QUEEN MARY'S COLLEGE (A)
Chennai 600004

DEPARTMENT OF COMPUTER SCIENCE

B.Sc COMPUTER SCIENCE

CO-K, PO MAPPED SYLLABUS

From 2022-2023 ONWARDS

LIST OF COURSES WITH CREDITS FOR THE NEW PROPOSED NEW SYLLABI (UG)

Course Components	Part	Code	Title of the Courses in the new Syllabus	Inst Hrs	Credits	Exam Hrs	Max Marks		Total
							C.I.A	External	
FIRST YEAR									
FIRST SEMESTER									
I	I		PART – I	5	3	3	25	75	100
II	II		PART – II	5	3	3	25	75	100
III	III	CS201	CORE I: Programming in C	5	5	3	25	75	100
IV	III	CS202	PRACTICAL – I: C Programming	6	5	3	25	75	100
V	III		ALLIED- Mathematics– I	6	5	3	25	75	100
VI	IV	EVS03	Environmental Studies	1	2	3	25	75	100
VII	SBE			2	3	3	25	75	100
SECOND SEMESTER									
VIII	I		PART – I	5	3	3	25	75	100
IX	II		PART – II	5	3	3	25	75	100
X	III	CS203	CORE II:Data Structures and Algorithms	5	5	3	25	75	100
XI	III	CS204	PRACTICAL – II Data structures using C	6	5	3	25	75	100
XII	III		ALLIED - Mathematics - II	6	5	3	25	75	100
XIII	IV	VEDU4	Value Education	1	2	2	25	75	100
XIV	SBE			2	3	3	25	75	100
SECOND YEAR									
THIRD SEMESTER									
XV	I		PART – I	5	3	3	25	75	100
XVI	II		PART – II	5	3	3	25	75	100
XVII	III	CS205	CORE III: Relational Database Management Systems	5	5	3	25	75	100
XVIII	III	CS206	PRACTICAL – III SQL and PL/SQL	6	5	3	25	75	100
XIX	III	CSA20	ALLIED - Digital Computer Fundamentals	6	3	3	25	75	100
XX	SBE			2	3	3	25	75	100
XXI	IV	CSNM7	NME – PC Software	1	2	3	25	75	100

Course Components	Part	Code	Title of the Courses in the new Syllabus	Inst Hrs	Credits	Exam Hrs	Max Marks		Total
							C.I.A	External	
SECOND YEAR									
FOURTH SEMESTER									
XXII	I		PART – I	5	3	3	25	75	100
XXIII	II		PART – II	5	3	3	25	75	100
XXIV	III	CS207	CORE IV: Web Technology	5	5	3	25	75	100
XXV	III	CS208	PRACTICAL – IV Web Technology Lab	6	5	3	25	75	100
XXVI	III	CSA21	ALLIED - Microprocessor and Assembly Language Programming	4	4	3	25	75	100
XXVII	IV	CSA22	ALLIED PRACTICAL – Digital Electronics and Microprocessor Lab	2	4	3	25	75	100
XXVIII	III	SBE		2	3	3	25	75	100
XXIX	IV	CSNM8	NME-Web Design	1	2	3	25	75	100
THIRD YEAR									
FIFTH SEMESTER									
XXX	III	CS209	CORE V: Operating Systems	6	5	3	25	75	100
XXXI	III	CS210	CORE VI: Programming in Java	6	5	3	25	75	100
XXXII	III	CS211	PRACTICAL V: Java programming	6	5	3	25	75	100
XXXIII	III	CS212	CORE VII: Computer Networks	6	5	3	25	75	100
XXXIV	III		ELECTIVE I	6	5	3	25	75	100
SIXTH SEMESTER									
XXXV	III	CS214	CORE VIII: Programming in Python	6	5	3	25	75	100
XXXVI	III	CS215	PRACTICAL VI: Python Programming	6	5	3	25	75	100
XXXVII	III	CS216	CORE IX: Software Engineering	6	5	3	25	75	100
XXXVIII	III	CS217	CORE X: Mobile Computing	6	5	3	25	75	100
XXXIX	III		ELECTIVE II	6	5	3	25	75	100

Candidates can opt anyone Elective course from the given list. And also, other Department students can Select the NME from Computer Science Department

S. No	SEM	TITLE OF THE COURSES IN THE NEW SYLLABUS	NO.OF CREDITS	Code	Marks	
					EXT	INT
1	V	Wireless Network (ELE I)	5	CS213A	75	25
2	V	Data Mining(ELE I)	5	CS213B	75	25
3	V	E-Commerce Technologies (ELE I)	5	CS213C	75	25
4	VI	Network Security (ELE II)	5	CS218A	75	25
5	VI	System Administration and Maintenance (ELE II)	5	CS218B	75	25
6	VI	Software Testing (ELE II)	5	CS218C	75	25
7	III	NME – PC Software	2	CSNM7	75	25
8	IV	NME-Web Design	2	CSNM8	75	25

CHOICE BASED CREDIT SYSTEM FOR U.G 2022 – 2023

TOTAL NUMBER OF PAPERS IN PARENT DEPARTMENT: 21 CREDITS: 102			
TYPE OF PAPER	**NO OF PAPERS**	**CREDITS PER PAPER**	**CREDITS**
PART III – CORE	16	5	80
PART III - CORE ELECTIVE	2	5	10
ALLIED – T ALLIED – P	2 1	5 2	10 2
PAPERS FROM OTHER DEPARTMENTS: 18			**CREDITS: 55**
PART – I – LANGUAGE	4	3	12
PART – II – ENGLISH	4	3	12
ALLIED – MATHEMATICS	2	5	10
PART – IV EVS (SEM I)	1	2	2
PART – IV VALUE EDUCATION (SEM II)	1	2	2
PART – IV SOFT SKILL (SEM I To IV)	4	3	12
PART V – EXTENSION ACTIVITY	1	1	1
TOTAL	**40**		**157**

- **Week – 6 working day order** **Semester – 15 such weeks**

S.NO	CORE ELECTIVE	HRS/WEEK*	NO OF WEEKS*	TOTAL HOURS / SEMESTER*
1	CORE	06	15	90
2	ELECTIVE	04	15	60

- Number of Units in the syllabus of core papers – 5
- Number of Units in the syllabus of elective papers – 5
- Maximum marks per paper – 100
- **Total marks in PART – III – 2300**

QUANTIFICATION OF END SEMESTER EXAMINATION

QUESTION PAPER PATTERN

(EFFECTIVE FROM THE ACADEMIC YEAR 2022 – 2023)

CORE and ELECTIVE PAPERS **Maximum Marks: 100**

Internal Assessment: 25* **External Valuation: 75***

No passing minimum in internal. Overall Aggregate should be 40%

Part – A
5×2 = 10 marks
Answer all the questions

Question	Unit
1	I
2	II
3	III
4	IV
5	V

Part – B
5×4 = 20 marks
Answer all the questions

Question	Unit
6(a) or 6(b)	I
7(a) or 7(b)	II
8(a) or 8(b)	III
9(a) or 9(b)	IV
10(a) or 10(b)	V

Part – C
3×15 = 45 marks
Answer any 3

Question	Unit
11	I
12	II
13	III
14	IV
15	V

INTERNAL EVALUATION METHODOLOGY FOR ALL THE PROGRAMS:

- ✓ Quiz programme
- ✓ Periodical class tests
- ✓ Objective type assignments
- ✓ Problem solving assignments (INDIVIDUAL / GROUP)
- ✓ Seminar based on lecture notes available online / USING POWERPOINT
- ✓ Online exercises from open source/resource
- ✓ e-quiz
- ✓ Group Discussion or debate
- ✓ Question session
- ✓ Descriptive assignments with creative questions

QUANTIFICATION OF INTERNAL EVALUATION – UG THEORY

- Minimum 6 tests – 2 out of 6
- Minimum 3 assignments – best of three
- Model examination for 75 marks reduced to 10 marks

TEST	ASSIGNMENT	ATTENDANCE	MODEL EXAM	TOTAL	CONTINUOUS INTERNAL ASSESSMENT
10	10	5	75	100	
Reduced To					
5	5	5	10		25

PRACTICALS

Maximum Marks: 100

Internal Assessment: 25 **External valuation: 75**

2 Model tests for 75 marks each reduced to 10 marks

Continuous Assessment	Model Exam	TOTAL
15	10	25

Record	PRACTICAL EXAM - END SEMESTER
5	70

Passing minimum

End Semester Examination 40%
Aggregate (CIA+UE) 40%
Grade Points and Cumulative Grade Point Average are awarded in the mark sheet

TEACHING METHODOLOGIES ADOPTED FOR THE UG PROGRAM

1. CHALK TALK
2. TEXT BOOK LEARNING
3. DIGITAL LEARNING- ONLINE PPT - LECTURE NOTES
4. VIDEO LECTURE – ONLINE – YOU TUBE – GOOGLE MEET - CLASSROOM
5. INTERACTIVE SESSIONS
6. STUDENT SEMINAR
7. LECTURE BY EXPERTS IN FIELD – INVITED TALKS

PROGRAMME EDUCATIONAL OBJECTIVE (PEO):

In line with the institutional vision and mission, B.Sc Computer Science Programme intends to offer knowledge and skills to the students facilitating them to

- Take up higher education, augment critical thinking, problem solving capabilities, through resilient and profuse learning of the core and elective courses and passable introduction and exposure to digital tools and training to communicate their original ideas effectively to be employable. (PEO1)
- Explore career opportunities, utilize appropriate resources and tools to be self-learners, demonstrate analytical skills and benefit academically competent. (PEO2)
- Recuperate leadership qualities in moulding the students as successful and self-confident women with rational thinking and scientific temper. (PEO3)

PROGRAMME SPECIFIC OUTCOME (PSO):

After completing B.Sc. Computer Science Programme, the student would be able to

1. Transmit fundamental knowledge in the core subjects, explore new pathways in experimental and theoretical computer science, perceive new ideas and analogy in every approach towards learning, choose an area of research and pursue higher education **(PSO1: PO1).**
2. Utilize digital tools and e-resources available as open-source for knowledge addition, learning and create innovative applications **(PSO2:PO7).**
3. Exhibit good interpersonal skills through effective communication and interactions, propose ideas and participate in core discussions and conferences, adopt better perspective towards life with confidence and remain a responsible citizen **(PSO3: PO2).**

PROGRAMME OUTCOME (PO):

The outcome of the UG programme in Computer Science would be to create an individual with very high knowledge in the subject concepts, develop good communication skills through frequent seminars and digitally conversant through presentations, get inclined to analyze and solve problems, have a quest for enquiry and learning. The programme also gives abundant opportunity for students to pursue disciplinary cum systematic learning (**PO**1), enhance and explore her communication skill set (**PO**2), undergo thorough training in analyzing problems(**PO**3), motivated to learn through questions and updated topics (**PO**4), work in teams (**PO**5) to take initiatives (**PO**6), become digitally efficient (**PO**7), embrace moral values (**PO**8), be aware of the resources available to equip knowledge (**PO**9), earnest to be self-learner (**PO**10) and project their findings globally. However, it is up to the student to take her thought initiative forward to reach her goal. The skill levels are checked on a scale of 3 and correlated as low (1), moderate (2) and strong (3) for each unit of the course to arrive at the total correlation of skills for the programme. Any level of skill below 30 % is not correlated and left as blank.

Graduate Attributes for B.Sc Computer Science Programme:

PO1. Disciplinary knowledge and skills: To develop a science graduate highly productive and constructive unit of society by acquiring a fundamental, systematic, coherent understanding of the academic field of Computer Science and its related disciplinary areas. **(PSO1)**

PO2. Skilled communicator: To develop communication skills involving the ability to listen carefully, to read texts analytically and to present complex information in a concise manner to improve analytical skills, to construct logical arguments using correct technical language relate to Computer Science, to develop personal skills such as the ability to work both independently and in a group. **(PSO4)**

PO3. Critical thinker and problem solver: Plan and execute computer-related problems, analyse and interpret the problems, write algorithm, develop program, execute and generate report. **(PSO3)**

PO4. Sense of inquiry: Analyse hardware and software of Computer Science by asking relevant questions in a sequential manner by inductive method. **(PSO5)**

PO5. Team player/worker: To develop a distinctive quality who can be self-sufficient in making own carrier and become part of development system of the nation, collaborate effectively and gain the ability to work both independently and in group.

PO6. Skilled project manager: Understand the flow of project/plan, effective interaction with team members, method and means for its implementation. Understand the flow of projects/experimentation, effective interaction with team members, method and means for its implementation.

PO7. Digitally Efficient: Use information communication technology to gather knowledge and update scientific information and skills through ICT tools. **(PSO2)**

PO8. Ethical awareness / reasoning: Demonstrate professional behaviour such as being objective, unbiased and truthful in all aspects of work and avoiding unethical, irrational behaviour such as fabricating, falsifying or misrepresenting data or committing plagiarism.

PO9. National and international perspective: Participate in global citizen science projects using e-learning materials as well execute proposals of national and international importance.

PO10. Lifelong learners: Learn, unlearn and relearn as well seeks solutions to real life problems.

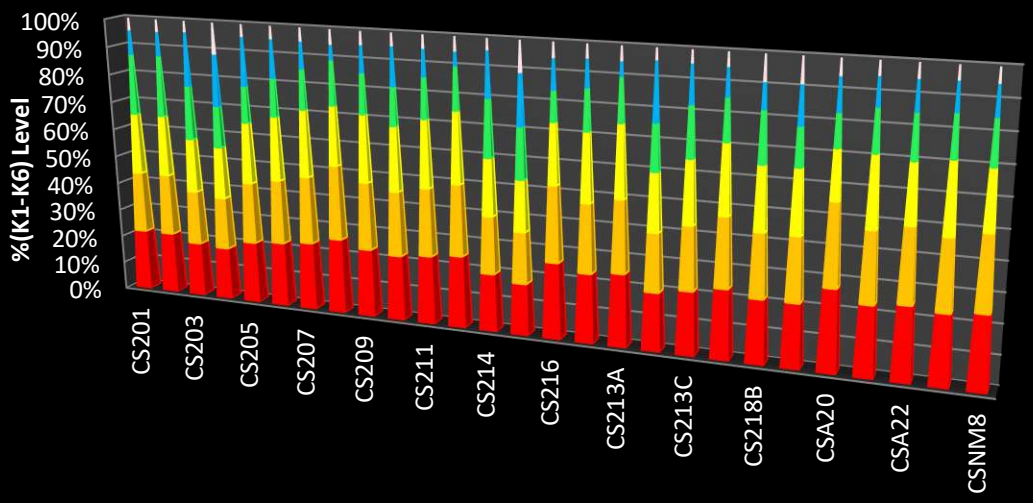
COURSE OUTCOME (CO):

The UG Computer Science curriculum has been designed to fit thoroughly into the ideologies of Bloom's taxonomy with strong knowledge level foundation, catering to remembering and understanding of the advanced concepts in Computer Science. Applying and analyzing the studied concepts scientifically based on the thorough theoretical and experimental knowledge acquired in all related fields, focused well in the evaluation pattern of both the continuous internal assessment and end-semester examination. Due weightage to creativity is given in internal assessment and project. The rational correlation of the course outcomes is evident in the evaluation pattern which is the strength of the course. Students would have acquired competence in areas of recent development and can fit themselves in places of scientific temper as they have the skill, computer knowledge and mastered the subject. Knowledge levels imparted in the curriculum are categorized based on Bloom's taxonomy under 6-levels as K1, K2, K3, K4, K5 and K6 and mapped to check their presence or absence and are not scaled.

