGraw-Hill,2011.

Reference Books:

SQL, PL/SQL- The Programming Language of Oracle Ivan Bayross , BPB, 4th Edition.
Fundamentals of Database Systems by Ramez Elmasri, Shamkant B Navathe,
7th Edition, Pearson, 2015.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –VI
SPH 396: Computer Networks

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble: A computer network defined as a set of computers connected together for the purpose of sharing resources. With the result of rapid technological progress in the 21st century there is a lot progress in collecting, transporting, storing, and processing information. Organizations with hundreds of offices spread over a wide geographical area routinely expect to be able to examine the current status of even their most remote outpost at the push of a button.

To introduce the connecting devices and IEEE standards To illustrate
transmission modes, Multiplexing.
To analyze network addressing.
To introduce about primary and secondary servers

UNIT-I

Connecting Devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two-Layer Switches, Routers, Three-Layer Switches, Gateway. Backbone Networks – Bus Backbone, Star Backbone, Connecting Remote LANs. Virtual LANs : Membership, Configuration, Communication Between Switches, IEEE Standard, Advantages. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to Summarize
Hubs, repeaters, Bridges, switches. (L2) Understand virtual LANS,
IEEE standards. (L3) Develop communication between switches.
(L3)

UNIT- II

Digital Transmission: Transmission Modes - Parallel Transmission, Serial Transmission. **Multiplexing :** Frequency Division Multiplexing, Wavelength Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Understand transmission modes
- Infer Multiplexing

UNIT-III

Network Layer : Logical Addressing – IPv4 Addresses : Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation. IPv6 Addresses: Structure, Address Space.

Internet Protocol : Internetworking , Need for Network Layer, Internet as a Datagram Network, Internet as a Connectionless Network. IPv4 : Datagram, Fragmentation, Checksum, Options. (12)

Learning Outcomes:
By the end of this Unit, the student will be able to Distinguish
IPv4 and IPv6 addressing modes. (L4) Identify fragmentation and
checksum. (L3)

UNIT-IV

Transport Layer: Process-to-Process Delivery - Client/Server Paradigm, Multiplexing and Demultiplexing, Connectionless versus Connection Oriented Service, Reliable Versus Unreliable, Three protocols.

User Datagram Protocol : Well-Known Ports for UDP, User Datagram, Checksum, UDP Operation, Use of UDP. (10)

Learning Outcomes:
By the end of this Unit, the student will be able to
Able to understand connectionless and connection oriented services. Distinguish between reliable and unreliable services.
Understand the three protocols. (L3)

UNIT-V

Congestion Control and Quality of Service: Data Traffic -Traffic Descriptor, Traffic Profiles.

Congestion : Network Performance, Congestion Control - Open Loop Congestion Control, Closed Loop Congestion Control.

Application Layer: Domain Name System - Name Space - Flat Name Space, Hierarchical Name Space. Domain Name Space - Label, Domain Name, Domain.

Distribution of Name Space: Hierarchy of Name Servers, Zone, Root Server, Primary and Secondary Servers. (10)

By the end of this Unit, the student will be able to Outline
data traffic and traffic profiles.(L2)
Distinguish open loop congestion and closed loop congestion. (L3) Identify primary and secondary Servers. (L4)

Course Outcomes:
Upon completion of the course, the student is able to To spell
how the connecting devices works.
To distinguish connection oriented and connectionless services. To describe
congestion contral

Text Book :
Data Communication and Networking by Behrouz A Forouzan,
Tata McGraw Hill, 4th Edition, 2006.

Reference Books :
Data and Computer Communications ,William Stallings, Pearson, 9th Edition,2013. Computer Networks ,Andrew S. Tanenbaum, Prentice Hall, 5th Edition,2013.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – VI

SPH 334: Numerical Methods Tutorial

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

Problems on absolute , relative and percentage errors Find a root of

an equation using bisection method Find a root of an equation using

the iteration method

Find a root of an equation using the method of false position Find a root of

an equation using Newton Raphson method

Solving system of simultaneous equations using Gauss elimination method Solving system

of simultaneous equations using LU decompoostion method Solving system of simultaneous

equations using Gauss-Jacobi method Solving system of simultaneous equations using

Gauss-Siedel method Problems using Newton's forward and backward interpolation

formulae Problems using divided difference and Lagrange's interpolation formulae

Problems using Stirling's and Bessel's formulae

Problems on Trapezoidal and simpson's rules for Numerical integration

Course Learning Outcomes:
On successful completion of this course, students will be able to:

Evaluate solution of algebraic and transcendental equations Understand the numerical techniques for various category of problems Evaluate problems on system of simultaneous equations
Solve problems on interpolation to estimate the function and function value.
Solve problems on Numerical integration

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – VI

SPH 333: Complex Analysis Tutorial

Credits: 2 Continuous Evaluation: 100 Marks

Problems on Cauchy-Riemann equations Problems on

analytical functions Problems on contour integration

Problems on Cauchy Goursat theorem Problems on

Cauchy integral formula Problems on Taylor's series

Problems on Laurent series

Problems on absolute and uniform convergence of power series

Course Outcomes:
On successful completion of this course, students will be able to:

Define analytic function
Evaluate problems on analytic functions Understand
contour integration
Evaluate problems on Cauchy Goursat theorem and Cauchy integral formula Solve
problems on Taylor's series
Solve problems on Laurent series

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – VI

SPH 338: Linear Programming Tutorial

Credits :2 Continuous Evaluation:100 Marks

Formulation of Linear programming problem Graphical

approach to solve LP problem Problems on convex sets

Simplex method to solve LPP Two Phase

method to solve LPP Big-M method to solve

LPP Formulation of dual problem Problems on

primal –dual

Course Outcomes:
On successful completion of this course, students will be able to:

Formulate Linear Programming Model
Evaluate Linear programming problems using graphical approach Understand convex sets with examples
Evaluate LP problems using simplex method
Solve LP problems using two phase method and Big- M method Solve problems on primal and dual

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –VI
SPH 328: Microcontrollers & Applications Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

Preamble: Objective: This course was designed to perform arithmetic, logical and interfacing programs.
The student will be able to understand then applies the written programs.

List of Experiments

Multiplication of two numbers using MUL Command (later using counter method for repeated addition)

Division of two numbers using DIV command (later using counter method for repeated subtraction)

Pick Largest & smallest number among a given set of numbers

Interface a DAC & Generate a stair case wave form with step duration and no. of steps as variables.

Interface a stepper motor and rotate Clockwise or anti clockwise through given angle step.

Using Keil software, write a program to pick the smallest among a given set of numbers.

Using Keil software, write a program to pick the largest among a given set of numbers.

Using Keil software, write a program to generate a rectangular wave form at a specified port terminal.

Course Outcomes:
After the completion of this course, the student will be able to write the programs and also controls basic interfacing devices **(L2 and L3)**

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –V
SPH 330: VLSI Design Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

Preamble: Objective: This course was designed to perform simulation programmes in VHDL The student will be able to understand then applies the written programs

List of Experiments

Study of Simulation using tools

Design Entry and Simulation of Combinational Logic Circuits

a) Basic logic gates b) Half adder and full adder

c) Half Subtractor and full sub tractor d) 8 bit adder

3. Design Entry and Simulation of Combinational Logic Circuits

a) 4 bit multiplier b) Encoder and Decoder c) Address Decoder d) Multiplexer

4. Design Entry and Simulation of Sequential Logic Circuits

a) Flip-Flops b) Counter

Study of Synthesis tools

Place and Route and Back annotation for FPGAs Schematic

Entry and SPICE Simulation

a) CMOS Inverter b) Universal Gate c) Differential Amplifier

8. Layout of a CMOS Inverter

Course Outcomes:
After the completion of this course, the student will be able to write the programs to simulate basic combinational and sequential circuits **(L2 and L3)**

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – VI
SPH346: Database Applications Lab

Hours per week: 4 Continuous Evaluation: 100 Marks
Credits: 2

List of Experiments

Perform Table Creation using SQL.

Perform Insertion, Deletion, Updation using SQL. Perform Table

Creation using Constraints Specification. Perform Simple SQL

Queries.

Perform Simple Queries using Logical operators. Perform

Simple queries using Date functions.

Perform Simple queries using String Functions. Perform

Simple PL/SQL program.

Perform PL/SQL programs using if, for, while. Perform

Grant, Revoke privileges.

Perform Programs on Exception Handling.

Create a Database- define Procedures, Functions, Triggers.

Text Books:

1.SQL, PL/SQL- The Programming Language Of Oracle, Ivan Bayross , BPB, 4th Ed. 2010. 2.Oracle Database 11g- The Complete Reference , Kevin Loney, TMH, Indian Edition, 2008.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – VI
SPH 348: Computer Networks Lab

Continuous Evaluation: 100 Marks

Hours per week: 4

List of Experiments:

Study of Network Devices in detail.
Study of different types of Network Cables and practically implement the cross-wired cable and straight cabling.
Study of Network IP.
Study of Basic Network Commands and Network Configuration commands. Network Sharing.
Connect Two Computers (One to One). Connect Computers in a LAN. Configuring a Switch.
Client – Server configuration. Study of Network tools.

