Solapur University, Solapur

Faculty of Science

Credit and Grading System

(June, 2014)

Solapur University, Solapur

Faculty of Science

Credit and Grading System

(W.e.f. June, 2014)

- Title of the Course: **B.Sc. – I (Entire Computer Science)**
- Subject : **Computer Science**

The Credit and Grading System

With the view to ensure worldwide recognition, acceptability, horizontal as well as vertical mobility for students completing under graduate degree, the Solapur University is implementing Credit and grading system of Evaluation at Undergraduate level.

Credit is a numerical value that indicates student's work load (Lectures, Lab work, Seminars, Tutorials, Field work, etc.) to complete a course unit. In most of the universities 15 contact hours constitute one credit. The contact hours are transformed into Credits. As per present norms, there are 4 contact hours per paper (subject) per week which works out to be 60 contact hours per paper (subject) per semester.

In Solapur University, for B. Sc.-I, there are 4 optional subject and one (English) compulsory subject. For B. Sc.-I, there are 5 contact hours per paper (subject) per week for optional subject and 4 contact hours for English. Therefore, total contact hours per week are 24. Each subject has 75 contact hours, which are transformed into 5 credits. As there are 4 contact hours per week for English, 4 credits shall be assigned for English subject.

Moreover, the grading system of evaluation is introduced for B. Sc. course, wherein process of Continuous Internal Evaluation is ensured. The candidate has to appear for Internal Evaluation of 30 marks and University Evaluation for 70 marks. It is 70 + 30 pattern of evaluation. It is applicable for theory and practical as well. The details regarding this evaluation system are as under.

Conversion of marks into Grades

A table for the conversion of the marks obtained by a student in each paper (out of 100) to grade and grade points is given below.

Sr. No	Range of Marks	Grade	Grade Point
1.	80-100	O	10
2.	70-79	A+	9
3.	60-69	A	8
4.	55-59	B+	7
5.	50-54	B	6
6.	45-49	C+	5
7.	40-44	C	4
8.	<39	FC	0 (Failed in Term Exam)
9.	<39	FR	0 (Failed in Internal Assessment)

1. **Grade Point Average at the end of the Semester (SGPA**)

$$SGPA = \frac{(G_1 \times C_1) + (G_2 \times C_2) + \ \ldots\ldots\ldots}{\sum C_i}$$

($\sum C_i$ - The total number of credits offered by the student during a semester)

2. Cumulative Grade Point Average (CGPA)

$$CGPA = \frac{(G_1 \times C_1) + (G_2 \times C_2) + \ \ldots\ldots\ldots}{\sum C_i}$$

$\sum C_i$ - the total number of credits offered by the student upto and including the semester for which CGPA is calculated.)

3. **Final Grade Point Average (FGPA)** will be calculated in the similar manner for the total number of credits offered for completion of the said course.

Where: C_i: Credits allocated for the ith course

G_i: Grade point scored in ith paper (Subject)

4. Conversion of average grade points into grades

SGPA/CGPA/FGPA	Letter Grade
9.5 – 10	O
8.5 -9.49	A+
7.5 – 8. 49	A
6.5 – 7.49	B+
5.5 – 6. 49	B
4.5 – 5. 49	C+
4.0 – 4. 49	C
< 3.99	FC /F
	FR

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Credit System Structure for B.Sc. – I, Semester – I (Entire Computer Science)

Class	Sem	Subject	No. of Papers/ Practicals	Hrs/Week			Paper Marks	UA	CA	Credits	Total
				L	T	P					
B.Sc. I	I	English	English paper I (compulsory)	4	-	-	100	70	30	4	
		Computer Science	ECS101 – Computer Fundamentals and Programming using C – I	5	-	-	100	70	30	5	
		Computer Science	ECS102 – Linear and Digital Electronics – I	5	-	-	100	70	30	5	
		Computer Science	ECS103 – Graph Theory and Numerical Methods	5	-	-	100	70	30	5	
		Computer Science	ECS104 – Descriptive Statistics and Probability Theory – I	5	-	-	100	70	30	5	
Total				**24**			**500**			**24**	**24**
Grand Total				**24**			**500**			**24**	**24 credits**

Abbreviations: L: lectures, T: Tutorials, P: Practicals; UA: University Assessment by End Semester Examination; CA: College assessment by Internal Continuous Examination
UA (University Assessment): University Theory paper shall be of 70 marks for 3.00 hrs duration
CA (College Assessment): The internal examination for Theory and Practical course.