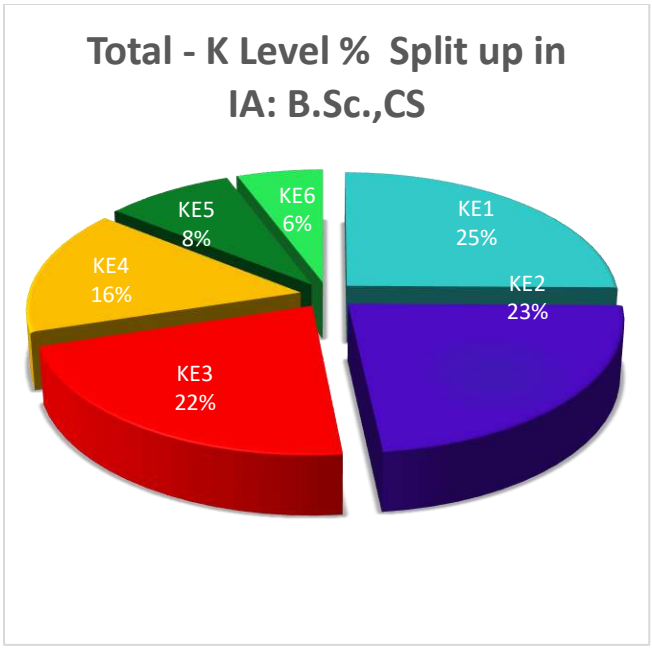
Upon completion of B.Sc Degree course in Computer science, the students will be able to

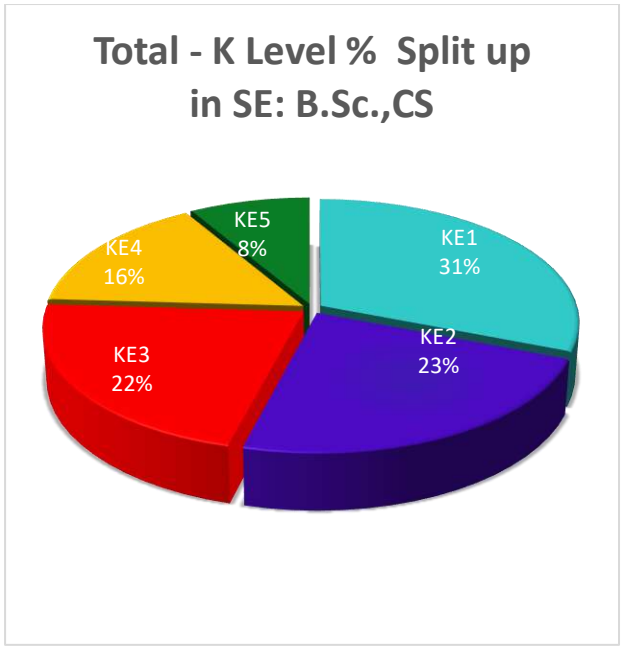
- Recall (K1), understand (K2) and associate (K3) the concepts of computer science in day today activities.
- Reason out (K4) and explain every scientific event in the eyes of computer science.
- Logically analyze (K4) scientific problems catering to any competitive examination.
- Demonstrate her skills in programming languages, debugging (K6).and solve (K5) computational problems.
- Acquire employability skills through hands on experience with PPT presentations, discussions and debates

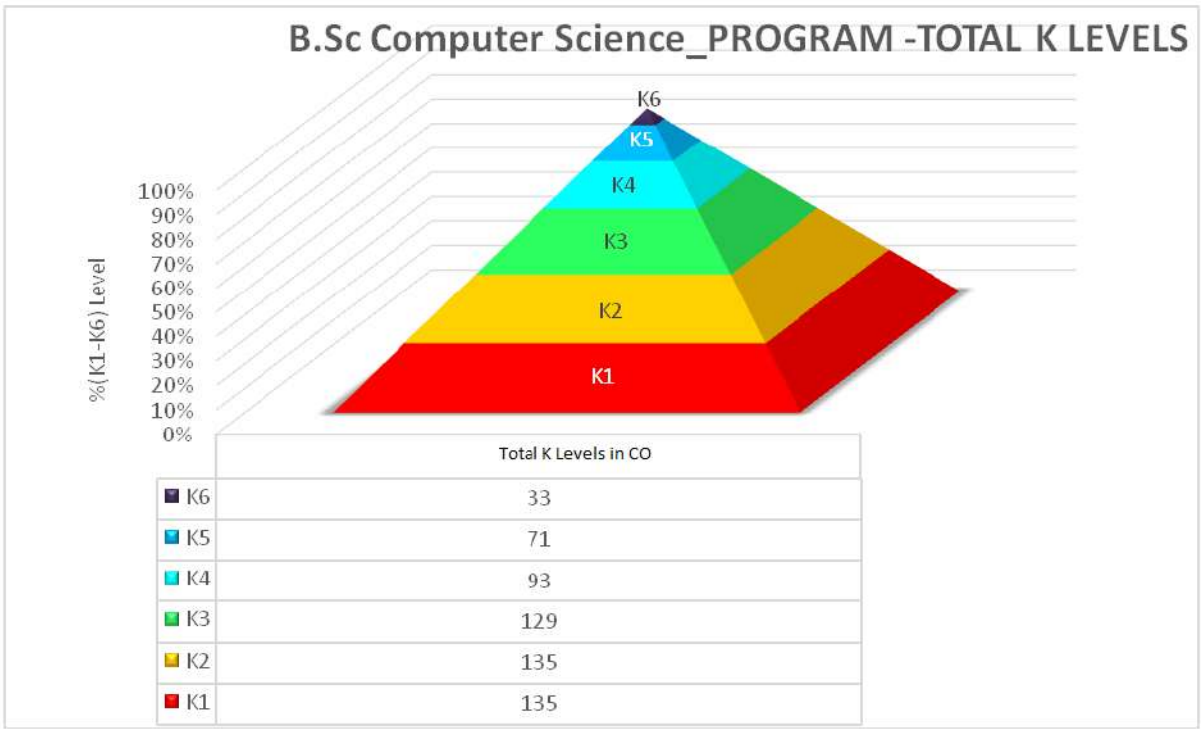
B.Sc C.Sc : CO_K MAPPING

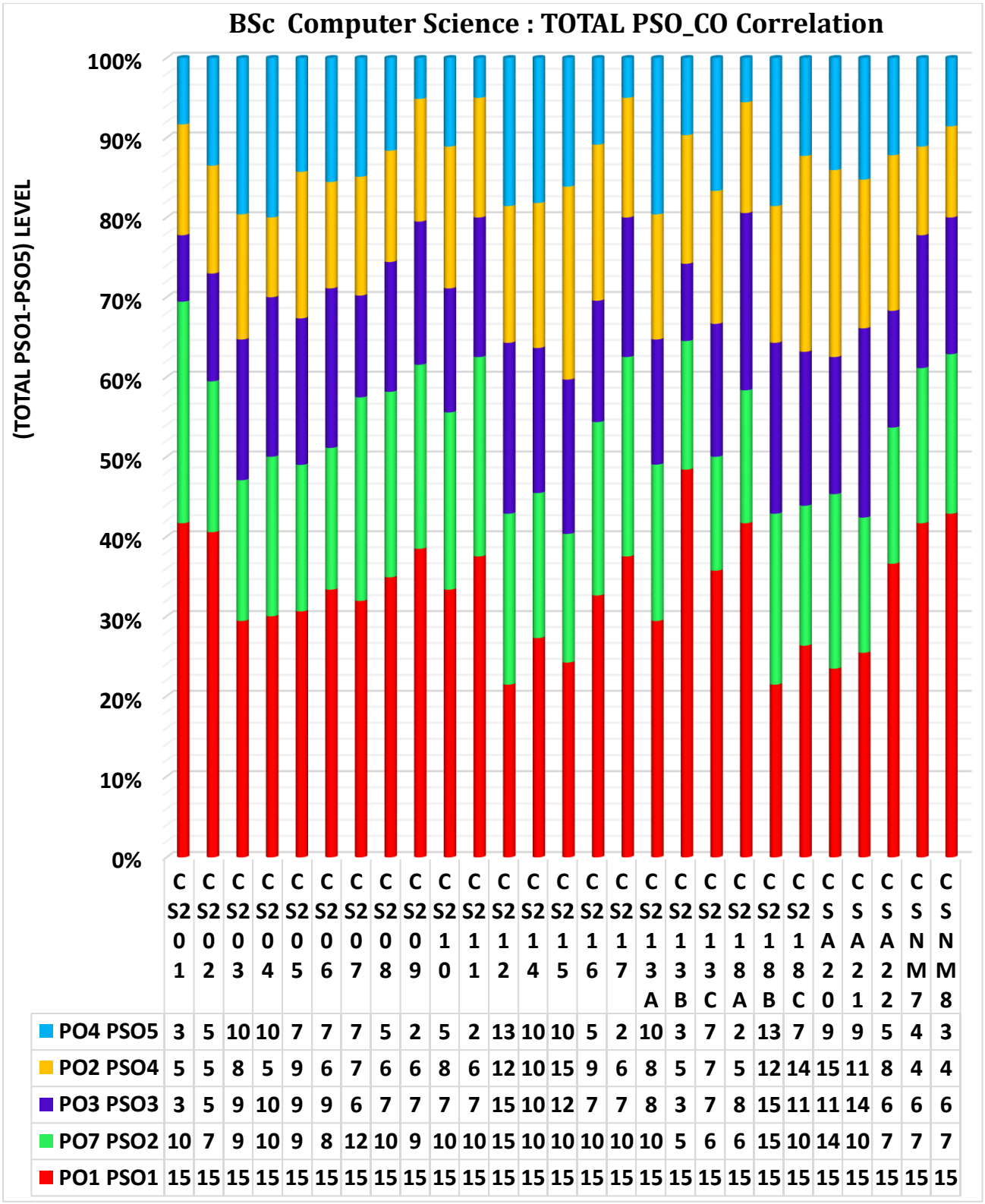


	CS201	CS202	CS203	CS204	CS205	CS206	CS207	CS208	CS209	CS210	CS211	CS212	CS214	CS215	CS216	CS217	CS213A	CS213B	CS213C	CS218A	CS218B	CS218C	CSA20	CSA21	CSA22	CSNM7	CSNM8
K6	1	1	1	3	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	2	2	1	1	1	1	1
K5	2	2	5	5	4	3	2	1	2	3	2	1	4	5	2	2	1	5	3	2	2	3	2	2	2	2	2
K4	5	5	5	4	3	3	3	3	3	3	3	3	5	5	2	3	3	4	4	3	4	3	2	3	3	3	3
K3	5	5	5	5	5	5	5	4	5	5	5	5	5	5	4	5	5	5	5	5	5	5	3	5	4	5	4
K2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
K1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

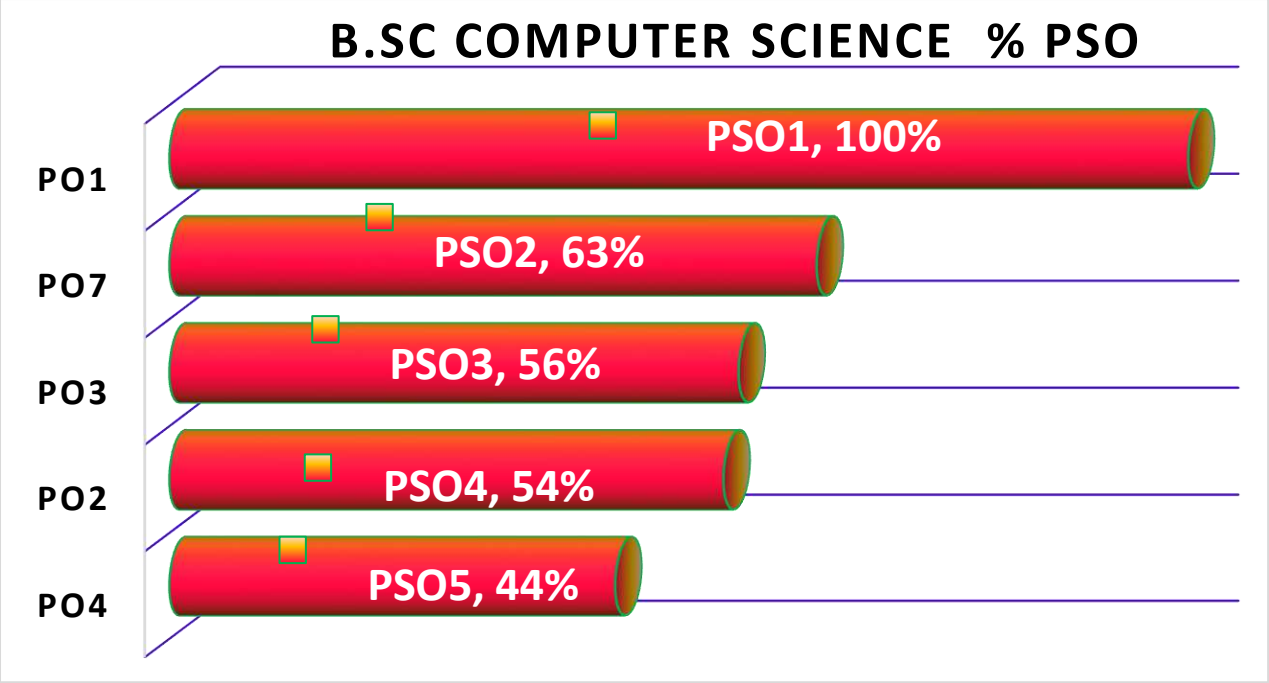

Total - K Level % Split up in IA: B.Sc.,CS
KE1 25%
KE2 23%
KE3 22%
KE4 16%
KE5 8%
KE6 6%

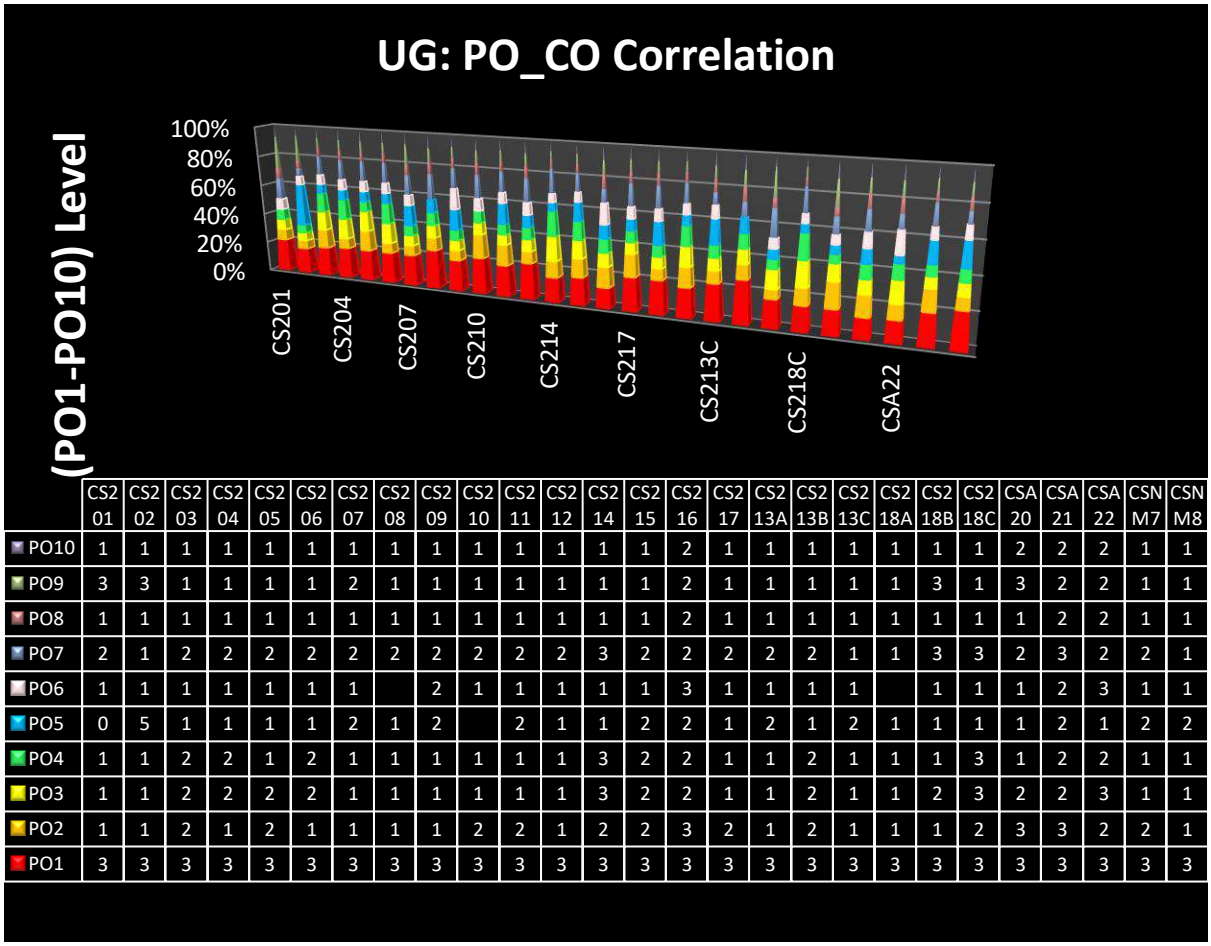

Total - K Level % Split up in SE: B.Sc.,CS
KE1 31%
KE2 23%
KE3 22%
KE4 16%
KE5 8%


B.Sc Computer Science_PROGRAM -TOTAL K LEVELS
%(K1-K6) Level
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
K6
K5
K4
K3
K2
K1
Total K Levels in CO
K6 33
K5 71
K4 93
K3 129
K2 135
K1 135