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER –VI
SSE 372: Basic Instrumentation Skills – II
Sessionals: 100 Marks

Hours per week: 2

Preamble: This course was designed to learn the instrumentation skills Objective: Able to handle various instruments

UNIT- I
Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators. Pulse generator, and function generator. Brief idea for testing, specifications, Distortion factor meter, wave analysis

Learning Outcomes:
To understand signal generation instruments To know their specifications

UNIT - II
Impedance Bridges: Block diagram of bridge, working principles of basic balancing type) RLC bridge, Specifications of RLC bridge

Learning Outcomes:
1. To study different bridge circuits
2. Must understand their operation

UNIT – III
Q-Meters: Block diagram &working principles of a Q-Meter, Digital LCR bridges.

Learning Outcomes:
Able to understand the block diagrams To know their principle of working

UNIT- IV
Digital Instruments: Principle and working of digital meters. Comparison of analog &digital instruments, Characteristics of a digital meter, working principles of digital voltmeter **Learning Outcomes:**
Able to understand thedigital technology
To know how to handle the digital instruments

UNIT- V
Digital Multimeter: Block diagram and working of a digital multimeter working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time-base stability, accuracy and resolution.

Learning Outcomes:
To understand the basic concepts of digital multimeter
To develop the skills to make measurements using digital multimeter

Course Outcomes:

To understand signal generation instruments **(L2).**
Must understand the operation of various instruments **(L1**). To study different bridge circuits **(L5)**.
Able to know the digital technology **(L3).**
To know how to handle the digital instruments **(L4)**.

Reference Books:

A text book in Electrical Technology -B L Theraja -S Chand and Co. Performance and design of AC machines -M G Say ELBS Edn.
Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill. Logic circuit design, Shimon P. Vingron, 2012, Springer.
Digital Electronics, SubrataGhoshal, 2012, Cengage Learning.
Electronic Devices and circuits, S. Salivahanan& N.S. Kumar, 3rd Ed., 2012, Tata McGraw Hill.
Electronic circuits: Handbook of design and applications, U. Tietze, Ch. Schenk, 2008, Springer
8. Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – VI
SSE 378: Graph Theory

Credits :2 Continuous Evaluation:100 Marks

Definition, examples and basic properties of graphs, pseudo graphs.
Complete graphs, bi- partite graphs, isomorphism of graphs

Paths and circuits Eulerian circuits, Hamiltonian cycles, the adjacency matrix Weighted graph, Spanning trees, Kruskal's algorithm ,Travelling salesman's problem
Shortest path algorithms :Dijkstra's algorithm, Floyd- Warshall algorithm.

Text Books:

Discrete Mathematics with Graph Theory, Edgar G. Goodaire and Michael M. Parmenter, Pearson Education (Singapore) P. Ltd., Indian Reprint, 2003,2nd edition.
Applied Abstract Algebra,Rudolf Lidl and Gunter Pilz, Springer (SIE), Indian reprint,2004, 2nd edition .

Course Learning Outcomes:
On successful completion of this course, students will be able to:

Define graph and its properties Explain
different types of graphs
Explain Eulerian circuits and Hamiltonian cycles
Understand kruskal's algorithm to find minimum spanning tree Evaluate
problems on Dijkstra's algorithm

B. Sc. (Mathematics, Electronics & Computer Science)
SEMESTER – VI
SSE 380 : Concepts of Ethical Hacking

Credits :2 Continuous Evaluation:100 Marks

Ethical Hacking overview - Hacking Laws - Footprinting - Google Hacking – Scanning – Enumeration - System Hacking - Trojans and Backdoors -Viruses and Worms - Sniffers - Social Engineering -Denial of Service - Buffer Overflows -Web Servers and Applications - Hacking Wireless Networks - Cryptography - Hacking with Linux - IDS, Firewalls, Honeypots - Penetration Testing.

Text Books:

Hands-On Ethical Hacking and Network Defense – By Michael T. Simpson, Kent Backman, James Corley , Cengage Learning, 2010.
Official Certified Ethical Hacker Review Guide – By Steven DeFino, Barry Kaufman, Nick Valenteen, Cengage Learning, 2009.
The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy By Patrick Engebretson ,Second Edition 2013.