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Credit System Structure for B.Sc. I, Semester II (Entire Computer Science)

Class	Sem	Subject	No. of Papers/ practicals	Hrs/Week			Paper Marks			Practical			Credits
				L	T	P		UA	CA	Marks	UA	CA	
B.Sc. I	II	English	English paper II (compulsory)	4	-	-	100	70	30				4
		Computer Science	ECS201 –Computer Fundamentals and Programming using C – II	5	-	-	100	70	30	100	70	30	5
		Computer Science	ECS202 – Linear and Digital Electronics – II	5	-	-	100	70	30	100	70	30	5
		Computer Science	ECS203 – Algebra and Operations Research	5	-	-	100	70	30	100	70	30	5
		Computer Science	ECS204 – Descriptive Statistics and Probability Theory – II	5	-	-	100	70	30	100	70	30	5
Total				**24**			**500**			**400**			**24**
		Practical - Computer Science	LAB – I: Laboratory Course in Computer Science	-	-	4							4
		Practical - Computer Science	LAB – II: Laboratory Course in Electronics	-	-	4							4
		Practical - Computer Science	LAB – III: Laboratory Course in Mathematics	-	-	4							4
		Practical - Computer Science I	LAB – IV: Laboratory Course in Statistics	-	-	4							4
Total				**24**		**16**	**500**			**400**			**16**
Grand Total										**900**			**40**
B.Sc.	**Part I**									**1400**			**24+40=64**

Abbreviations: L: lectures, T: Tutorials, P: Practicals; UA: University Assessment by End Semester Examination; CA: College assessment by Internal Continuous Examination
UA (University Assessment): University Theory paper shall be of 70 marks for 3.00 hrs duration
CA (College Assessment): The internal examination for theory and Practical course.

- LAB – I: Laboratory Course in Computer Science is based on papers ECS101 and ECS201
- LAB – II: Laboratory Course in Electronics is based on papers ECS102 and ECS202
- LAB – III: Laboratory Course in Mathematics is based on papers ECS103 and ECS203
- LAB – IV: Laboratory Course in Statistics is based on papers ECS104 and ECS204

General Guidelines for Credit and Grading System

1. The University follows Semester system
2. An academic year shall consist of two semesters
3. Each B.Sc. course shall consist of three years i.e. six semesters
4. B.Sc. Part – I shall consist of two semesters: Semester I and Semester II. In semester – I, there will be one theory paper of 100 marks for each subject. There shall be four optional science subjects and English paper-I compulsory for every student. Similarly, in semester – II there will be one theory paper of 100 marks for each subject. There shall be four optional science subjects and English paper-II compulsory for every student. The scheme of evaluation of performance of candidates shall be based on University assessment as well as College internal assessment as given below. For B.Sc. Part I Semester I & II the internal assessment will be based on Unit tests, Home assignment, viva, practicals etc as given below. Practical course examination of 100 marks shall be conducted at the end of second semester. The practical examination of 100 marks shall also consist of 70 marks for University practical assessment and 30 marks for college internal assessment. For University practical examination out of two examiners, one examiner will be internal and another examiner will be External. Both examiners will be appointed by the University. The internal practical assessment shall be done as per scheme given below.

5. Scheme of evaluation
As per the norms of the grading system of evaluation, out of 100 Marks, the candidate has to appear for College internal assessment of 30 marks and external evaluation (University Assessment) of 70 marks. The respective B.O.S. may decide the nature of College internal Assessment after referring to the scheme given below or may be used as it is.

The details are as follows:

Semester - I:
University Examination (70 Marks): No. of Theory papers: 1 Papers/Subject (Total 5 Papers)
Internal Continuous Assessment (30 Marks):
Scheme of Marking: 20 Marks: Internal Test
10 Marks: Home assignment/Tutorials/Seminars/ Group discussion/ Viva/Field visit/Industry visit.

Semester - II:
Theory:
University Examination (70 Marks): No of Theory papers: 1 Papers/Subject (Total 5 Papers)
Internal Evaluation (30 Marks):
Scheme of Marking: 20 Marks: Internal Test
10 Marks: Home assignment/Tutorials/ Seminars/ Group discussion/ Viva/ Field visit/Industry visit.
Practical8
University Examination (70 Marks): No of Practicals: 1 Papers/Subject (Total 4 Practicals)
Internal Evaluation (30 Marks):
Scheme of Marking: 20 Marks: Internal Test on any two practicals
10 Marks: Lab Journal/viva, attendance, attitude etc.

6. Passing Standard
The student has to secure a minimum of 4.0 grade points (Grade C) in each paper. A student who secures less than 4.0 grade point (39% or less marks, Grade FC/FR) will be declared fail in that paper (subject) and shall be required to reappear for respective paper. A student who failed in University Examination (Theory) & passed in internal assessment

of a same paper (subject) shall be given FC Grade. Such student will have to appear for University Examination only. A student who fails in Internal Assessment and passed in University examination (Theory) shall be given FR Grade. Such student will have to appear for both University examination as well as internal assessment. In case of year down candidates from the mark scheme the candidates shall appear for the same 70 marks paper of the external examination and his performance shall be scaled to 100 marks.