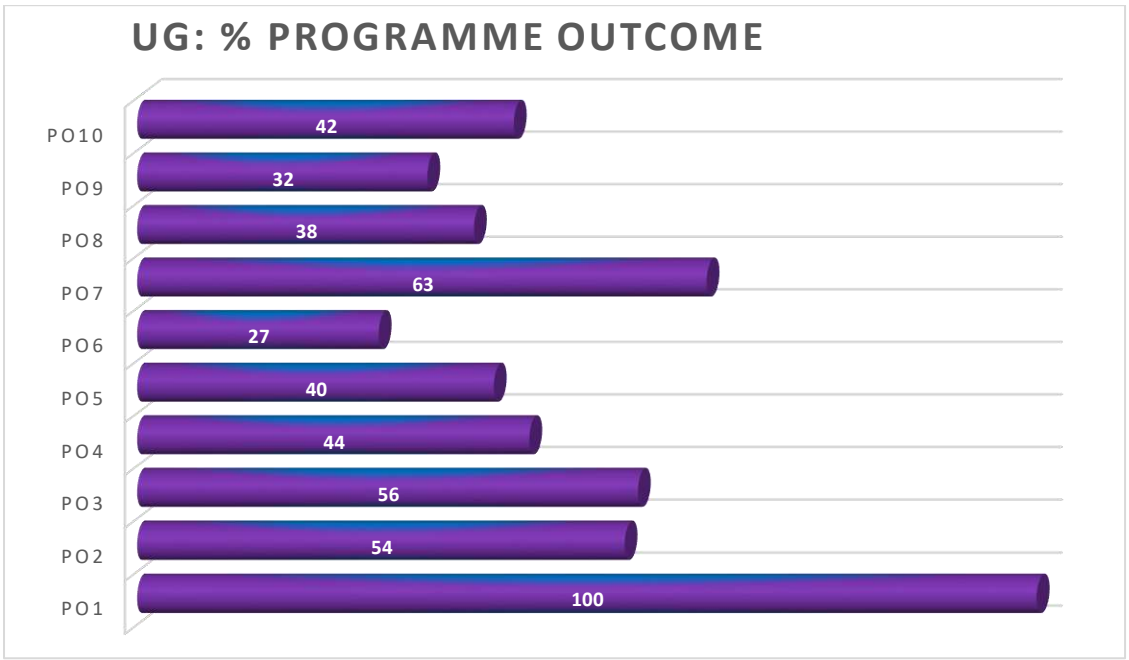


	CS201	CS202	CS203	CS204	CS205	CS206	CS207	CS208	CS209	CS210	CS211	CS212	CS214	CS215	CS216	CS217	CS213A	CS213B	CS213C	CS218A	CS218B	CS218C	CSA20	CSA21	CSA22	CSNM7	CSNM8
PO4 PSO5	3	5	10	10	7	7	7	5	2	5	2	13	10	10	5	2	10	3	7	2	13	7	9	9	5	4	3
PO2 PSO4	5	5	8	5	9	6	7	6	6	8	6	12	10	15	9	6	8	5	7	5	12	14	15	11	8	4	4
PO3 PSO3	3	5	9	10	9	9	6	7	7	7	7	15	10	12	7	7	8	3	7	8	15	11	11	14	6	6	6
PO7 PSO2	10	7	9	10	9	8	12	10	9	10	10	15	10	10	10	10	10	5	6	6	15	10	14	10	7	7	7
PO1 PSO1	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15


B.SC COMPUTER SCIENCE % PSO
PO1
PO7
PO3
PO2
PO4
PSO1, 100%
PSO2, 63%
PSO3, 56%
PSO4, 54%
PSO5, 44%



	CS201	CS202	CS203	CS204	CS205	CS206	CS207	CS208	CS209	CS210	CS211	CS212	CS214	CS215	CS216	CS217	CS213A	CS213B	CS213C	CS218A	CS218B	CS218C	CSA20	CSA21	CSA22	CSNM7	CSNM8
PO10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2	2	1	1
PO9	3	3	1	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	3	1	3	2	2	1	1
PO8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	2	1	1
PO7	2	1	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	1	1	3	3	2	3	2	2	1
PO6	1	1	1	1	1	1	1		2	1	1	1	1	1	3	1	1	1	1		1	1	1	2	3	1	1
PO5	0	5	1	1	1	1	2	1	2		2	1	1	2	2	1	2	1	2	1	1	1	1	2	1	2	2
PO4	1	1	2	2	1	2	1	1	1	1	1	1	3	2	2	1	1	2	1	1	1	3	1	2	2	1	1
PO3	1	1	2	2	2	2	1	1	1	1	1	1	3	2	2	1	1	2	1	1	2	3	2	2	3	1	1
PO2	1	1	2	1	2	1	1	1	1	2	2	1	2	2	3	2	1	2	1	1	1	2	3	3	2	2	1
PO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3



DEPARTMENT OF COMPUTER SCIENCE					
FIRST YEAR – SEMESTER I					
PROGRAMMING IN C					
SEMESTER	**:**	I	**HOURS OF INSTRUCTION**	**:**	5
CORE	**:**	I	**CREDIT**	**:**	5
Lect. Hrs	**:**	75	**CODE NO**	:	CS201

COURSE OBJECTIVES
To equip students with comprehensive knowledge of computer fundamentals and so that they can develop programs on their own for various applications.

CO1	**Explain the** features of C programming language and **classify** the different data types and **apply** them to write simple statements and simple problems can be solved by **analysing** the problem**.** https://nptel.ac.in/courses/106/104/106104128/ **[PO9]**	**K1 K2 K3 K4 K5**
CO2	Can **explain** the control structures and flow of control. The simple programs can be written and **evaluated.** The **creativity** can be shown through writing programs efficiently **[PO3].**	**K1 K2 K3 K4 K5**
CO3	Able to **distinguish** between different types of variables. **Explain** the function declaration, definition and call. A group **activity [PO5]** like quiz can be conducted and to apply the concepts and face question session **[PO4].**	**K1 K2 K3 K4**
CO4	Can **explain** arrays, structures and functions. Can **apply** the concepts to solve small problems **[PO2]**and find a solution. Seminar with **PPT** presentation can be given **[PO7]**.	**K1 K2 K3 K4**
CO5	Able to **explain** file and pointer concepts. **Analyze** when a problem is given and develop a software as a group activity **[PO5].**	**K1 K2 K3 K4 K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	2 Skilled Communicator	3 critical thinker and problem solver	4 Sense of inquiry	5 Team player / worker	6 Skilled project manager	7 Digitally Efficient	8 Ethical awareness/ reasoning	9 National and International perspective	10 Lifelong learners
CO1	3	1			1		2	1	3	1
CO2	3	1			1		2	1		1
CO3	3	1	1	1	1	1	2	1		1
CO4	3	1	1	1	1		2	1		1
CO5	3	1	1	1	1	1	2	1		1
AVG	**3**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**3**	**1**
TOTAL	**15**	**5**	**3**	**3**	**5**	**2**	**10**	**5**	**3**	**5**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	C fundamentals Character set - Identifier and keywords - data types - constants - Variables - Declarations - Expressions - Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions.	**15**
Unit II	Data input output functions - Simple C programs - Flow of control - if, if-else, while, do-while, for loop, Nested control structures - Switch, break and continue, go to statements - Comma operator.	**15**
Unit III	Functions - Definition - proto-types - Passing arguments – Recursions, Storage Classes - Automatic, External, Static, Register Variables - Multi-file programs.	**15**
Unit IV	Arrays - Defining and processing - Passing arrays to Functions - Multi-dimensional arrays - Arrays and String. Structures - User defined data types - Passing structures to functions - Self-referential structures - Unions - Bit wise operations.	**15**
Unit V	Pointers - Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Files: Creating Processing, Opening and Closing a data file.	**15**

ASSESSMENT PATTERN

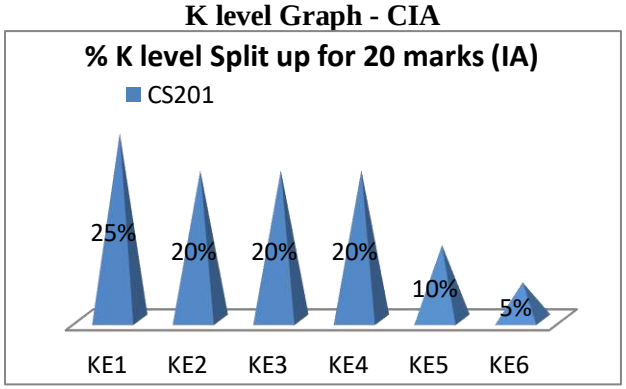
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

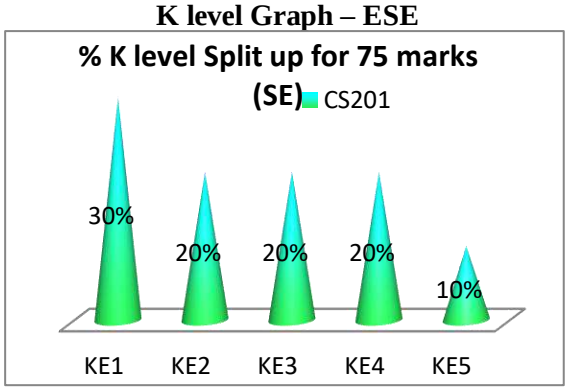
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	2		3
Understand (4)	1	1	2
Apply (4)	1	1	2
Analyze (4)	1	2	1
Evaluate (2)			2
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	20
Apply	20
Analyze	20
Evaluate	10

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Programming in ANSI C	E. Balagurusamy	Tata McGraw Hill	5th Edition

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	The C Programming Language	B.W. Kernighan and D M.Ritchie	PHI	1998 2nd Edition
2	C: The Complete Reference	H. Schildt	TMH	2000 4th Edition
3	Programming with C	Gottfried B.S	TMH Pub. Co. Ltd., New Delhi	1996. 2nd Edition
4	Let us C	Kanetkar Y	BPB Pub New Delhi	1999.

E-Resources.

1. https://www.geeksforgeeks.org/c-programming-language/
2. https://www.programiz.com/c-programming
3. https://www.tutorialspoint.com/ansi_c/c_introduction.htm

DEPARTMENT OF COMPUTER SCIENCE					
FIRST YEAR – SEMESTER I					
PRACTICAL I: C PROGRAMMING					
SEMESTER	**:**	I	**HOURS OF INSTRUCTION**	**:**	6
PRACTICAL	**:**	I	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	**:**	CS202

COURSE OBJECTIVES
To gain practical knowledge through experiments

Course Outcome	Description	Knowledge Levels
CO1	**Demonstrate[P07]** C Programs and **select** the syntax in C programming language and **write [PO3]** simple programs and compare with built-in functions and **evaluate** the results. **Viva Voce can be conducted [PO2].** https://nptel.ac.in/courses/106/104/106104128/ [PO9]	**K1 K2 K3 K4 K5**
CO2	**Write [PO3]** simple C string programs by **identifying** the functions and **applying** string functions to perform string manipulations and the results can be **evaluated [PO7]**.	**K1 K2 K3 K5 K6**
CO3	**Write [PO4]** simple C programs to **demonstrate** recursion by **selecting** the syntax and the results can be **evaluated [PO7]**. **Viva Voce can be conducted [PO2].**	**K1 K2 K3 K4**
CO4	**Write [PO4]** simple C programs by **analyzing** and **selecting** the syntax to perform matrix manipulation the results can be **evaluated and demonstrated [PO7**].	**K1 K2 K3 K4 K5**
CO5	**Write [PO4]** simple C programs by **selecting** the syntax to perform sorting and searching and the results can be **demonstrated [PO7]**. **Viva Voce can be conducted [PO2].**	**K1 K2 K3 K4**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	2 Skilled Communicator	3 critical thinker and problem solver	4 Sense of inquiry	5 Team player / worker	6 Skilled project manager	7 Digitally Efficient	8 Ethical awareness/ reasoning	9 National and International perspective	10 Lifelong learners
CO1	3	1	1	1	1		3	1	3	1
CO2	3	1	1	1	1		1	1		1
CO3	3	1	1	1	1		1	1		1
CO4	3	1	1	1	1		1	1		1
CO5	3	1	1	1	1	1	1	1		1
AVG	3	1	1	1	1	1	1	1	3	1
TOTAL	15	5	5	5	5	3	7	5	3	5

	Course Outline	
EXP No	Content	
Unit I	I) Summation of Series	1. Sin(x), 2. Cos(x), 3. Exp(x) (Comparison with built in functions) – CO1
Unit II	II) String Manipulation	1. Counting the number of vowels, consonants, words, white spaces in a line of text and array of lines. 2. Reverse a string and check for palindrome. 3. Sub string detection, count and removal. 4. Finding and replacing substrings. – CO2
Unit III	III) Recursion	1. ${}^{n}P_{r}$, ${}^{n}C_{r}$ 2. GCD of two numbers 3. Fibonacci sequence 4. Maximum & Minimum – CO3
Unit IV	IV) Matrix Manipulation	1. Addition and Subtraction 2. Multiplication 3. Transpose, and trace of a matrix 4. Determinant of a Matrix – CO4
Unit V	V) Sorting and Searching	1. Insertion Sort 2. Bubble Sort 3. Linear Search 4. Binary Search – CO5

ASSESSMENT PATTERN

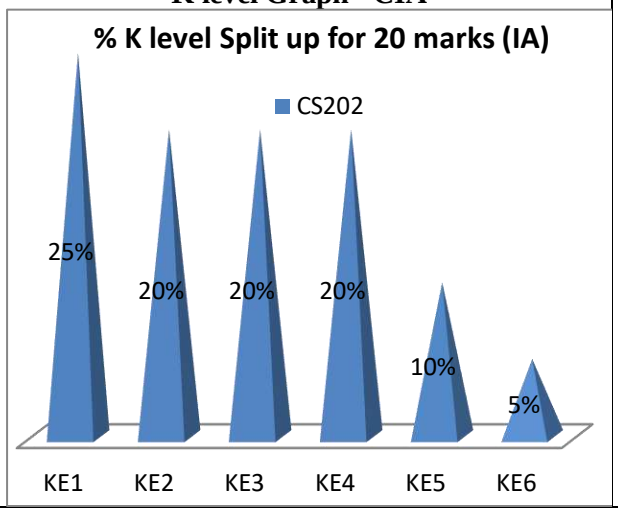
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

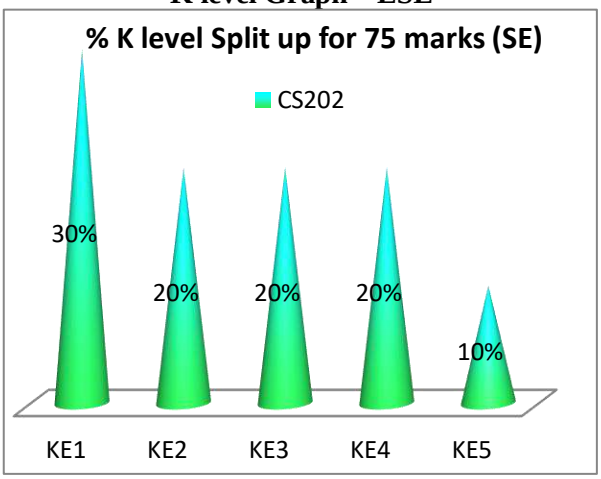
Bloom's Category Marks (out of 25)	Test (10)	Record (5)	Model exam (10)
Remember (5)	2		3
Understand (4)	2		2
Apply (4)	2		2
Analyze (4)	2		2
Evaluate (2)	1		1
Create (1)	1		

Bloom's Category	Weightage %
Remember	30
Understand	20
Apply	20
Analyze	20
Evaluate	10

K level Graph - CIA



K level Graph – ESE



DEPARTMENT OF COMPUTER SCIENCE					
FIRST YEAR – SEMESTER II					
DATA STRUCTURES AND ALGORITHMS					
SEMESTER	**:**	II	**HOURS OF INSTRUCTION**	**:**	5
CORE	**:**	II	**CREDIT**	**:**	5
Lect. Hrs	**:**	75	**CODE NO**	**:**	CS203

COURSE OBJECTIVES
To introduce the various data structures and their implementations Study various sorting algorithms

Course Outcome	Description	Knowledge Levels
CO1	**What** is an algorithm, **Compare** different algorithms and **Choose** the best algorithm [**PO3**]. **Define** stack and queue, **List** their applications in real life, **Choose** the best data structure for the real life problem using array and **Analyze** the performance of the algorithm. (**Assignment** on **choosing** a small real-world problem [**PO1**], **creatively choosing** the appropriate one (stack or queue), **writing** an algorithm using array and **computing** its complexity [**PO3**]. **Present** it as a word document [**PO2**])	**K1** **K2** **K3** **K4** **K5**
CO2	**What** is linked list, **Why** linked list, **Explain** the implementation of stacks and queues using arrays and linked list, **Creatively choose** array or linked list for the given problem and **Evaluate** its performance [**PO3**],	**K1** **K2** **K3** **K4** **K5** **K6**
CO3	**Learn** the terminologies in tree and graph, **What** is binary tree, **Illustrate** the various tree and graph traversals, **Identify** the best traversal for real life problem, **Compare and contrast** the various traversals and **Justify** the selection of a traversal [**PO3**]. (A **group activity [PO5]** on **identifying** the various tree and graph traversal techniques available, their applications in real life problems [**PO1**] from various e-resources[**PO7]**, **creatively choose** the appropriate techniques [**PO3**] and present their work through PPT [**PO2**])	**K1** **K2** **K3** **K4** **K5**
CO4	**Define** Symbol table, **Learn, compare and contrast** the various external sorting techniques, A**pply** the relevant sorting technique based on the problem and **Justify** the selection [**PO7**].	**K1** **K2** **K3** **K4** **K5**
CO5	**Learn, compare and contrast** the various internal sorting techniques, A**pply** the relevant sorting technique based on the problem and **Justify** the selection and **What** is file organisation. (**Implement** few internal sorting techniques using any programming language and **analyse** their performance using EXCEL[**PO7, PO10**])	**K1** **K2** **K3** **K4** **K5**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	2	2	2	1	1	2	1	1	1
CO2	3	1	2	2	1	1	1	1	1	1
CO3	3	2	2	2	2	1	2	1	1	1
CO4	3	1	1	2	1	1	1	1	1	1
CO5	3	2	2	2	1	1	3	1	1	2
AVG	**3**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**1**
TOTAL	**15**	**8**	**9**	**10**	**6**	**5**	**9**	**5**	**5**	**6**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction of algorithms, analyzing algorithms, Arrays: Representation of Arrays, Implementation of Stacks and queues, Application of Stack: Evaluation of Expression - Infix to postfix Conversion - Multiple stacks and Queues, Sparse Matrices.	**15**
Unit II	Linked list: Singly Linked list - Linked stacks and queues - polynomial addition - More on linked Lists - Doubly linked List and Dynamic Storage Management - Garbage collection and compaction.	**15**
Unit III	Trees: Basic Terminology - Binary Trees - Binary Tree representations - Binary trees - Traversal - More on Binary Trees - Threaded Binary trees - counting Binary trees. Graphs: Terminology and Representations - Traversals, connected components and spanning Trees, Single Source Shortest path problem.	**15**
Unit IV	Symbol Tables: Static Tree Tables - Dynamic Tree Tables - Hash Tables: Hashing Functions - overflow Handling. External sorting: Storage Devices - sorting with Disks: K-way merging	**15**
Unit V	Internal sorting: Insertion sort - Quick sort - 2 way Merge sort - Heap sort - shell sort - sorting on keys. Files: Files, Queries and sequential organizations- Index Techniques - File organization.	**15**

ASSESSMENT PATTERN

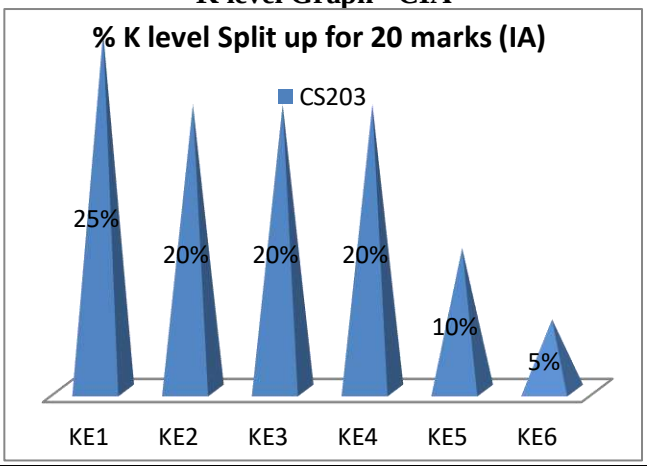
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

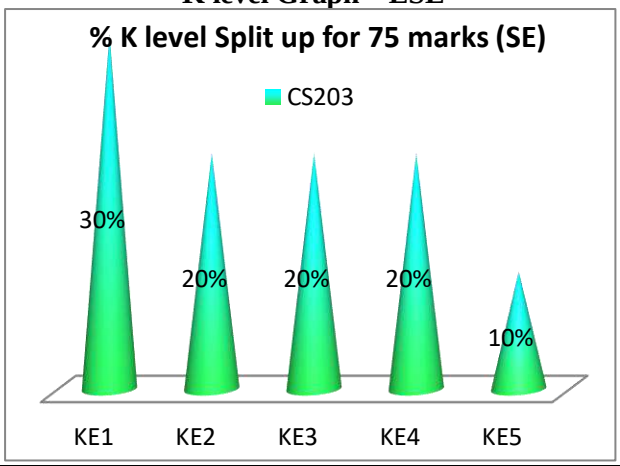
Bloom's Category Marks (out of 25)	Tests (5)	Assignments (5)	Model exam (10)
Remember (5)	2		3
Understand (4)	1	1	2
Apply (4)	1	1	2
Analyze (4)	1	1	2
Evaluate (2)		1	1
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	20
Apply	20
Analyze	20
Evaluate	10

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Data Structures	Ellis Horowitz, SartajShani	Galgotia publication	Reprint 1995

Reference Books:

S.No	Title of the book	Authors	Publishers	Year of Publication
1	Data structures Using C	C Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein	Kindersley (India) Pvt. Ltd	2007
2	Data structure and Algorithms	Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman	Pearson Education Pvt. Ltd.	2017

E-Resources

1. https://www.tutorialspoint.com/data_structures_algorithms/
2. https://www.programiz.com/dsa
3. https://www.geeksforgeeks.org/data-structures

DEPARTMENT OF COMPUTER SCIENCE					
FIRST YEAR – SEMESTER II					
PRACTICAL II: DATA STRUCTURES USING C					
SEMESTER	**:**	II	**HOURS OF INSTRUCTION**	**:**	6
PRACTICAL	**:**	II	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS204

COURSE OBJECTIVES
To understand the concept of data structures through ADT including List, Stack and Queues. To design and implement various data structure algorithms.

Course Outcome	Description	Knowledge Levels
CO1	**Remember** all the syntaxes in **C [PO7]**, **understand** the **computational tools [PO7], apply** built in functions in **evaluating [PO3]** the input data, type, save, run, debug program, send email, take print outs **[PO7]** and **analyse** the results **[PO7][PO10].** **(Interactive session with questions)(Viva – Voce in IA) [PO2].**	**K1** **K2** **K3** **K4** **K5**
CO2	**Keep in mind** the concept of stack and queue, **appreciate** its **application** in real life situations, **evaluate[PO3]** the desired activity by **creating** the **required** codes to **solve** a specific problem. **(Interactive session with questions)(Viva – Voce in IA) [PO2].**	**K1** **K2** **K3** **K4** **K5** **K6**
CO3	**Understand** the memory management concept, **develop** the code for creating nodes, **creatively evaluate [PO3]** codes to perform various operations in linked list and analyse the results. **[PO7]**. **(Interactive session with questions)(Viva – Voce in IA) [PO2].**	**K1** **K2** **K3** **K4** **K5** **K6**
CO4	**Sum up** the concepts learnt on nodes, **understand** how binary trees can be constructed, **apply** the concept and **creatively think [PO3]** to **evaluate [PO3]** and perform the various operations on the binary tree. **(Interactive session with questions)(Viva – Voce in IA) [PO2].**	**K1** **K2** **K3** **K5** **K6**
CO5	**Recall** sorting and hash table, **understand** the various techniques, **apply** the concept and **critically evaluate [PO3]** the performance and **analyze** the result. **(Interactive session with questions)(Viva – Voce in IA) [PO2].**	**K1** **K2** **K3** **K4** **K5**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	1	2	2	1	1	2	1	1	1
CO2	3	1	2	2	1	1	2	1	1	1
CO3	3	1	2	2	1	1	2	1	1	1
CO4	3	1	2	2	1	1	2	1	1	1
CO5	3	1	2	2	2	1	2	1	1	2
AVG	**3**	**1**	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**1**
TOTAL	**15**	**5**	**10**	**10**	**6**	**5**	**10**	**5**	**5**	**6**

	Course Outline
Exp No	**Content**
1.	Write a C program to create two array list of integers. Sort and store the elements of both of them in third list. - CO1.
2.	Write a C program to multiply two matrices A and B and store the resultant matrix in C using arrays. - CO1.
3.	Write a C program to experiment the operation of STACK using array. – CO2.
4.	Write a C program to create menu driven options to implement QUEUE to perform the following (i) Insertion (ii) Deletion (iii) Modification (iv) Listing of elements. - CO2.
5.	Write a C program to create Linked list representations of employee records and do the following operations using pointers. (i) To add a new record. (ii) To delete an existing record. (iii) To print the details about an employee. (iv) To find the number of employees in the structure. - CO3.
6.	Write a C Program to count the total nodes of the linked list. - CO3.
7.	Write a C program to insert an element at the end of the linked list. - CO3.
8.	Write a C program to insert an element at the beginning of a doubly linked list. - CO3.
9.	Write a C program to display the hash table, using the mid square method. – CO5.
10.	Write a C program to implement Circular link list– CO4.
11.	Write a C program to insert nodes into a Binary tree and to traverse in pre order. – CO4.
12.	Write a C program to traverse the given binary tree using all traversal methods. – CO4.
13.	Write a C program to arrange a set of numbers in ascending order using QUICK SORT. – CO5.

ASSESSMENT PATTERN

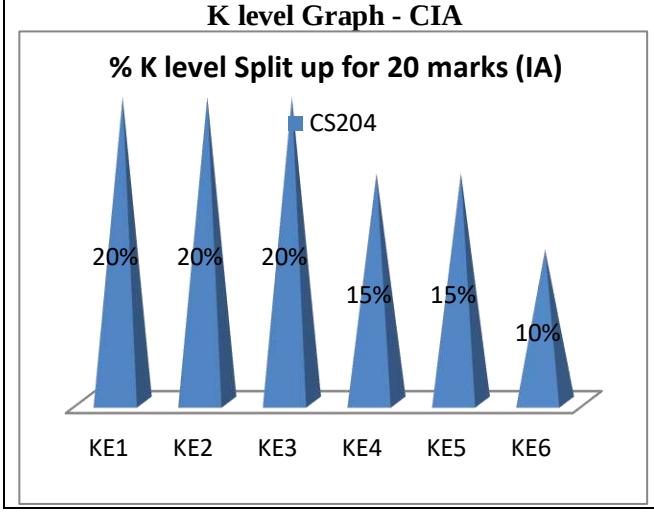
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

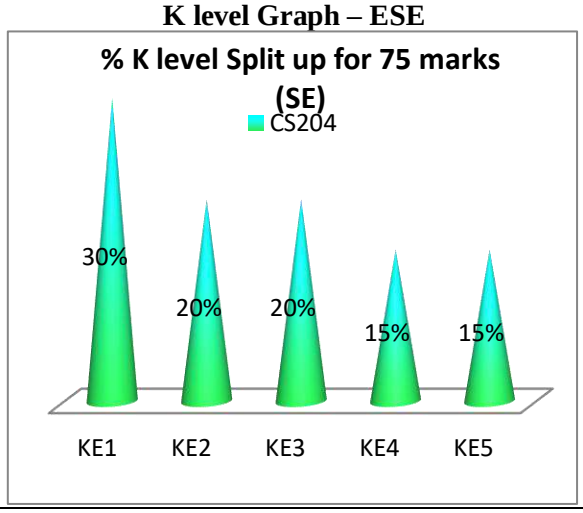
Bloom's Category Marks (out of 25)	Tests (10)	Record (5)	Model exam (10)
Remember (4)	3		1
Understand (4)	2		2
Apply (4)	2		2
Analyze (3)	1		2
Evaluate (3)	1		2
Create (2)	1		1

Bloom's Category	Weightage %
Remember	30
Understand	20
Apply	20
Analyze	15
Evaluate	15

K level Graph - CIA



K level Graph – ESE



DEPARTMENT OF COMPUTER SCIENCE					
SECOND YEAR – SEMESTER III					
RELATIONAL DATABASE MANAGEMENT SYSTEMS					
SEMESTER	**:**	III	**HOURS OF INSTRUCTION**	**:**	5
CORE	**:**	III	**CREDIT**	**:**	5
Lect. Hrs	**:**	75	**CODE NO**	:	CS205

COURSE OBJECTIVES
To describe a sound introduction to the discipline of database management systems. To give a good formal foundation on the relational model of data. Study and design tables in the SQL.

Course Outcome	Description	Knowledge Levels
CO1	**Understand** the basic concept of RDBMS. **Differentiate** between the File system and DBMS**. Recognize and compare** various data models (Assignment on ER diagram using Open-Source **CASE** tools.)	**K1** **K2** **K3**
CO2	**Understanding** the structured Query language and **apply** it to the concepts of relational model. **Identify** the various commands and **associate** them with the type of SQL commands. **Construct** and **evaluate** SQL queries with the help of commands. (Open-Source DBMS Tools – MySQL, Oracle Cloud used to do the queries and can be demonstrated in the interactive online sessions)	**K1** **K2** **K3** **K5**
CO3	**Define and Understand** Integrity Constraints and Security aspects. **Realize and transform** the constraints and security aspects to Tables with the help of queries. **Analyze** the encryption and authorization aspects related to the Database and **evaluate** it (Group discussion to be done for identifying the different constraints in the database)	**K1** **K2** **K3** **K4** **K5**
CO4	**Determine** the needs for normalisation. **Construct** tables on the basis of normalisation. **Analyze and evaluate** the type of normalization for the given database. **Create** normalization rules for tables. (A problem on normalization has to be presented by the student in groups in GMEET)	**K1** **K2** **K3** **K4** **K5** **K6**
CO5	**Understand t**he transaction process. **Realize** the usage of different types of locking protocols. **Analyze** the protocols for database management system and **evaluate** it (E-Quiz on transaction management and types of Protocols has to be presented in PPT in Groups)	**K1** **K2** **K3** **K4** **K5**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	2	1	1			2	1		1
CO2	3	2	2	2			3	1		1
CO3	3	1	2	1	2	1	1	1	1	1
CO4	3	2	2	2	2	1	2	1	1	1
CO5	3	2	2	1	2	1	1	1		1
AVG	**3**	**2**	**2**	**1**	**2**	**1**	**2**	**1**	**1**	1
TOTAL	**15**	**9**	**9**	**7**	**6**	**3**	**9**	**5**	**2**	**5**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction: Database System Applications-DBMS Vs. File System - View of Data-Data Model Database Languages - Database users and Administrators - Transaction Management - Database System Structure - Application Architecture. Data Models: Basic Concepts - Constraint- Keys- ER Diagram - Weak Entity - Extended ER Features - UML; Relational Model: Structure of Relational Databases - Relational Algebra - Views.	**15**
Unit II	SQL: Background-Basic Structure-Set Operation-Aggregate Function-Null Values-Nested Sub Queries-Views - Modification of the Database - Data Definition Language - Embedded SQL - Dynamic SQL.	**15**
Unit III	Advanced SQL : Integrity and Security: Domain - Constraint - Referential Integrity - assertions - Triggers - Security and Authorization - Authorization in SQL - Encryption and Authentication.	**15**
Unit IV	Relational Database Design: First Normal Form - Pitfalls in Relational Database Design-Functional Dependencies (Second Normal Form) - Boyce-Codd Normal Form - Third Normal Form - Fourth Normal Form - Overall Database Design Process.	**15**
Unit V	Transaction Management: Transaction concepts - States - Serializability. Lock based concurrency control: Locks - Granting - Two-Phase Locking protocol. Time stamp based protocol: Timestamps - Timestamp ordering protocol - Deadlock handling.	**15**

ASSESSMENT PATTERN

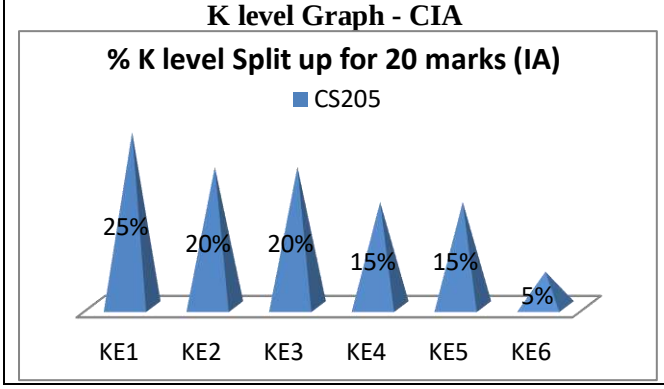
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

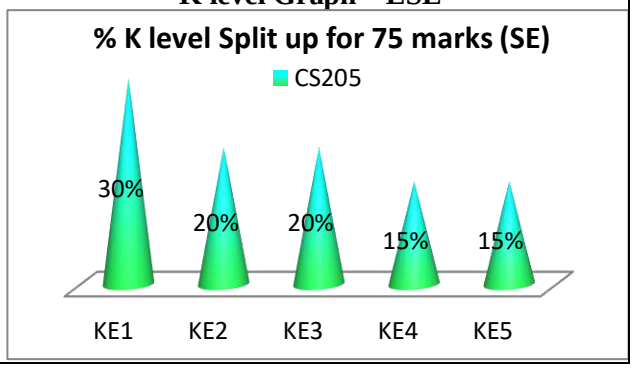
Bloom's Category Marks (out of 25)	**Test (5)**	**Assignment (5)**	**Model exam (10)**
Remember (5)	2	1	2
Understand (4)	1	1	2
Apply (4)		2	2
Analyze (3)	1		2
Evaluate (3)	1		2
Create (1)		1	

Bloom's Category	**Weightage %**
Remember	30
Understand	20
Apply	20
Analyze	15
Evaluate	15

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No	**Title of the book**	**Authors**	**Publishers**	**Year of Publication & Edition**
1	Database System and Concepts	A Silberschatz, H Korth, S Sudarshan	Tata McGraw Hill	5th Edition, 2005

Reference Books:

S.No	**Title of the book**	**Authors**	**Publishers**	**Year of Publication**
1	Essential of DBMS	Alexix Leon & Mathews Leon	Vijay Nicole Publications	2nd Reprint 2009
2	Fundamentals of DBMS	Alexix Leon & Mathews Leon	Vijay Nicole Publications	2nd Edition 2014

E-Resources

1. https://www.mysql.com
2. https://www.oracle.com/in/cloud/
3. https://www.cse.iitb.ac.in/infolab/Data/Publications/DBConceptsBook/slide-dir