ATKT

Candidate passed in all the papers except 5 (five) heads including theory as well as practicals together of the semester I and Semester II of B.Sc. Part I examination shall be permitted to enter upon the course of Semester III of B.Sc.Part II

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Nature of Question Paper for Credit-Grading Semester Pattern

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Time: - 3.00 hrs. Total Marks- 70

Section - I

Q. No.1) Multiple choice questions (5)

i) ----------

a) b) c) d)

ii)

iii)

iv)

v)

Q.No.2) Answer any five of the following (10)

i)

ii)

iii)

iv)

v)

vi)

vii)

Q.No.3 A) Write short notes on any Two of the following (10)

i)

ii)

iii)

B) Answer any one of the following (10)

i)

ii)

Section - II

Q. No. 1) Multiple choice questions. (5)

i) ----------

a) b) c) d)

ii)

iii)

iv)

v)

Q.No.2) Answer any five of the following (10)

i)

ii)

iii)

iv)

v)

vi)

vii)

Q.No.3 A) Write short notes on any Two of the following (10)

i)

ii)

iii)

B) Answer any one of the following (10)

i)

ii)

Term: SEM-I separate passing Head: No, Min. Papers: Max. Papers: Max:
The papers under Sem- I are as follows:

Paper Name: Computer Fundamentals and Programming using C – I
Paper Code: ECS101 Min: 0 Max 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	AT	Min	Max	Evaluation system
Lectures	5	5	Theory	--	100	UA	28	70	CA	12	30	Marks system

Paper Name: Linear and Digital Electronics – I
Paper Code: ECS102 Min: 0 Max 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	AT	Min	Max	Evaluation
Lectures	5	5	Theory	--	100	UA	28	70	CA	12	30	Marks system

Paper Name: Graph Theory and Numerical Methods
Paper Code: ECS103 Min: 0 Max 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	AT	Min	Max	Evaluation
Lectures	5	5	Theory	--	100	UA	28	70	CA	12	30	Marks system

Paper Name: Descriptive Statistics and Probability Theory – I
Paper Code: ECS104 Min: 0 Max 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	AT	Min	Max	Evaluation
Lectures	5	5	Theory	--	100	UA	28	70	CA	12	30	Marks system

Paper Name: English Paper I (Compulsory)
Paper code: ECS ENG1 Min:0, Max:100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	AT	Min	Max	
Lectures	4	4	Theory	--	100	UA	28	70	CA	12	30	Marks system

Term: Sem - II Separate passing Head: No, Min. Papers: Max. Papers: Max:
The papers under Sem-II are as follows:

Paper Name: Computer Fundamentals and Programming using C – II
Paper Code: ECS201 Min: 0 Max 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	AT	Min	Max	Evaluation system
Lectures	5	5	Theory	--	100	UA	28	70	CA	12	30	Marks system

Paper Name: Linear and Digital Electronics – II
Paper Code: ECS202 Min: 0 Max 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	AT	Min	Max	Evaluation
Lectures	5	5	Theory	--	100	UA	28	70	CA	12	30	Marks system

Paper Name: Algebra and Operation Research
Paper Code: ECS203 Min: 0 Max 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	AT	Min	Max	Evaluation
Lectures	5	5	Theory	--	100	UA	28	70	CA	12	30	Marks system

Paper Name: Descriptive Statistics and Probability Theory – II
Paper Code: ECS204 Min: 0 Max 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	AT	Min	Max	Evaluation
Lectures	5	5	Theory	--	100	UA	28	70	CA	12	30	Marks system

Paper Name: English Paper II (Compulsory)
Paper code: ECS ENG2 Min:0, Max:100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	AT	Min	Max	
Lectures	4	4	Theory	--	100	UA	28	70	CA	12	30	Marks system

Abbreviations: TLM – Teaching Learning Method; AM – Assessment Method; AT: Assessment Type; UA – University Assessment; CA – College Assessment; Hrs- Contact Hours per Week; Min – Minimum Marks; Max – Maximum Marks

B. Sc. – I (Entire Computer Science) Semester – I

ECS101: Computer Fundamentals and Programming using C – I

75 contact hours, **5** credits

Section – I

Unit 1 [15]

Introduction to computer: Definition of computer, characteristics, limitations, concepts of h/w and s/w, capabilities of computers, evaluation, generation, classification based on size and purpose, applications of computers in various fields, computer language – high level, low level, assembly level, compiler, interpreter.
Structure of computer: Block diagram, ALU, Memory Unit, Control Unit, Introduction to motherboard, SMPS, Expansion Slots, Serial and Parallel ports.
Computer codes: BCD, EBCDIC, ASCII, Bit, Byte, Word.

Unit 2 [15]

Input devices: Keyboard, Mouse, Light pen, Joystick, Touch screen, Digitizer, Scanner, MICR, OMR, Barcode reader.
Output devices: VDU, Printers – Dot-matrix, Inkjet, Laser, Line, Plotters.
Memory: ROM, EPROM, PROM.
Secondary Storage devices: Magnetic disk, Magnetic tape, Floppy disk, CD ROM.

Unit 3 [07]

Overview of Operating System: Definition and functions of OS Features of OS.
Disk Operating System (DOS), DOS internal and external commands, Batch files commands, concept of directory and file, Types of OS – Single user, Multi-user.

Section – II

Unit 4 [08]

Programming Methodology: Step involving in problem solving, Problem definition, Algorithm - Characteristics, Notation of Algorithm, Flowcharts - Definition, Symbol, features, Running and debugging the program.
Introduction to C: History, Character set and keywords, Structure of C programming, Constant and its type, Variable and its type (Data types),

Unit 5 [15]

Operators: Arithmetic, logical, relational, bitwise, increment, decrement, Conditional.
Control Statements: Conditional control statements- if, if else, nested if, switch, Looping – for statements, nested for, while, do-while statements, Unconditional control statements- break, continue, goto.