DEPARTMENT OF COMPUTER SCIENCE					
SECOND YEAR – SEMESTER III					
PRACTICAL III SQL and PL/SQL					
SEMESTER	**:**	III	**HOURS OF INSTRUCTION**	**:**	6
PRACTICAL	**:**	III	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS206

COURSE OBJECTIVES
Study the various Database management system commands. Construct and Write queries in SQL to retrieve any type of information from a database. Demonstration of the SQL commands with the help of back end RDBMS and front end system for implementation purpose

Course Outcome	Description	Knowledge Levels
CO1	**Understand** and **determine** the various attributes for the database, **construct** queries with the help of DDL commands and **analyze** it.	**K1** **K2** **K3** **K4**
CO2	**Analyze** the given problem and i**dentify**the queries and**construct the tab;e** with the help of DML commands and **evaluate** the same. (Interactive GMEET session will be conducted for presenting the query)	**K1** **K2** **K3** **K4** **K5**
CO3	**Design** constraints for the given tables according to the application. **Exploring** various options in the PL/SQL programs. **Implement** and **evaluate** cursors, triggers and functions in PL/SQL programs (Demonstration of the session to be done in Groups in the Lab).	**K1** **K2** **K3** **K4** **K5**
CO4	**Introduce** the front-end tool Visual basic. **Explore** and **identify** various tools and methods to use in different applications	**K1** **K2** **K3**
CO5	**Identify** an application. **Construct** the database, **analyze** the feasibility of theSystem**.Evaluate** and **Design** a small project to realize a real-world problem as stated in the syllabus.	**K1** **K2** **K3** **K5** **K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	1					1	1		1
CO2	3	2	2	1			3	2		1
CO3	3	1	2	2	2	1	1	1	1	1
CO4	3	1	2	2	2	1	2	1	1	1
CO5	3	1	3	2	1	2	1	1		1
AVG	**3**	**1**	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**1**
TOTAL	**15**	**6**	**9**	**7**	**5**	**4**	**8**	**6**	**2**	**5**

	Course Outline
Exp No	**Content**
1.	Data Definition of Base Tables.-CO1
2.	DDL with Primary key constraints-CO1
3.	DDL with constraints and verification by insert command-CO1
4.	Data Manipulation of Base Tables and Views-CO2
5.	Demonstrate the Query commands.-CO2
6.	Demonstrate the use of Procedures and Functions in PL/SQL –CO2
7.	Write a PL/SQL code block to calculate the area of the circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in a table Areas. Areas – radius, area. -CO3
8.	Write a PL/SQL block of code for reversing a number. (Example : 1234 as 4321). -CO3
9.	Create a transparent audit system for a table Client-master (client-no, name, address, Bal-due). The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details and the date of operation are stored in the auditclient(client-no, name, bal-due, operation, userid, opdate) table, then the delete or update is allowed to go through.-CO3
10.	To design a Note Pad Application menu using Visual Basic.-CO4
11.	To design a Report using Visual Basic.-CO4
12.	To design the Database and implement it by using VB-CO5 a. Student Information System b. Railway Reservation System c. Library Information System

ASSESSMENT PATTERN

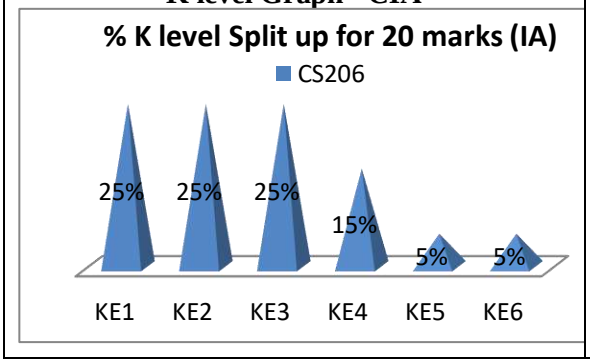
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

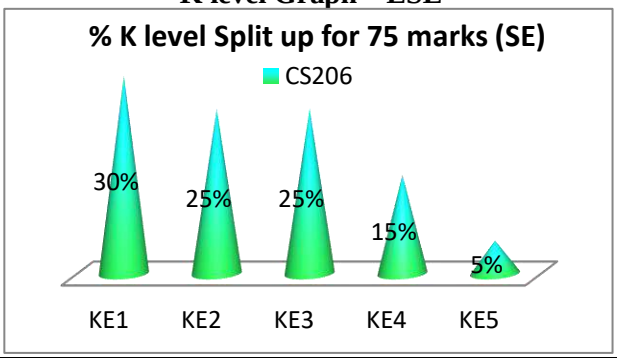
Bloom's Category Marks (out of 25)	Test (10)	Record (5)	Model exam (10)
Remember (5)	3		2
Understand (5)	3		2
Apply (5)	3		2
Analyze (3)	1		2
Evaluate (1)			1
Create (1)			1

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



DEPARTMENT OF COMPUTER SCIENCE					
SECOND YEAR – SEMESTER III					
ALLIED - DIGITAL COMPUTER FUNDAMENTALS					
SEMESTER	**:**	III	**HOURS OF INSTRUCTION**	**:**	4
ALLIED	**:**	I	**CREDIT**	**:**	3
Lect. Hrs	**:**	60	**CODE NO**	:	CSA20

COURSE OBJECTIVES
This Course aims to train the student to the basic concepts of Digital Computer Fundamentals and to impart the in-depth knowledge of combinational circuits and sequential circuits

Course Outcome	Description	Knowledge Levels
CO1	Acquire thorough knowledge on the various types of number system. **Define** the various logic Gates used in digital communication systems and **build** the logic circuits and **demonstrate** it. video lecture [**PO9]** on **https://www.allaboutcircuits.com/video-lectures/logic-gates-logic-states/**	**K1** **K2** **K3**
CO2	**Build** different types of digital electronic circuit using various mapping and logical tools and **infer [PO3]** the techniques to prepare the most simplified circuit using various mapping and mathematical methods. **Analyze**, **determine** the results and **show** it. **construct**k- maps for new expressions and present the work through a PPT or excel worksheet.	**K1** **K2** **K3** **K4** **K5** **K6**
CO3	**Show** the design and working of Multiplexers, Demultiplexers, Encoders, Decoders and Parity checkers and generators and **explain** it. Find out the solution **[PO3]** for error checking using Parity checkers and generators. **E-Quiz** on combinational circuits	**K1** **K2**
CO4	**Find** out the fundamental components of digital circuits, design and **analyze** digital circuits, learn building various sequential digital circuits**, apply** and **justify** their applications. **Group discussion [PO5] on the various types of sequential circuits.**	**K1** **K2** **K3** **K4** **K5**
CO5	**Define** the different types of counters, **explain** its functions.	**K1** **K2**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	3	2	1		1	2	1	2	2
CO2	3	3	3	1	1		1		3	2
CO3	3	3	2	1	2	2	2	1	3	2
CO4	3	3	3	3	3	1	3	1	3	2
CO5	3	2	1	1		1	2	2	2	2
AVG	3	3	2	1	1	1	2	1	3	2
TOTAL	15	14	11	7	6	5	10	5	13	10

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Number Systems and Codes: Number System - Base Conversion - Binary Codes - Code Conversion. Digital Logic: Logic Gates - Truth Tables - Universal Gates.	**12**
Unit II	Boolean Algebra: Laws and Theorems - SOP, POS Methods - Simplification of Boolean Functions - Using Theorems, K-Map- Three and Four variable Mapping-Binary Arithmetic: Binary Addition - Subtraction - Various Representations of Binary Numbers - Arithmetic Building Blocks - Adder - Subtractor.	**12**
Unit III	Combinational Logic: Multiplexers - Demultiplexers - Decoders – Encoders – Coder Converters – Parity Generators and Checkers.	**12**
Unit IV	Sequential Logic: RS, JK, D, and T Flip-Flops - Master-Slave Flip-Flops.	**12**
Unit V	Counters: Asynchronous and Synchronous Counters - Ripple, Mod, Up-Down Counters– Ring Counters.	**12**

ASSESSMENT PATTERN

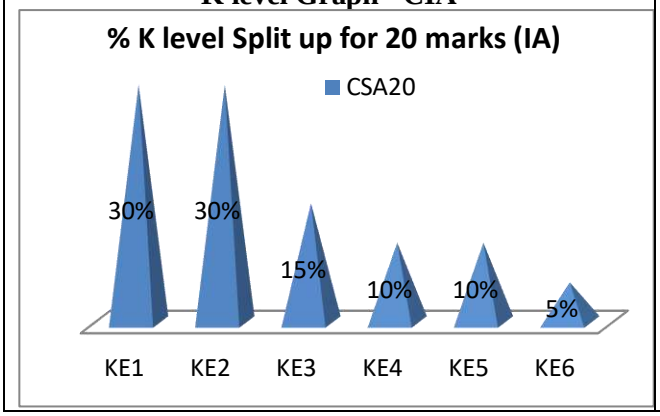
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

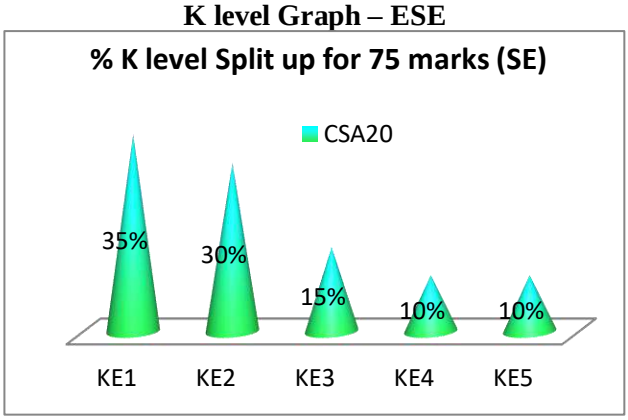
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	1	1	3
Understand (5)	1	1	3
Apply (4)	1	1	2
Analyze (3)	1	1	1
Evaluate (2)	1		1
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Digital Logic and Computer Design	M. Morris Mano	PHI	2001

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	Digital Fundamentals	V.Vijayendran	Printers and Publishers Pvt. Ltd.	2004
2	Digital Computer Design	V.Rajaraman and T.Radhakrishnan	Prentice Hall of India	2001
3	Digital Principles and Applications	D.P.Leach and A.P.Malvino	TMH	2002 5th Edition
4	Digital Computer Fundamentals	T.C.Bartee	Tata McGraw Hill	1991 6th Edition

E-Resources

1. https://www.javapoint.com/digital-electronics
2. https://www.geeksforgeeks.org/shift-registers-in-digital-logic/
3. https://www.tutorialspoint.com/digital_circuits/index.htm

DEPARTMENT OF COMPUTER SCIENCE					
SECOND YEAR – SEMESTER IV					
WEB TECHNOLOGY					
SEMESTER	**:**	IV	**HOURS OF INSTRUCTION**	**:**	5
CORE	**:**	IV	**CREDIT**	**:**	5
Lect. Hrs	**:**	75	**CODE NO**	:	CS207

COURSE OBJECTIVES
Study the various HTML tags and design simple web pages. To Study the scripting language Java Script

Course Outcome	Description	Knowledge Levels
CO1	**Acquire** knowledge about the basics of HTML tags, **understand** and **apply** web designing tags for list creation. **Examine** the method of inserting audio and video to the page. **(e-quiz: On HTML tags) [PO7]**.	**K1** **K2** **K3** **K4**
CO2	**Get** introduced to the concepts of tables and frames. **Learn** to **apply** form elements to design web application. Lecture video with Discussion: https://nptel.ac.in/courses/106/105/106105084/**[PO9]**.	**K1** **K2** **K3**
CO3	**Familiarize** the concepts of cascading style sheets, **why** do we need CSS and where and how they can be **applied** to enhance presentation effects of the web page. Assignment on website design on various topics. Submit the document in google class room. **[PO2, PO4, PO7].**	**K1** **K2** **K3**
CO4	**What** is Java Script?Howto add script to the page**. Understand** control structures, compare and **apply** JavaScript for dynamic effects and **analyze** and **evaluate** conditional and loop statements.	**K1** **K2** **K3** **K4** **K5**
CO5	**Define** objects and events, **understand** event handling. **Apply, examine** and **deduce** data validation. Interactive session through G-MEET to **create** and present an application on pay slip validation as a group seminar referring two or more e-resources. https://nptel.ac.in/courses/106/105/106105191/ https://spoken-tutorial.org/**[PO2, PO4, PO5, PO7, PO8, PO9].**	**K1** **K2** **K3** **K4** **K5** **K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	3	2	1		1	2	1	2	2
CO2	3	3	3	1	1		1		3	2
CO3	3	3	2	1	2	2	2	1	3	2
CO4	3	3	3	3	3	1	3	1	3	2
CO5	3	2	1	1		1	2	2	2	2
AVG	3	3	2	1	1	1	2	1	3	2
TOTAL	15	14	11	7	6	5	10	5	13	10

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups. Links and Navigation: Basic Links, Creating Links with the <a> Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the <img> Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages.	**15**
Unit II	Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames: Introducing Frameset, <frame> Element, Creating Links Between Frames, Setting a Default Target Frame Using <base> Element, Nested Framesets, Inline or Floating Frames with <iframe>.	**15**
Unit III	Cascading Style Sheets: Introducing CSS, Where you can Add CSS Rules. CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. More Cascading Style Sheets: Links, Lists, Tables, Outlines, The :focus and :activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout wit, Page Layout CSS, Design Issues.	**15**
Unit IV	Java Script: How to add script to your pages, Variables and Data Types - Statements and Operators, Control Structures, Conditional Statements, Loop Statements - Functions - Message box, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes.	**15**
Unit V	Working with JavaScript: Practical Tips for Writing Scripts, JavaScript Objects: Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Events, Event Handlers, Forms - Validations, Form Enhancements, JavaScript Libraries.	**15**

ASSESSMENT PATTERN

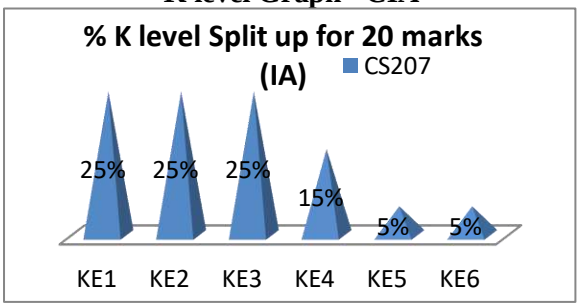
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

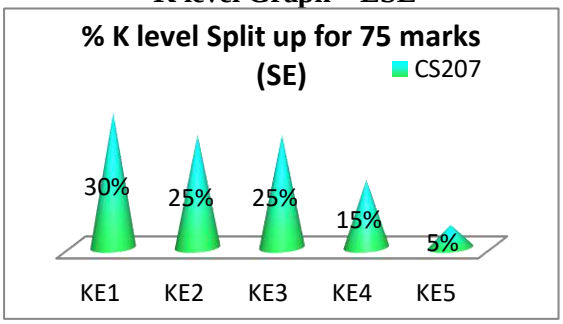
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (6)	1	2	3
Understand (5)	2	1	2
Apply (4)	1	1	2
Analyze (3)	1		2
Evaluate (1)			1
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Beginning HTML, XTML, CSS and Java Script	Jon Duckett	Wiley Publishing	

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	Web Programming	Chris Bates	Wiley Publishing	3rd Edition
2	Web Technology: Theory and Practice	M. Srinivasan	Pearson Publication	

E-Resources

1. https://www.w3schools.com/html/
2. https://www.javatpoint.com/jsp-tutorial
3. https://www.tutorialspoint.com/css/index.html

DEPARTMENT OF COMPUTER SCIENCE					
SECOND YEAR – SEMESTER IV					
WEB TECHNOLOGY LAB					
SEMESTER	**:**	IV	**HOURS OF INSTRUCTION**	**:**	6
PRACTICAL	**:**	IV	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS208

COURSE OBJECTIVES
To design web pages using various HTML tags. To write simple programs in Java Script

Course Outcome	Description	Knowledge Levels
CO1	**Acquire** knowledge about the HTML tags and **understand t**o create a web page with lists, dynamic effects, include layers and **apply** animations.	**K1** **K2** **K3**
CO2	**Recall** the steps to include Text Box element in a form. **Learn** to a**pply** java script code to **analyze** and **validate** the form entry.	**K1** **K2** **K3** **K4** **K5**
CO3	**What** is dynamic effect? **Understand** to **design** an interactive web page with dynamic effects. http://nptel.vtu.ac.in/econtent/courses/CSE/06CS73/index.php	**K1** **K2** **K3**
CO4	**Learn and Gain** practical knowledge to use mathematical expression. Develop web program to accept student marks to prepare mark list, also **create** pay slip from employee details. https://onlinecourses.swayam2.ac.in/aic20_sp11	**K1** **K2** **K6**
CO5	**What** is an event? **Understand** the method of calling an event. **Analyze** mouse over and mouse out event on an image file.	**K1** **K2** **K3** **K4**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	1	1	1			2	1		1
CO2	3	1	1	1			2	1		1
CO3	3	1	2	1			2	1	2	2
CO4	3	1	1	1			2	1	2	2
CO5	3	2	2	1			2	1		1
AVG	**3**	**1**	**1**	**1**			**2**	**1**	**1**	**1**
TOTAL	**15**	**6**	**7**	**5**			**10**	**5**	**4**	**7**