Unit 6 [15]

Arrays: Array definition and declaration, Single and multidimensional array, basic matrix operations, Character array (string)- Declaration, operation on string and inbuilt String functions.

Reference Books

1. Computer Today - Basundra
2. Fundamental of computers - V. Raja Raman.
3. Computer Fundaments - P.K. Sinha.
4. HTML, DHTML, JAVA Script, CGI, Perl – Ivan Bayross
5. Let us C- Y. C. Kanetkar
6. C programming- Dennis Ritchie
7. Programming in C- Gottfried

8. Programming in ANSII-C – Balgurusamy

ECS102: Linear and Digital Electronics – I

75 contact hours, **5** credits

Section – I

Unit 1 [15]

Introduction to Components: Resistors, capacitors, transformers, inductors charging and discharging of condensers, decay & growth in L-C & R-C ckt.s, LCR series & parallel circuits.

Network Theorems: Ohm's law, Kirchoff's law, Thevenin's theorem, Norton's theorem, Superposition theorem, maximum power transfer theorem, Substitution theorem (only statements & applications to problems, no proof) (applications to d.c. only).

Unit 2 [15]

Semiconductors: Classification on the basis of band theory, intrinsic & extrinsic semiconductors, p-n junction (basic principle of operation), p-n junction diode, types of p-n diode (zener diode, LED & 7-segment display, photodiodes, photo resistors).

D.C. Power Supplies: Half wave rectifier, full wave rectifier, bridge rectifier, filter circuits, load regulation, line regulation, Zener as a voltage regulator.

Unit 3 [08]

Bipolar Junction Transistors: Types (power & RF type), symbols & identifications, configuration(C-B,C-C,C- E),biasing methods(potential divider type for C-E only),load line concepts for a.c. & d.c.(Q-point concept & stability).

Section – II

Unit 4 [07]

Number System: Binary, decimal, BCD, hexadecimal and octal, Conversion from one to another, character code, Excess three codes, gray code, error detection and correcting code (Parity bits and Hamming code).

Unit 5 [15]

Logic Gates: Introduction to gates Demorgan's theorems, conversion of one gate to another, Boolean, algebra, identities, Karnaugh map (Three and four variable) simplification and logic diagram.

Application of logic gates: Half adder, Full adder, half subtractor, parallel adder, Universal adder/subtractor, introduction to logic families and comparative study (TTL & MOS).

Unit 6 [15]

Combinational Circuits: Multiplexers, Principles, tree multiplexing, Nibble multiplexing, IC 74150.

Demultiplexers: principles, tree Demultiplexing, IC 74154, encoders, IC74148, decoders, IC 74138, seven segment display IC7447/7446.

Reference Books

1. Principle of Electronics – V. K. Mehta (new e/d)
2. Electronics Principle – Malvino
3. Basic Solid State Electronic – B. L.T heraja
4. Electronic Components – Madhuri Joshi
5. Principle of Electronics – P. C. Narayan Rao (Vol. I, II, III) New Age International.
6. Text book of F.Y.B.C.S. (Electronics) - Deuskar, Shaligram, Lele & others.
7. Digital principle & applications – Malvino Leech
8. Digital principle – Floyed
9. Digital electronics – C.F.Strangio
10. Modern Digital electronics – R.P.Jain
11. Principle of electronics – B.V. Narayan Rao (3rd edition)

ECS103: Graph Theory and Numerical Methods

75 contact hours, **5** credits

Section – I

Unit 1 [15]

Graphs: Definition and elementary results, types of graphs, isomorphism, adjacency and incidence matrix.

Derived graphs: Sub graphs, induced sub graphs, complement of a graph, self complementary graphs, union, intersection, ring sum, product of two graphs.

Unit 2 [15]

Connected graphs: Definition of connected, disconnected graphs, edge sequence, trial, path, circuit, definitions and elementary results, Isthmus and cut vertex, Vertex and edge connectivity, Dijkstra's shortest path algorithm.

Eulerian and Hamiltonian graphs: Eulerian graphs: Definition and examples. Koningsberg's 7-bridge problem. Fleury,s algorithm, Introduction to Hamiltonian graph.

Unit 3 [08]

Trees: Definition and elementary results, equivalent characterizations. Centre of a tree, spanning tree, fundamental circuits and fundamental cut sets, Kruskal's algorithm for weighted spanning tree. Binary tree and elementary results.

Section – II

Unit 4 [07]

System of linear equations and matrices: Introduction to system of linear equations, Gauss elimination, Gauss – Jordan method, homogeneous system of linear equations, matrices, elementary matrices and method of finding A-1, Results on systems of linear equations and invertibility.

Unit 5 [15]

Errors in numerical calculations: Floating point representation of real numbers, Rounding off errors, absolute, relative and percentage errors, Arithmetic operation on normalized floating point numbers.

Solution of non linear equations: Location of roots, bisection, regula-falsi and Newton Raphson method, Comparison of these methods. Acceleration of convergence: Aitken's process.

Polynomial interpolation and approximation: finite difference: forward, backward. Newton's formula for both forward and backward interpolation, Lagrange's interpolation.

Unit 6 [15]

Numerical differentiation and integration: Numerical differentiation formula using interpolating polynomials, general quadrature formula. Trapezoidal formula, Simpson's (1/3) rule and (3/8) rule for integration.

Solution of ordinary differential equation: Numerical solution by Taylor's Series. Euler's method, Runge - Kuta method: Second and fourth order.

Reference Books

1. Elements of Discrete Mathematics – C.L. Liu
2. First step in graph theory – Raghunathan, Nimkar and Solapurkar.
3. Elements of graph theory – Bhave and Raghunathan.
4. Combinatrics – V. Krishnamurthy

5. Discrete Mathematical Structure for Comp. Science – Alan Doerr and K. Levassuer.
6. Combinatorics - V.Krishnamurthy
7. Introductory Methods of Numerical Analysis – S.S. Sastry (Prentice Hall)
8. Computer Oriented Numerical Methods – Rajaraman
9. Introduction to applied Numerical Analysis – C. Richard, W. Hamming.
10. Numerical Methods for Science and Engineering – R. G. Stanton (Prentice Hall)

ECS104: Descriptive Statistics and Probability Theory – I

75 contact hours, **5** credits

Section – I

Unit 1 [15]

Population and Sample: Concept of Statistical population with illustration, Concept of Sample with illustration, Methods of sampling - SRSWR, SRSWOR, Stratified, Systematic (description only)

Data condensation and Graphical methods: Raw data, Attribute, Variables, Discrete and Continuous Variable, General principles of classification of raw data, Construction of frequency dist, Cumulative frequency dist, Relative frequency dist, Graphical representation of frequency dist- Histogram, frequency polygon, frequency curve, Ogives, Diagrammatic representation- simple bar, sub-divided bar, Pie diagram, Numerical problems.

Unit 2 [15]

Measures of Central Tendency: Concept of Central Tendency, Objects of Central Tendency, Criteria for good Measures of Central Tendency, A.M. – def., formula for computation for ungrouped & grouped data, combined A.M., effect of change of origin & scale, weighted A.M., merits & demerits, Median- def., formula for computation for ungrouped & grouped data, graphical methods, merits & demerits, Mode- def., formula for computation for ungrouped & grouped data, graphical methods, merits & demerits, Use of appropriate average, Quartiles- def., formula for computation for ungrouped & grouped data, graphical methods merits & demerits, Numerical Problems.

Measures of dispersion: Concept of dispersion, Absolute & Relative measures of dispersion, Range- def., formula for computation for ungrouped & grouped data, coeff. of range, merits & demerits, Q.D.- def., formula for computation for ungrouped & grouped data, coeff. of Q.D., merits & demerits, Variance & S.D.- def., formula for computation for ungrouped & grouped data, combined variance, C.V., effect of change of origin & scale, merits & demerits, Numerical problems.

Unit 3 [08]

Moments, Measures of skewness & kurtosis: Raw & central moments- def., formula for computation for ungrouped & grouped data (up to first four moments), Relation between central & raw moments, Idea of symmetric frequency distribution, skewness of frequency distribution, positive & negative skewness, empirical relation between mean, median & mode, Measures of skewness- Pearson's measure, Bowley's Measure, β_1, γ_1, Idea of kurtosis of a frequency distribution, types of kurtosis- Leptokurtic, Mesokurtic, Platykutic, Measures of kurtosis based on moments β_2, γ_2, Numerical problems.

Section – II

Unit 4 [07]

Permutations & Combinations: Principles of counting, Permutations of n dissimilar objects taken r at a time (with without repetitions), Permutations of n objects not all of which r different, Combinations of n objects taken r at a time, Combinations with restriction on selection (excluding or including a particular object in the group), Numerical problems.

Unit 5 [15]

Probability: Idea of deterministic & nondeterministic models, Random expt. – Sample space (finite, infinite, countable), Events-Types of events, Probability – Classical def.,

relative frequency approach, probability models, axioms of probability, probability of an event, Theorems of probability (with proof)-
i) $0 \leq P(A) \leq 1$, ii) $P(A) + P(A') = 1$, iii) $P(\Phi) = 0$ iv) $P(A) \leq P(B)$ when A is subset of B
v) Addition law of probability.
Concept & def. of conditional probability, multiplication theorem: Concept & def. of conditional probability, multiplication theorem, Concept & def. of independence of two events, pair wise & complete independence with resp. to three events, Numerical problems.

Unit 6 [15]
Discrete random variable: Def. of r.v., discrete r.v., Def. of p.m.f., c.d.f. & properties of c.d.f., Def. of expectation & variance, theorems on expectation, Determination of median & mode using p.m.f., Numerical problems.
Standard Discrete Distribution: Uniform Distribution- Def., mean, variance, illustration of real life situations, Binomial distribution- Def., mean, variance, illustration of real life situations, additive property (statement only).
Poisson distribution-mean, variance, illustration of real life situation, additive property (Statement only), Limiting case of binomial distribution (Statement only), Hypergeometric distribution – mean, variance, illustration of real life situation, Numerical problems.

Reference Books
1. Fundamentals of Mathematical Statistics- Kapoor & Gupta.
2. Modern elementary Statistics – J.E.Freund
3. Statistical Methods – J.Medhi.
4. Fundamentals of Statistics-S.C.Gupta.
5. Fundamentals of applied Statistics-Gupta & Kapoor.
6. Business Statistics – S. Shah
7. Programmed Statistics - B.L.Agarwal.