	Course Outline
Exp No	**Content**
1.	Create a form having number of elements (Textboxes, Radio buttons, Check boxes, and so on). Write JavaScript code to count the number of elements in a form. – CO2
2.	Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes have been filled. If a textbox has been left empty, popup an alert indicating which textbox has been left empty. – CO2
3.	Develop a HTML form, which accepts any Mathematical expression. Write JavaScript code to evaluate the expression and display the result. -CO4
4.	Create a page with dynamic effects. Write the code to include layers and basic animation. – CO1, CO3
5.	Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function). – CO4
6.	Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year. – CO4
7.	Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade. – CO4
8.	Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay. – CO4
9.	Create a form consisting of two multiple choice lists and one single choice list (a)The first multiple choice list, displays the Major dishes available (b)The second multiple choice list, displays the Starters available. (c)The single choice list, displays the Soft drinks available. – CO1
10.	Create a web page using two image files, which switch between one another as the mouse pointer moves over the image. Use the on Mouse Over and on Mouse Out event handlers. – CO5

ASSESSMENT PATTERN

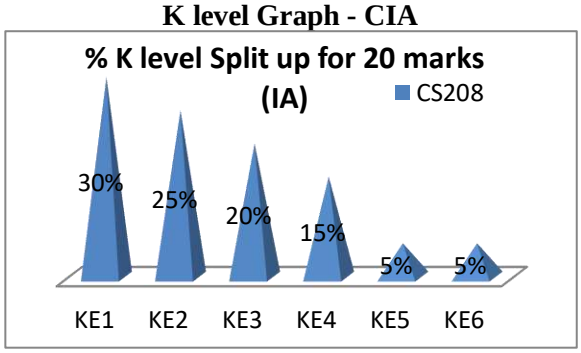
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

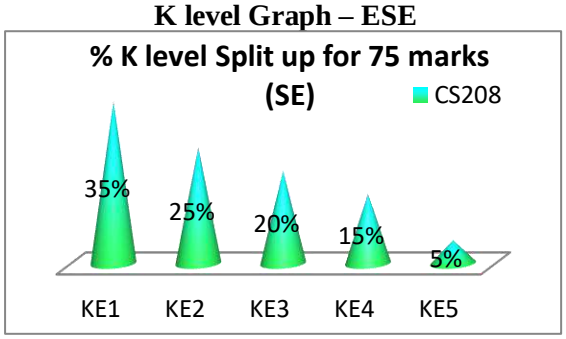
Bloom's Category Marks (out of 25)	Test (10)	Record (5)	Model exam (10)
Remember (6)	3		3
Understand (5)	2		3
Apply (4)	2		2
Analyze (3)	2		1
Evaluate (1)			1
Create (1)	1		

Bloom's Category	Weightage %
Remember	35
Understand	25
Apply	20
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



DEPARTMENT OF COMPUTER SCIENCE					
SECOND YEAR – SEMESTER IV					
ALLIED –MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING					
SEMESTER	**:**	IV	**HOURS OF INSTRUCTION**	**:**	4
ALLIED	**:**	II	**CREDIT**	**:**	4
Lect. Hrs	**:**	60	**CODE NO**	:	CSA21

COURSE OBJECTIVES
The Course aims to train the student to understand the basic concepts of microprocessor and its architecture, The student acquires programming skills by understanding the assembly language 8085

Course Outcome	Description	Knowledge Levels
CO1	**Identify** the basics of a computer through microprocessor fundamentals, **illustrate** its architecture, internal components and **find** out the functions and **analyze** it. Video lecture **[PO9]** on https://nptel.ac.in/courses/108/105/108105102/.	**K1 K2 K3 K4**
CO2	**Identify** the basics of a computer through microprocessor fundamentals, **illustrate** its architecture, internal components and **find** out the functions. Video lecture **[PO9]** on https://nptel.ac.in/courses/108/105/108105102/.	**K1 K2 K3**
CO3	**Find** out and **apply** the Looping concepts in the 8085 program for generating pulse wave forms. **Demonstrate** the 8085 programs using subroutine concept,	**K1 K2 K3 K4 K5**
CO4	**Compare** and **contrast [PO3]** the difference between memory mapped I/O and I/O mapped I/O. **Find** out the various vectored interrupts, **analyze** it and **identify** its usage and **justify** it. **Group discussion on interfacing concepts.**	**K1 K2 K3 K4 K5**
CO5	**Analyze [PO3]** the interfacing of peripherals, **find** out its applications, **apply**, **explain** how to **build** various interfaces and **justify** it. **Group discussion on interfacing the peripherals**	**K1 K2 K3 K4 K5 K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	3	2	2	2	2	3	1	3	3
CO2	3	3	3	2	1	2	3	2	3	3
CO3	3	3	3	2	2	2	3	2	2	2
CO4	3	3	2	1	2	2	2	3	2	2
CO5	3	3	1	1	1	2	3	2	3	2
AVG	3	3	2	2	2	2	3	2	2	2
TOTAL	15	15	11	9	8	10	14	12	11	12

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Architecture and Operation: Introduction to 8085, Microprocessor organization/ architecture and its operation Microprocessor based system.	**12**
Unit II	Programming the 8085: Programming model, instruction classification, Instruction format, addressing modes, writing assembly level programs- overview of instruction set, timing diagrams data transfer, Arithmetic, Logic branch operations.	**12**
Unit III	Programming techniques- Looping Counting and Indexing, 16 bit arithmetic operations, logic operations Compare and rotate operations. Stacks and subroutines- conditional CALL and RETURN instructions. Advanced subroutine concepts. BCD to Binary and Binary to BCD conversions, Binary to ASCII and ASCII to Binary code conversion, BCD addition and subtraction, multiplication and division.	**12**
Unit IV	Memory Interface: Memory and I/O mapping and interfacing concepts. Interrupts: 8085 vectored interrupts, Restart as Software instructions, additional I/O concepts and processes.	**12**
Unit V	Interfacing of peripherals (I/Os) and applications: Interfacing Keyboard (linear and matrix) and 7 segment display including multiplexers, 8279 programmable keyboard /display interface, 8255 PPI, DMA and 8257 DMA controller, Serial communication using 8251.	**12**

ASSESSMENT PATTERN

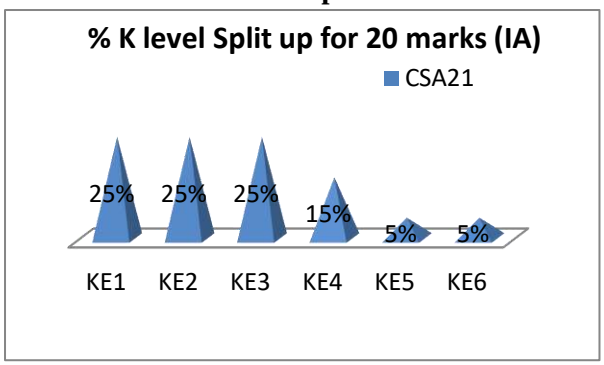
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

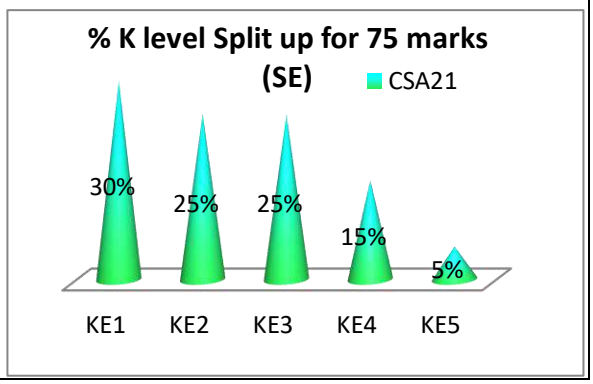
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	2	1	2
Understand (5)	1	1	3
Apply (5)	1	1	3
Analyze (3)	1	1	1
Evaluate (1)			1
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Microprocessor Architecture, Programming and Application with 8085	R.S.Gaonkar	Penram International	2011 5th Edition

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	Microprocessor and Programmed Logic	Kenneth L.Short	PHI	2nd Edition
2	Introduction to Microprocessors	Aditya P. Mathur	Tata McGraw Hill	3rd Edition
3	Microprocessors and Digital Systems	Douglas V.Hall	Tata McGraw Hill	2nd Edition 1983
4	Introduction to Intel family of Microprocessors	Antonakos	Pearson Education	1995

E-Resources

1. https://nptel.ac.in/courses/106/108/106108100/
2. https://www.geeksforgeeks.org/microprocessor-tutorials/
3. https://www.javatpoint.com/memory-and-io-interfacing

DEPARTMENT OF COMPUTER SCIENCE					
SECOND YEAR – SEMESTER IV					
ALLIED PRACTICAL : DIGITAL ELECTRONICS AND MICROPROCESSOR LAB					
SEMESTER	**:**	IV	**HOURS OF INSTRUCTION**	**:**	2
ALLIED	**:**	III	**CREDIT**	**:**	4
Lect. Hrs	**:**	30	**CODE NO**	:	CSA22

COURSE OBJECTIVES
This Practical paper aims to know the concepts of Logic Gates and combinational circuits, and to understand and implement the concepts of registers and counters and to write simple 8085 assembly level programming

Course Outcome	Description	Knowledge Levels
CO1	To understand the behavior and **demonstrate** the operation of AND, OR, NOT, NAND, NOR, and EXOR gates. To **apply** knowledge of the fundamental gates to create truth tables and also **show** the universality of NAND and NOR gates. **Video Lecture on https://www.youtube.com/watch?v=8z9Fz3AnImo** **Analyze** the digital circuit to evaluate the Boolean Expressions. **Construct [PO3]** the basic logic circuits with more than two-inputs and verify Demorgan's theorems. **Determine** the Boolean expression from a logic circuit	**K1** **K2** **K3** **K4** **K5**
CO2	To understand **Where** to use AND, OR and NOT gates and **show** a simple combinational logic circuit. Determine the circuits for adders and subtractors and **justify** the results. **Evaluate** the circuit for counters and **interpret** the results. **Group Discussion [PO5] on the operations of Counters**.	**K1** **K2**
CO3	**Develop [PO3]** the Programs on Assembly language 8085 for the implementation of various arithmetic manipulations such as addition, subtraction, multiplication and division of two 8 bit numbers and **demonstrate** it. **Find** out the square and square root of a 8 bit number and **compare** the results with manual calculation and **analyze** and **Justify** it.	**K1** **K2** **K3** **K4** **K5** **K6**
CO4	**Demonstrate** the Programs on Assembly language 8085 to for sorting an array of numbers and **find** out the smallest and Largest number in that array. **Construct** the Programs on Assembly language 8085 to convert the numbers from BCD to Hexa, ASCII to BCD, BCD to ASCII and **compare** the results with manual calculation	**K1** **K2** **K3** **K4**
CO5	**Develop[PO3**] the Programs on Assembly language 8085 to **show** the block movement of data from one memory Location to another and **Demonstrate** the result.	**K1** **K2** **K3**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	2	2	1	2	2	2	2	2	2
CO2	3	2	3	2	1	3	2	2	3	2
CO3	3	2	3	2	2	3	2	2	2	2
CO4	3	2	3	2	2	2	2	2	3	2
CO5	3	3	3	2	1	3	2	2	2	2
AVG	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**2**	**2**	**2**
TOTAL	**15**	**11**	**14**	**9**	**8**	**13**	**10**	**10**	**12**	**10**

	Course Outline	
Exp No	**Content**	
1.	Logic Gates	a)Verification of Truth Tables AND, OR, NOT, NAND, NOR , EX – OR. b)Realisation of NAND and NOR AS Universal Gates. – CO1
2.	Implementation and Evaluation of Boolean Expression	Verification of Demorgan's Law. Implementation of Boolean Expressions using Logic Circuit. Simplification of Boolean Expression using K-Map Technique.- CO1
3.	Adders and Subtractors	Implementation of Half Adder and Half Subtractor. Implementation of Full Adder and Full Subtractor. -CO2
4.	Counters	Study of UP/ DOWN Counter. – CO2
5.	Arithmetic operations using 8085 Assembly Language Programs	Arithmetic Operation using 8 bit number (Addition, Subtraction, Multiplication and Division). Finding the square of an 8 bit number. Finding the square root of an 8 bit number.- CO3
6.	Sorting the numbers	Sort an Array of numbers in Ascending and Descending order. Find the Smallest and Largest number among a set of N numbers. - CO4
7.	Number Conversions	Convert the following: BCD to Hexa, ASCII to BCD, BCD to ASCII. - CO4
8.	Block movement	Moving a block of data from one location to another location. - CO5

ASSESSMENT PATTERN

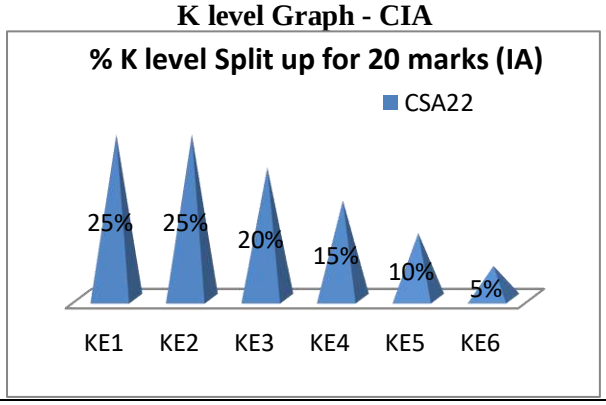
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

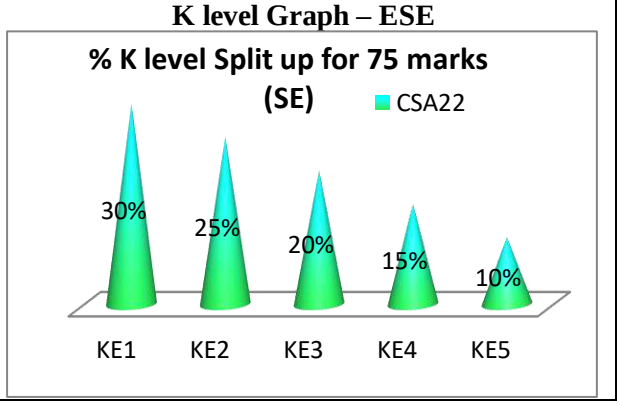
Bloom's Category Marks (out of 25)	Test (10)	Record (5)	Model exam (10)
Remember (5)	3		2
Understand (5)	2		3
Apply (4)	2		2
Analyze (3)	1		2
Evaluate (2)	1		1
Create (1)	1		

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	20
Analyze	15
Evaluate	10

K level Graph - CIA



K level Graph – ESE



DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER V					
OPERATING SYSTEMS					
SEMESTER	**:**	V	**HOURS OF INSTRUCTION**	**:**	6
CORE	**:**	V	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS209

COURSE OBJECTIVES
The course aims at the student to learn basic concepts and functions of operating systems and understand the concept of process, thread and resource management. The student acquires knowledge on various Memory, I/O and File management techniques

Course Outcome	Description	Knowledge Levels
CO1	**Acquire** knowledge on core concepts of operating systems and able to **explain** different types of operating systems and its structure. This helps to **compare** with different types of operating systems and **plan** how to select advanced operating system. **(e-Quiz: System Calls-PO7).**	**K1** **K2** **K3** **K4**
CO2	**Learn** process managementand **explain** thread usage, **apply** thread model and **analyze**parallelism in the system by the use of multithreading. **Categorize** various issues in Inter Process Communication (IPC) and the role of operating system in IPC. **Assignment on Inter Process Communication [PO7].**	**K1** **K2** **K3** **K4**
CO3	**Understand** the process management policies and scheduling of process by central processing unit and **compare** different page replacement algorithms. **Learn** different CPU scheduling algorithms and **construct** Gantt Charts, performance **evaluation [PO3]** of different scheduling algorithms based on scheduling criteria, **creatively [PO3]** select best scheduling algorithm of maximizing CPU utilization and present the work through a PPT or excel worksheet **[PO7]** as a group activity **[PO5]** and face question session **[PO4]**.	**K1** **K2** **K3** **K5** **K6**
CO4	Be familiar with the deadlock concept and **build** resource allocation graph of minimizing deadlock, **analyze** different deadlock detection, recovery and avoidance algorithm and **choose** best method when applied to resources whose state can be saved and restored easily. **Lecture video with Discussion:https://nptel.ac.in/courses/106/105/106105214/ [PO9]**	**K1** **K2** **K3** **K5**
CO5	**Define** principles of I/O hardware and I/O software and **apply** different levels of access to files and assigning roles for specific users of increasing efficiency, **Categorize** different directory structures based on access control and services to user. Interactive session through WHITE BOARD, GMEET, **https://nptel.ac.in/courses/106/105/106105214/ [PO7,PO9]**	**K1** **K2** **K3** **K4**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	1	2				2	1		1
CO2	3	1	1				2	1		1
CO3	3	2	2	1	2	1	2	1		1
CO4	3	1	1	1	2	1	1	1	1	1
CO5	3	1	1				2	1	1	1
AVG	**3**	**1**	**1**	**1**	**2**	**2**	**2**	**1**	**1**	**1**
TOTAL	**15**	**6**	**7**	**2**	**4**	**1**	**9**	**5**	**2**	**5**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction - History of operating systems - Different kinds of operating systems – Operating system concepts - System calls-Operating system structure.	**15**
Unit II	Processes and Threads: Processes - threads - thread model and usage - inter process communication.	**15**
Unit III	Scheduling - Memory Management: Memory Abstraction - Virtual Memory - Page replacement algorithms.	**20**
Unit IV	Deadlocks: Resources- introduction to deadlocks - deadlock detection and recovery - deadlocks avoidance - deadlock prevention. Multiple processor system: multiprocessors - multi computers.	**20**
Unit V	Input / Output: principles of I/O hardware - principles of I/O software. Files systems: Files - directories - file system implementation - File System Management and Optimization.	**20**