B. Sc. – I (Entire Computer Science) Semester – II

ECS201: Computer Fundamentals and Programming using C – II

75 contact hours, **5** credits

Section – I

Unit 1 [15]

Windows Operating System: Features of Windows OS, GUI.
Modules of Windows – Windows Explorer, Program manager, Control panel, Printer Manger, Elements of windows – Desktop, Application, icons etc, Windows accessories – Paintbrush, Notepad.
Process Management: Multiprogramming, Multitasking, Multiprocessing, Time sharing.
Networking Environment: Definition of networking, Types of networking – LAN, MAN, WAN Introduction to Internet, Uses and benefits.

Unit 2 [15]

Editors and Word Processors: Definition of Word Processor, Detail study of features of MS-WORD and MS– EXCEL.

Unit 3 [08]

Web Technology: Evaluation of internet, HTML, History, Structure of HTML, Tags, Formatting, Text, Adding images, Hyper link, Image Map, Tables, Frames, Sending Email, Introduction to JavaScript, Data types and variables, Operators, control statements, built in functions.

Section – II

Unit 4 [07]

Functions: Definition, declaration, function prototypes, Local and global variables, User defined functions, Storage classes.

Unit 5 [15]

Pointers: Definition and declaration, Operation on pointer, Pointer initialization, Pointer and function, Pointer and array, Pointer of pointer, Call by value and Call by reference, Dynamic memory allocation.
Structures and Union: Definition and declaration, Array of structures, Passing structure to function, Pointer to structure, Nested structure, self referential structure, Size of and type def.

Unit 6 [15]

File Handling: Standard input- get char(), getch(), getche(), Standard output- put char(), putch(), putche(), Formatted input- scanf(), sscanf(), fsclose(), File opening mode- open, modify, write, append, Text and binary mode.
Macros and Preprocessing: Feactures of C preprocessor, Macro – Declaration, Expansion, File Inclusion.

Reference Books:

1. Computer Today - Basundra
2. Fundamental of computers - V. Raja Raman.
3. Computer Fundaments - P.K. Sinha.
4. HTML, DHTML, JAVA Script, CGI, Perl – Ivan Bayross
5. Let us C- Y. C. Kanetkar
6. C programming- Dennis Ritchie
7. Programming in C- Gottfried
8. Programming in ANSII-C – Balgurusamy

ECS202: Linear and Digital Electronics – II

75 contact hours, **5** credits

Section – I

Unit 1 [15]

Field Effect Transistor: FET, MOSFET, types, working principles, characteristics, applications.

Amplifiers: Classification of amplifies depending on coupling, frequency range, mode of operation & frequency response, CE amplifier, gain (voltage, current, power, frequency response, types of amplifiers (concepts only).

Unit 2 [15]

Operational Amplifiers: Symbols, block diagram, negative feedback, virtual ground concept, parameters, general applications, inverting amplifier, non-inverting amplifier, adder, subtractor, integrator, differentiator, comparator, Parameters of Operational Amplifier (CMRR, Ad, Ac, I/P bias current, offset current, I/P & O/P impedance).

Unit 3 [08]

Oscillators: Feedback concept (positive & negative), basic principle, Barkhausen criteria, types of oscillators (RC,LC),Wien bridge, phase shift, Hartley, Collpitt's & crystal oscillator, multivibrators (using 741, 555), applications of oscillators & multivibarators.

Section – II

Unit 4 [07]

Sequential Circuits: Introduction to sequential circuits, Flip-flop, principle of operation, type, IC7474, IC7475, counters concept only (Synchronous and asynchronous).

Unit 5 [15]

IC 7490, modular counter, shift resistor, IC7495, ring counter, shift counter.

Data Converter: D To A converter, (R2 R and binary weighted), A to D converter (All types).

Unit 6 [15]

Memory Devices: RAM, ROM, EPROM, PROM, Diode matrix ROM, Principle of static and dynamic methods.

Reference Books

1. Principle of Electronics – V. K. Mehta (new e/d)
2. Electronics Principle – Malvino
3. Basic Solid State Electronic – B. L. Theraja
4. Electronic Components – Madhuri Joshi
5. Principle of Electronics – P. C. Narayan Rao (Vol. I, II, III) New Age International
6. Text book of F.Y.B.C.S. (Electronics) – Deuskar, Shaligram, Lele & others.
7. Digital principle & applications – Malvino Leech
8. Digital principle – Floyed
9. Digital electronics – C. F. Strangio
10. Modern Digital electronics – R. P. Jain
11. Principle of electronics – B. V. Narayan Rao (3rd edition)

ECS203: Algebra and Operations Research

75 contact hours, **5** credits

Section – I

Unit 1 [15]

Finite Induction: Revision of first principle, Generalized first principle of finite induction.

Relations: Ordered Pairs, Cartesian product of sets.

Relation: Definition, types of relation, equivalence, partial orderings, Diagraph of relations, Matrix representation of relation, composition of relations, transitive closure, Warshall's algorithm, equivalence class, properties of equivalence class, partition of set.