ASSESSMENT PATTERN

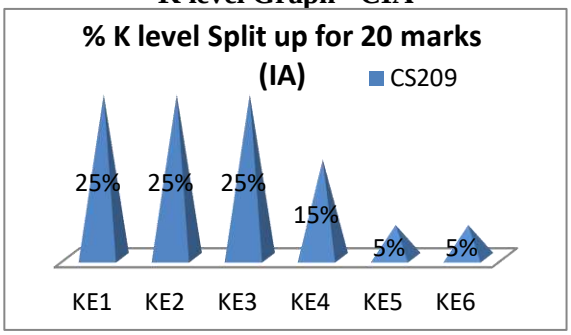
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

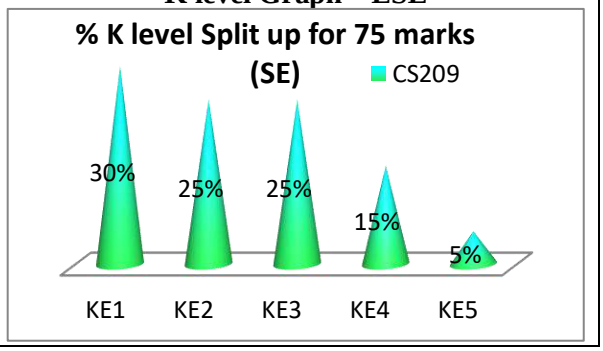
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember(5)	2	1	2
Understand(4)	2	1	2
Apply(4)	1	1	3
Analyze(3)		1	2
Evaluate(2)			1
Create(2)		1	

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Modern Operating Systems	Andrew S. Tanenbaum	PHI private Limited	2008 2nd Edition

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	Operating Systems - Internals & Design Principles	William Stallings.	Prentice - Hall of India private Ltd	5th Edition
2	Operating System	Sridhar Vaidyanathan	Vijay Nicole Publications	2014 1st Edition

E-Resources

1. https://www.javatpoint.com/os-tutorial
2. http://140.113.212.23/courses/embedlab_10/lecture/ Operating%20Systems.pdf
3. http://www2.latech.edu/~box/os/ch05.pdf

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER V					
PROGRAMMING IN JAVA					
SEMESTER	**:**	V	**HOURS OF INSTRUCTION**	**:**	6
CORE	**:**	VI	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS210

COURSE OBJECTIVES
The course aims at the student to learn the basics of object oriented programming, learn the fundamental concepts of Java, objects, classes, inheritance and interfaces, Exception Handling, Multithreading, I/O, Applet Programming and AWT controls in Java The student acquires programming skills through thorough understanding of the basic constructs of Java.

Course Outcome	Description	Knowledge Levels
CO1	**Learn** the basics of object oriented programming, **Understand** the fundamental concepts of Java, Arrays and Control statements and **Develop** programs using the same. **(E-Quiz: Java Basics [PO7, PO3]).**	**K1** **K2** **K3**
CO2	**Define** objects, classes, and constructors in Java, **Understand** Overloading of methods, **Apply** classes to work with Inheritance and **Compare** the different inheritance types in Java and develop programs using the same and **Evaluate** them. Lecture video with Discussion: https://nptel.ac.in/courses/106/105/106105191/**[PO9].**	**K1** **K2** **K3** **K4** **K5**
CO3	**Define** packages, and interfaces to work with multiple inheritance, **Understand** the concept of Exception handling and multithread programming in Java, D**evelop** the programs using the same. **Compare** different types of threading **(Interactive – Practice (PPT) session on Multiple Inheritance – Planned)[PO3][PO7]**	**K1** **K2** **K3**
CO4	**Study t**he basics of I/O and Applet Programming in Java**, Explain** about Applet window and **Develop** simple Applet programs and **Analyze** them. **Compare** the outputs and **Evaluate** the same. Interactive Programming session through WHITE BOARD, PPT, **GMEET [PO7,PO9]**	**K1** **K2** **K3** **K4** **K5**
CO5	**Study t**he basics of AWT controls, **Explain** each control and **Develop** applications using the same and **Evaluate** the performance **[K5,PO3]** of the applications and **creatively [K6,PO3]** present the work through a PPT or showing output of newly developed application**[PO7]** as a **group activity[PO5]** and face question session**[PO4].**	**K1** **K2** **K3** **K4** **K5** **K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	**3**	1	2	**1**	1		**2**	1	1	1
CO2	**3**	2	1	**1**	1		**1**	1	1	1
CO3	**3**	2	2	**1**	1		**2**	1	1	1
CO4	**3**	1	1	**1**	1		**3**	1	1	2
CO5	**3**	2	1	**1**	2	1	**2**	1	1	1
AVG	**3**	2	1	**1**	1	1	**2**	1	1	1
TOTAL	**15**	**8**	**7**	**5**	**6**	**1**	**10**	**5**	**5**	**6**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Genesis of Java: Creation of Java - why java is important to internet - The Java Buzz words - An overview of Java Object Oriented Programming. Data types - Variables - Type conversion and casting - Automatic type promotion in Expressions - Strings. Arrays: One Dimensional Array - Multi Dimensional Array - Operators - Control statements.	**15**
Unit II	Class Fundamentals - Declaring objects - Assigning object Reference variables - Introducing Methods - Constructors - Garbage collection - Finalize () Method - Stack class. A Closer Look at Methods and classes: Overloading Methods - Argument passing - Nested and Inner classes - String class - Using command line arguments. Inheritance Basics and Types - Method overriding - Dynamic Method Dispatch - Using Abstract class - Using final with inheritance.	**15**
Unit III	Packages & Interface - Exception Handling - Creating your own Exception subclasses. Multithreaded Programming: Java Thread Model - Main Thread - Creating a Thread - Creating Multiple Threads - Using is Alive() and join() - Thread priorities - Synchronization - Inter thread Communication.	**20**
Unit IV	I/O & Applets: I/O Basics - Reading console Input - writing console output - The Print Writer class - Reading and Writing Files. The Applet class: - Applet Architecture - Applet Skeleton - Applet Display method - Requesting Repainting - HTML APPLET tag - Passing Parameters to Applet - Event Handling Mechanisms - Event classes - Sources of Events - Event Listener Interfaces	**20**
Unit V	AWT Classes - Window fundamentals - working with Frame Windows - working with Graphic Using AWT controls: Controls fundamentals - Labels - using Buttons - Applying check Boxes - Check Box group - Choice controls - Using a Text field - Using a Text Area - Understanding Layout Managers (Flow Layout only) - Menu Bars and Menus.	**20**

ASSESSMENT PATTERN

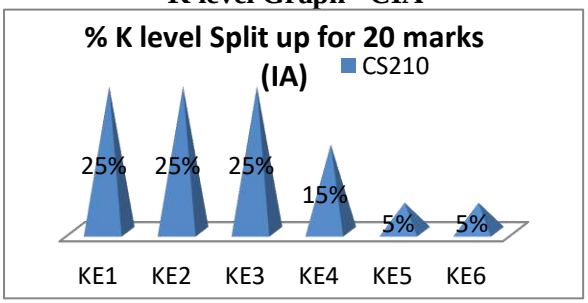
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

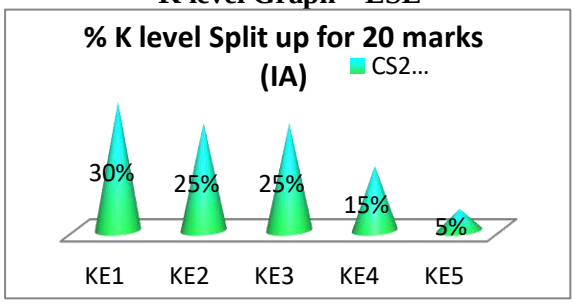
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	1	1	3
Understand (5)	2	1	2
Apply (5)	1	1	3
Analyze (3)	1	1	1
Evaluate (1)			1
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Programming with Java	E. Balagurusamy	Tata McGraw Hill Education India	2014 6th Edition

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	Java - The Complete Reference	Herbert Schildt	McGraw Hill Education	2014 9th Edition
2	Programming with JAVA	Dr. C.Muthu	Tata McGraw Hill	2010 2nd Edition
3	Programming in JAVA	Sachin Malhotra & Saurabh Choudhary	Tata McGraw Hill	2nd Edition
4	JAVA Programming for Core and Advanced Learners	Sagayaraj, Denis, Karthik and Gajalakshmi	Universities Press	1st Edition 2018

E-Resources

1. https://www.w3schools.com/java/java_intro.asp
2. https://www.tutorialspoint.com/java/index.htm
3. https://www.javatpoint.com/java-tutorial

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER V					
PRACTICAL V: JAVA PROGRAMMING					
SEMESTER	**:**	V	**HOURS OF INSTRUCTION**	**:**	6
PRACTICAL	**:**	V	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS211

COURSE OBJECTIVES
The course aims at the student to be knowledgeable enough about basic Java language syntax and semantics to be able to successfully read and write Java computer programs, implement interfaces, inheritance, and polymorphism as programming techniques and apply exceptions handling Applet Programming and AWT controls

Course Outcome	Description	Knowledge Levels
CO1	**Recall t**he basics of Java programming, **Implement** the concepts of objects, classes and constructors, and overloading and develop programs using the same. **(Interactive session with questions) (Viva – Voce in IA) [PO2]**	**K1** **K2** **K3**
CO2	**Define** objects, classes in Java, and **Extend** classes to work with inheritance and interfaces in Java and **Develop** programs, **Compare** and **Evaluate** the same. **(Interactive session with questions) (Viva – Voce in IA) [PO2]**	**K1** **K2** **K3** **K4** **K5**
CO3	**Recall** the concepts of threading, **Explain** about Exception handling and multithreaded programming in Java and **Develop** the programs using the same and **Analyze** them. **(Interactive session with questions) (Viva- Voce in IA)[PO2]**	**K1** **K2** **K3** **K4**
CO4	**Study** and **Understand t**he basics of Applet Programming in Java**, and Develop** simple Applet programs as well as using AWT controls in Java and **Evaluate** the performance**[K5,PO3]** of newly developed Applet Program and **creatively [K6,PO3]** present the work through a PPT or showing output **[PO7]** as a **group activity[PO5]** and face question session**[PO4].**	**K1** **K2** **K3** **K4** **K5** **K6**
CO5	**Study** the basics of AWT controls **Compare** different controls and **Develop** programs using Menus, and Event handling in Java. **(Interactive session with questions) (Viva- Voce in IA)[PO2]**	**K1** **K2** **K3**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	1	1	1	1		1	1	1	1
CO2	3	2	2	1	1		2	1	1	1
CO3	3	1	1	1	1		1	1	1	1
CO4	3	3	2	1	2	1	3	1	1	2
CO5	3	1	1	1	1		1	1	1	1
AVG	**3**	**2**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**1**
TOTAL	**15**	**8**	**7**	**5**	**6**	**1**	**8**	**5**	**5**	**6**

	Course Outline
Exp No	**Content**
1.	Define a class called Student with the attributes name, reg-number and marks obtained in four subjects (m1,m2,m3,m4).Write a suitable constructor and methods to find the total mark obtained by the student and display the details of the student. – CO1
2.	Write a Java program to find the area of a square, rectangle and triangle by (i) Overloading Constructor (ii) Overloading Method. – CO1
3.	Write a java program to add two complex numbers. [Use passing object as argument and return object]. – CO2
4.	Define a class called Student-super with data members name, roll number and age. Write a suitable constructor and a method output () to display the details – CO2
5.	Derive another class Student from Student-super with data members' height and weight. Write a constructor and a method output () to display the details which overrides the super class method output().[Apply method Overriding concept]. – CO2
6.	Write a java program to create an interface called Demo, which contains a double type constant, and a method called area () with one double type argument. Implement the interface to find the area of a circle. – CO3
7.	Write a java program to create a thread using Thread class. – CO3
8.	Demonstrate Java inheritance using extends keyword. – CO2
9.	Create an applet with four Checkboxes with labels MARUTI-800, ZEN, ALTO and ESTEEM and a Text area object. The program must display the details of the car while clicking a particular Checkbox. – CO4
10.	Write a Java program to throw the following exception, 1) Negative Array Size 2) Array Index out of Bounds – CO3
11	Write a java program to create a file menu with option New, Save and Close; and Edit menu with option cut, copy, and paste.- CO5
12	Write a java programming to illustrate Mouse Event Handling – CO5

ASSESSMENT PATTERN

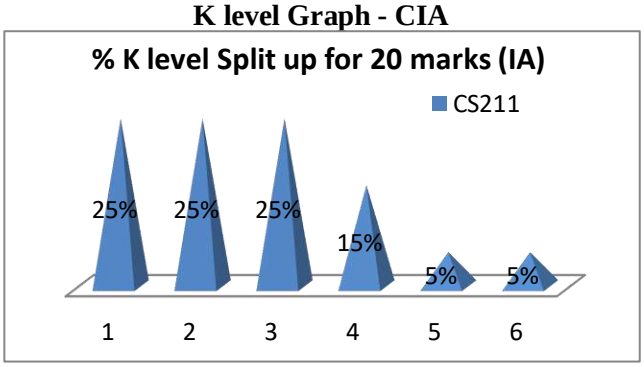
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

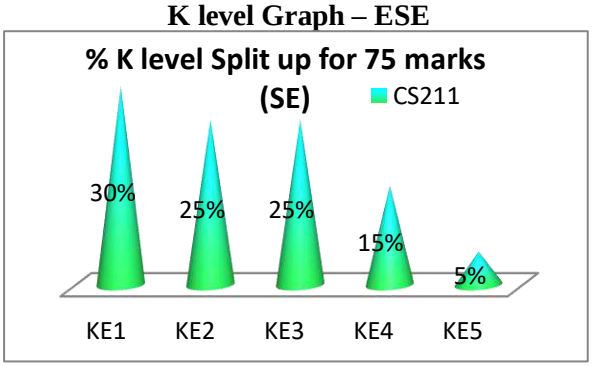
Bloom's Category Marks (out of 25)	Test (10)	Record (5)	Model exam (10)
Remember (5)	3		2
Understand (5)	3		2
Apply (5)	3		2
Analyze (3)	1		2
Evaluate (1)			1
Create (1)			1

Bloom's Category	Weightage %
Remember	28
Understand	20
Apply	20
Analyze	20
Evaluate	12

K level Graph - CIA



K level Graph – ESE



DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER V					
COMPUTER NETWORKS					
SEMESTER	**:**	V	**HOURS OF INSTRUCTION**	**:**	6
CORE	**:**	VII	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS212

COURSE OBJECTIVES
The course aims at the student to understand the concept of Computer networks and impart knowledge about networking and inter networking devices

Course Outcome	Description	Knowledge Levels
CO1	**Acquire** knowledge on computer networks and able to define the functions of each layer in the OSI and TCP/IP model. This helps to **compare** with different networks and **plan** how to select good transmission media. **(e-Quiz: OSI & TCP/IP Models -PO7)**	**K1 K2 K3 K4**
CO2	Able to **illustrate** communication satellites and telephone network structure, **acquire** thorough knowledge on data link layer concepts, design issues and protocols and **apply** them to **categorize** different error detection and correction techniques to minimize errors. **Assignment (Soft Copy) on Data Link Layer [PO7]**	**K1 K2 K3 K4**
CO3	**Acquaint** with the fundamentals of data link protocols and **identify** various elementary data link protocols for framing, error control, flow control and multiple access protocols to access a shared network channel. **Lecture video with Discussion:** https://nptel.ac.in/courses/106/105/106105183/[PO7]	**K1 K2 K3**
CO4	**Understand** the network layer concepts, **apply** design issues and protocols to **analyze** routing and congestion control algorithms to direct internet traffic efficiently, performance **evaluation [PO3]** of different routing algorithms based on lowest metrics, **creatively [PO3]** select best path and present the work through a PPT or excel worksheet **[PO7]** as a group activity **[PO5]** and face question session **[PO4]**.	**K1 K2 K3 K5 K6**
CO5	**Define** transport layer design issues, connection management and protocols, **analyze** cryptography method of protecting information and **categorize** encryption and decryption techniques to secure and protect data during communication. Interactive session through WHITE BOARD, GMEET, https://nptel.ac.in/courses/106/105/106105183/**[PO7,PO9]**	**K1 K2 K3 K4**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	1	2				2	1		1
CO2	3	1	1				2	1		1
CO3	3	1	1	1	2	1	1	1	1	1
CO4	3	2	2	1	2	1	2	1		1
CO5	3	1	1				2	1	1	1
AVG	**3**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**1**
TOTAL	**15**	**6**	**7**	**2**	**4**	**2**	**10**	**5**	**2**	**5**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction – Network Hardware - Software - Reference Models - OSI and TCP/IP Models - Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer - Theoretical Basis for Data Communication - Guided Transmission Media.	**15**
Unit II	Wireless Transmission - Communication Satellites - Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues - Error Detection and Correction.	**15**
Unit III	Elementary Data Link Protocols - Sliding Window Protocols - Data Link Layer in the Internet - Medium Access Layer - Channel Allocation Problem - Multiple Access Protocols - Bluetooth.	**20**
Unit IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms - IP Protocol - IP Addresses - Internet Control Protocols.	**20**
Unit V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection - Simple Transport Protocol - Internet Transport Protocols (ITP) - Network Security: Cryptography.	**20**