Functions: Definition of function as relation, injective, surjective and bijective functions, inverse function, composition of functions.

Unit 2 [15]

Complex Numbers: Addition, subtraction, multiplication, conjugate, division, modulus, argument of a complex number, Geometric representation, polar form and its properties.

Logic: Proposition and predicate logic, logical connectives, truth tables, logical equivalence, tautology, contradiction and neither, valid arguments and proofs, Quantifiers.

Unit 3 [07]

Binary Operations: Definition and examples, Residue classes modulo n, Additive and multiplicative modulo and their properties.

Section – II

Unit 4 [15]

Introduction to Operations Research: History, Evolution, scope and Limitations.

Linear Programming Problem(LPP): Statement of LPP, formulation of problems as LPP, Definitions of Slack variables, surplus variables and artificial variable, standard form of LPP, Definitions of a solution, feasible solution, basic feasible solution and an optimum solution.

Solution of LPP: by graphical method, simplex method, Big-M method, Duality Theory- Writing dual of primal problem.

Unit 5 [15]

Transportation Problem (TP): Statement of TP, balanced and unbalanced TP, methods of obtaining initial basic feasible solution of TP- North-West Corner method, method of matrix minima and Vogel's approximation method.

MODI Method of obtaining an optimal solution of TP.

Unit 6 [08]

Assignment Problem (AP): Statement of AP, balanced and unbalanced AP, relation with TP, Optimal solution of AP.

Reference Books

1. Combinatorics – V. Krishnamurthy
2. Discrete Mathematical structure for Comp. Science – Alan Doerr K Levassuer
3. Elements of Discrete Mathematics – C. L. Liu
4. Operations Research - H.A.Taha
5. Operations Research - Kantiswarup Gupta
6. Linear Programming - S. Vajda

ECS204: Descriptive Statistics and Probability Theory – II

75 contact hours, **5** credits

Section – I

Unit 1 [15]

Correlation: Bivariate data, scattered diagram, Concept of correlation, types of correlation, cause & effect Relation, Karl Pearson's coeff. of correlation (r), limit of r ($-1 \leq r \leq 1$) Interpretation of r, basic assumptions on which r is based, Spearman's rank correlation coeff. (R), Numerical problems.

Regression for ungrouped data: Concept of regression, Derivation of lines of regression by least square principle, Properties of regression coeff., Non-linear regression- fitting of second degree & exponential curves, Numerical problems.

Unit 2 [15]

Multiple regression, multiple & partial correlation (for trivariate data): Yule's notations & concept of multiple regression, Fitting of multiple regression plane, Partial regression coeff., interpretation, Multiple correlation coeff.-Concept, definition, computation & interpretation, Partial correlation coeff.-Concept, definition, computation & interpretation, Numerical problems.

Time Series: Meaning & utility, Components of time series, Additive & multiplicative models, Methods of estimating trend-moving average method, least square method, merits & demerits, Numerical problems.

Unit 3 [07]

Index No.: Need & meaning of index no's, Problems in construction of index no, Construction of price & quantity index no.-Unweighted & weighted I. No., Laspeyre's, Paasche's, Fisher's I. No., Uses of index no., Numerical problems.

Section – II

Unit 4 [08]

Two dimensional discrete r.v.: Def. of two dimensional discrete r.v., joint p.m.f., marginal p.m.f., conditional p.m.f., Independence of two discrete r.v., Expectation- E(X+Y), E(X*Y), cov(X,Y), Numerical problems

Continuous r.v.: Def.-continuous r.v., p.d.f., c.d.f., statement of properties of c.d.f., Def. of mean & variance, Numerical problems.

Unit 5 [15]

Uniform and Exponential distributions: Uniform distribution- Def., mean, variance, nature of probability curve, Exponential distribution- Def. with mean, mean,variance, lack of memory property (with proof) & its interpretation, nature of probability curve.

Normal Distribution: Normal distribution – Def., identification of parameters, nature of probability curve, s.n.v., properties of normal distribution, distribution of aX+b, aX+bY+c when X & Y are independent, approximation to Binomial & Poisson distribution.

Unit 6 [15]

Testing of Hypothesis: Population, sample, random sample from distribution, parameter, statistic, standard error of estimator, Concept of null hypothesis, alternative hypothesis, critical Region, level of significance, type I & type II error, one sided & two sided tests.

Large sample test – Ho: $\mu = \mu o$ against H1, $\mu \neq \mu o$, Ho: $\mu 1 = \mu 2$ against H1, $\mu 1 \neq \mu 2$, Ho: P = Po aginst H1, P ≠ Po, Ho: P1 = P2 aginst H1, P1 ≠ P2, Numerical problems.

Reference Books

1. Fundamentals of Mathematical Statistics- Kapoor & Gupta.
2. Modern elementary Statistics – J.E.Freund
3. Statistical Methods – J.Medhi.
4. Fundamentals of Statistics – S. C. Gupta.
5. Fundamentals of applied Statistics – Gupta & Kapoor.
6. Business Statistics – S. Shah
7. Programmed Statistics – B. L. Agarwal.

LAB I: Laboratory course in Computer Science

Laboratory course on paper ECS101

1) Demonstration of peripherals
2) Linking of various peripherals
3) Operation of all keys of keyboard
4) DOS – external and internal commands, batch files commands
5) Windows Operating System –

Windows explorer, program manager, control panel, print manager, Creating folders, files, icons, shortcuts

6) MS – WORD – Creating new documents, typing, deleting, selecting text, undo, Redo, formatting text – auto format, formatting characters, drop caps, Paragraphs, line spacing, margins, page setup, headers and footers

Writer's tools – spelling checker, auto format, auto correct, find and replace

Mail merge – Data source, Main document, creating mail merge document.

7) MS – EXCEL - Creating worksheet, Graphs, resizing graphs, formulas, if Statement, types of functions
8) Internet – creating e – mail accounts, browsing.
9) Design HTML page to display student Information
10) Solve following program using JAVA Script
 a) check whether given number is even or odd
 b) check whether given number is Prime or not
 c) check whether given number is palindrome or not.
 d) check whether given number is perfect or not

Laboratory course on paper ECS201

1) Write a Program to convert the Temperature in centigrade degree to the Fahrenheit degree.
2) check whether given number is even or odd.
3) Write a program to find out First Fifty Prime numbers.
4) Write a program to find GCD & LCM of given number.
5) Write a program to convert given Binary number into its Octal / Decimal, Hexadecimal Equivalent.
6) Write a program to display Fibonacci series.
7) Write a Recursive function to find out the Factorial of Given Number.
8) Write a program to remove blank lines from a file.
9) Write a program to count the no. of words in a given text file.
10) Write a program to reverse the given number.
11) write a program to calculate Matrix Addition, Multiplication using Functions as well as without Functioning.
12) Write a program to find given string is Palindrome or not using function.
13) Write a program that accepts the Roll No, Name, Marks obtained in three tests of 'N' students & display the total and Average in tabular format.
14) Write a program to accepts two alphabets and pass them to the Function via Pointers Which checks for type of these alphabets. If both alphabets are Vowels then function Should return to the calling function, their previous alphabets. If both alphabets are Constant then function should return their successor alphabets.
15) Write a program to add two Matrices; Use two Dimensional array as Pointer & Dynamic Memory allocation.
16) Write a program to input 10 names each of the length at least 8 characters sort them in a alphabetical order.
17) Write a program to demonstrate macro substitution.
18) Write a program to demonstrate file inclusion mechanism.

LAB-II: Laboratory Course in Electronics

GROUP - A
1. Study of electronic components
2. Study of instruments & measurement techniques Part I
3. Study of instruments & measurement techniques Part II
4. Study of Kirchoff's laws
5. Zener diode as a voltage regulator
6. Common Emitter Amplifier
7. Use of CRO
8. Full wave rectifier
9. Voltage regulator by using three pin ICs
10. Phase Shift Oscillator
11. Op-amp as adder
12. Op-amp sub tractor

GROUP - B
1. Transistor as a switch
2. Study of basic gates
3. Study of Flip-flop
4. Study of binary counter
5. Study of DeMorgan's theorems
6. Astable Multivibrator using IC 555
7. Half adder
8. Full adder
9. Interconversion of gates using NOR gate
10. Interconversion of gates using NAND gate

LAB-III: Laboratory Course in Mathematics

1) Relations- Diagraph of relations, matrix representation, transitive closure and Warshall's algorithm.
2) Adjacency and incidence matrix.
3) Union, intersection, ring sum, product of two graphs, fusion of vertices.
4) Dijkstra's shortest path algorithm.
5) Fleury's algorithm.
6) Kruskal's algorithm for weighted spanning tree
7) Fundamental circuits and fundamental cut sets.
8) Solution of system of linear equations by Gauss elimination method, Gauss- Jordan method.
9) Inverse of a matrix: row reduction method, adjoint method. Solution of system of linear equations by matrix inversion method.
10) Determinant of a matrix by row reduction method, cofactor expansion method.
11) Eigen values and eigen vectors of a matrix: Find Eigen values and eigen vectors of a matrix, find matrix P that diagonalizes the given matrix, if it exist.
12) Solution of non linear equations, bisection method, regula-falsi method, Newton Raphson method.
13) Interpolation: Newton's interpolation formula for both forward and backward interpolation, Lagrange's interpolation formula.
14) Numerical integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th rule.
15) Problems on LPP by Graphical method, Simplex method, Big-M method.
16) Problems on TP.
17) Problems on AP.

LAB-IV: Laboratory course in statistics

1. Construction of frequency dist. & graphical representation
2. Diagrammatic representation

3. Measures o f central tendency (ungrouped data)
4. Measures o f central tendency (grouped data)
5. Measures o f dispersion
6. Computation of raw & central moments, measures of skewness & kurtosis.
7. Computation of correlation coeff.
8. Fitting of lines of regression.
9. Fitting of second degree & exponential curve.
10. Fitting of multiple regression plane & computation of multiple & partial correlation coeff.
11. Fitting of Binomial distribution.
12. Fitting of Poission distribution.
13. Fitting of Normal distribution.
14. Model sampling from uniform & exponential distribution.
15. Time series
16. Index no.
17. Large sample tests.