ASSESSMENT PATTERN

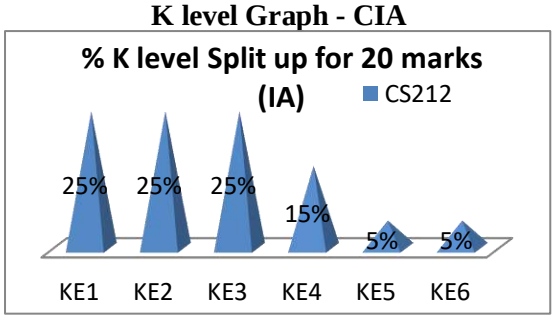
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

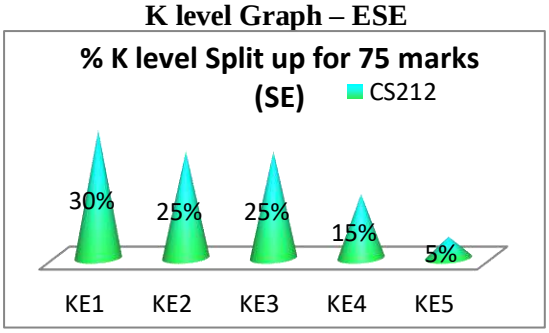
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	2	1	2
Understand (5)	1	1	3
Apply (5)	1	1	3
Analyze (3)	1	1	1
Evaluate (1)			1
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Computer Networks	A. S. Tanenbaum	Prentice-Hall of India	2008 4th Edition

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	Data Communications and Networking	B. A. Forouzan	Tata McGraw Hill	2007 4th Edition
2	Data Communications, Computer Networks and Open Systems	F. Halsall	Pearson Education	2008
3	Data Networks	D. Bertsekas and R. Gallagher	PHI	2008 2nd Edition
4	Communication Networks	Lamarca	Tata McGraw Hill	2002

E-Resources

1. https://www.javatpoint.com/computer-network-tutorial
2. http://seat.massey.ac.nz/159334/lectures/week3_1_1s.pdf
3. https://www.ics.uci.edu/~magda/ics_x33/module_tcp.pdf

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER VI					
PROGRAMMING IN PYTHON					
SEMESTER	**:**	VI	**HOURS OF INSTRUCTION**	**:**	6
CORE	**:**	VIII	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS214

COURSE OBJECTIVES
To Understand the basic components of computer programming using the python language. To Demonstrate significant experience with the python program development environment

Course Outcome	Description	Knowledge Levels
CO1	Executing Python Programs, Basic Programming concepts are introduced. **Define** variables, expressions and statements, **Apply** Input/ Output, Operators.**Analyze** different areas where python programme can be applied. Online – QUIZ program in batches on basic python commands https://www.javapoint.com/python-tutorial	**K1** **K2** **K3** **K4**
CO2	**Understand** various program components of python programming **Apply and Analyze** different types of Conditions, Functions, Arguments, Return values and **infer** the techniques to prepare the creatively **construct** Iteration, Loops, Strings Learn various Data Structures, Lists, Dictionaries, Tuples Create the Sequences, Exception Handling. Group presentation on string handling in Gmeet.	**K1** **K2** **K3** **K4** **K5**
CO3	**Acquaint** with the design and working of File Handling, Modules, Regular Expressions, Text handling. Learning various **O**bject-Oriented Programming basics. **Find** Interacting with Databases, Introduction to MySQ Land **Execute** the Queries, **Evaluate** the difference from other RDBMS interacting with MySQL **Creating** Building an address book with add/edit/delete/search features. https://www.javapoint.com/python-basic-programs Presentation of the Address book design in groups. Students should practice in FOSS python.	**K1** **K2** **K3** **K4** **K5** **K6**
CO4	**Acquaint**the Introduction to Graphics programming by learning GTK and PyGTK. – **Apply** graphic command and **analyze** the usage of it **Formulate [K6]** Scientific Programming using NumPy / SciPy, Image Processing, By **applying acquired knowledge in [K3]** Processing multimedia files, Evaluate various Network Programming, Web services using SOAP, **[K6]** can Design and develop a new game using Graphics Programming, PyGame. Presentation of NUMPY commands in online.	**K1** **K2** **K3** **K4** **K5** **K6**
CO5	**Applying the acquired knowledge in** Version Control Systems, Subversion/Git.Can**analyze** and **Create** Documentation, and contribute to build Open Source Projects. Present the documentation and also support details of contribution to open source project.	**K1** **K2** **K3** **K4** **K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	2	3	2	2	1	3	1	1	1
CO2	3	2	3	2	2	1	3	1	1	1
CO3	3	2	3	3	2	1	3	1	1	1
CO4	3	3	3	3	2	1	3	1	1	1
CO5	3	3	3	3	3	2	3	1	1	1
AVG	**3**	**2**	**3**	**3**	**2**	**1**	**3**	**1**	**1**	**1**
TOTAL	**15**	**12**	**15**	**13**	**11**	**6**	**15**	**5**	**5**	**5**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction to Python - Why Python - Installing in various Operating Systems - Executing Python Programs - Basic Programming concepts - variables, expressions and statements - Input/ Output - Operators.	**18**
Unit II	Conditions - Functions - Arguments - Return values - Iteration - Loops - Strings -Data Structures - Lists - Dictionaries - Tuples - Sequences - Exception Handling.	**18**
Unit III	File Handling - Modules - Regular Expressions - Text handling - **O**bject Oriented Programming - Classes - Objects - Inheritance - Overloading - Polymorphism Interacting with Databases - Introduction to MySQL - Interacting with MySQL - Building an address book with add/edit/delete/search features.	**18**
Unit IV	Introduction to Graphics programming - Introduction to GTK - PyGTK - Developing GUI applications using PyGTK - Scientific Programming using NumPy / SciPy - Image Processing - Processing multimedia files -Network Programming - Graphics Programming - PyGame.	**18**
Unit V	Introduction to Version Control Systems - Subversion/Git - Writing Unit Tests - Creating Documentation - Contributing to Open Source Projects.	**18**

ASSESSMENT PATTERN

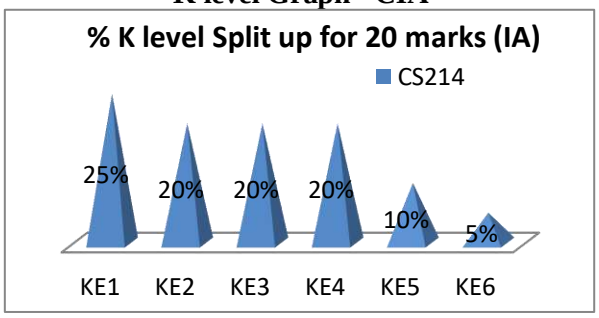
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

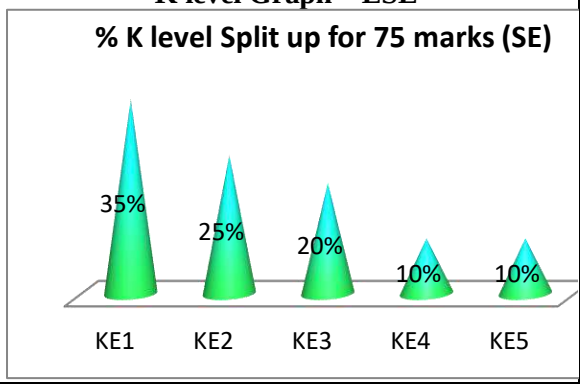
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	1	1	3
Understand (4)	1	1	2
Apply (4)	1	1	2
Analyze (4)	1	1	2
Evaluate (2)	1		1
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	20
Apply	20
Analyze	20
Evaluate	10

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Think Python: How to Think Like a Computer Scientist,	Allen B. Downey	O'Reilly	2012

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	Python 2.6 Text Processing: Beginners Guide	Jeff McNeil	Packet Publications	2010
2	Dive Into Python	Mark Pilgrim	Apress	2009 2nd Edition

E-Resources

1. https://www.javapoint.com/python-tutorial
2. https://www.javapoint.com/python-basic-programs
3. https://www.geeksforgeeks.org/python-tutorial

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER VI					
PRACTICAL VI: PYTHON PROGRAMMING					
SEMESTER	**:**	VI	**HOURS OF INSTRUCTION**	**:**	6
PRACTICAL	**:**	VI	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS215

COURSE OBJECTIVES
To understand the programming basics in Python Programming. To understand the object-oriented program design and development in Python Programming.

Course Outcome	Description	Knowledge Levels
CO1	**Remember** all the syntaxes in **PYTHON [PO7]**, **understand** the **computational tools [PO7], apply** built in functions in **evaluating [PO3]** the input data, type, save, run, debug program, use arithmetic operations, control flow tools like if. use for loop. **[PO7]** and **analyse** the results **[PO7] [PO10].** **(Interactive session with questions) (Viva – Voce in IA) [PO2].**	**K1 K2 K3 K4 K5**
CO2	**Keep in mind** the concept of stack and queue, tuple, and sequence **appreciate** its **application** in real life situations, **evaluate [PO3]** the desired activity by **creating** the **required** codes to **solve** a specific problem. **(Interactive session with questions) (GROUP Quiz program [PO2].**	**K1 K2 K3 K4 K5 K6**
CO3	**Understand** the mathematical operations to **develop** the code to read and write files, create and delete directories.**creatively evaluate [PO3]** codes to perform program with exception handling.**[PO7]**. **(Interactive session with questions) (Viva – Voce in IA) [PO2].**	**K1 K2 K3 K4 K5 K6**
CO4	**Sum up** the concepts learnt on classes, **understand and Analyze** how to create address book. **apply** the concept and **creatively think [PO3]** to **evaluate [PO3]** and Connect with MySQL **(Interactive session with questions) (Viva – Voce in IA) [PO2].**	**K1 K2 K3 K4 K5 K6**
CO5	**Recall** string handling and regular expressions, **understand** the various techniques, **apply** the concept and **critically evaluate [PO3]** the performance and **use** string handling and regular expressions. Create GUI program using PyGTK. **(Interactive session with questions) (Viva – Voce in IA) [PO2].** Group project with presentation	**K1 K2 K3 K4 K5**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	2	2	2	2	1	2	1	1	1
CO2	3	2	2	2	2	1	2	1	1	1
CO3	3	2	2	2	2	1	2	1	1	1
CO4	3	2	2	2	2	1	2	1	1	1
CO5	3	2	2	2	3	2	2	1	1	1
AVG	**3**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**1**
TOTAL	**15**	**10**	**10**	**10**	**11**	**5**	**10**	**5**	**5**	**5**

	Course Outline
Exp No	**Content**
1.	Write a program to use control flow tools like if. - CO1.
2.	Write a program to use for loop. - CO1.
3.	Data structures use list as stack use list as queue tuple, sequence – CO2.
4.	Create new module for mathematical operations and use in your program. – CO3.
5.	Write a program to read and write files, create and delete directories. – CO3.
6.	Write a program with exception handling. – CO3.
7.	Write a program using classes. . – CO4.
8.	Connect with MySQL and create address book. . – CO4.
9.	Write a program using string handling and regular expressions. . – CO5.
10.	Create a GUI program using PyGTK. – CO5.

ASSESSMENT PATTERN

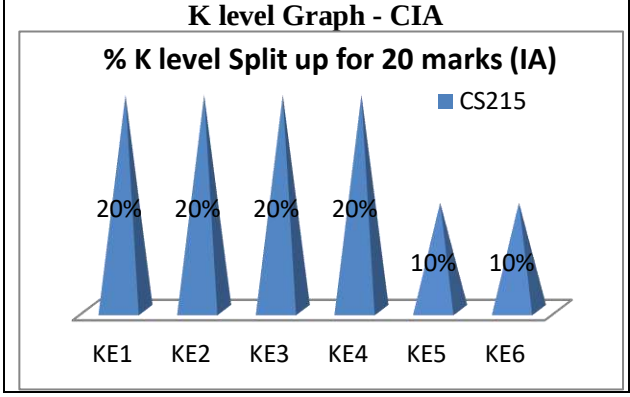
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

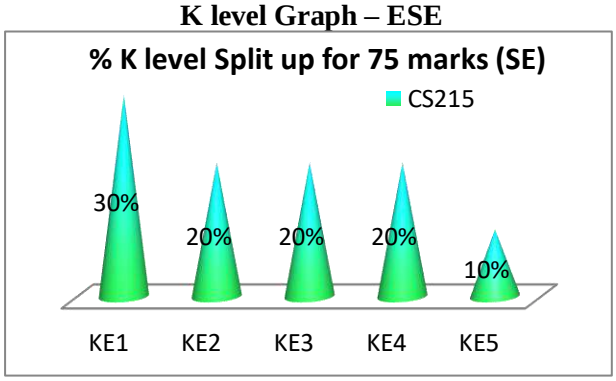
Bloom's Category Marks (out of 25)	Test (10)	Record (5)	Model exam (10)
Remember (4)	2		2
Understand (4)	2		2
Apply (4)	2		2
Analyze (4)	2		2
Evaluate (2)	1		1
Create (2)	1		1

Bloom's Category	Weightage %
Remember	30
Understand	20
Apply	20
Analyze	20
Evaluate	10

K level Graph - CIA



K level Graph – ESE



DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER VI					
SOFTWARE ENGINEERING					
SEMESTER	**:**	VI	**HOURS OF INSTRUCTION**	**:**	6
CORE	**:**	IX	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS216

COURSE OBJECTIVES
This Course aims to understand the software engineering concepts, coding, testing and user interface design and develop the software projects and software reliability and quality management

Course Outcome	Description	Knowledge Levels
CO1	**Explain** the different software life cycle models and **find** out the importance of software project management. **Identify** the metrics for software project management. Video lecture on **https://nptel.ac.in/courses/106/101/106101061/**	**K1** **K2** **K3**
CO2	**Find** the characteristics of a good software design and **Explain** it. **present the work through a PPT**	**K1** **K2**
CO3	**Design** the software using various design models**. List** out the SA/SDmethodology**, apply** it **illustrate** its use, **analyze** it **and evaluate** it. **Group discussion[PO5] on the various design models.**	**K1** **K2** **K3** **K4** **K5** **K6**
CO4	**Define** the user interface design and **utilize** the tools available for the development of software. **Classify** the different testing methods and **Justify** it.	**K1** **K2** **K3** **K5**
CO5	**Define** the characteristics of software maintenance and **Interpret** it**. Analyse [PO5]** reliability and **apply** quality standards in developing a software	**K1** **K2** **K3** **K4**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	3	2	2	2	3	2	1	2	2
CO2	3	3	3	2	2	3	2	2	2	2
CO3	3	3	3	3	2	3	2	2	2	2
CO4	3	3	3	2	2	3	2	2	2	2
CO5	3	3	1	1	1	3	2	2	2	2
AVG	3	3	2	2	2	3	2	2	2	2
TOTAL	15	15	12	10	9	15	10	9	10	10

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction - Software EngineeringDiscipline - Evolution and Impact - Programs Vs Software Products. Software Life Cycle Models: Use of a Life Cycle Models - Classical Waterfall Model -Iterative Waterfall Model - Prototyping Model - Evolutionary Model - Spiral Model. Software Project Management: Responsibilities of a Software Project Manager - Project Planning - Metrics for Project Size Estimation - Project Estimation	**15**
Unit II	Requirements Analysis and Specification: Requirements Gathering and Analysis -Software Requirements Specification (SRS) - Formal System Development Techniques. Software Design: Characteristics of a Good Software Design - Cohesion and Coupling - Neat Arrangement - Software Design Approaches.	**15**
Unit III	Function-Oriented Software Design: Overview of SA/SD Methodology - Structured Analysis - Data Flow Diagrams (DFDs). Object Modeling Using UML: Overview of Object-Oriented Concepts - UML Diagrams - Use Case Model - Class Diagrams - Interaction Diagrams - Activity Diagrams - State Chart Diagram.	**20**
Unit IV	User Interface Design: Characteristics of a Good User Interface - Basic Concepts - Types of User Interfaces - Component-Based GUI Development; Coding and Testing: Coding - Testing - UNIT Testing - Black-Box Testing - White-Box Testing - Debugging - Integration Testing - System Testing.	**20**
Unit V	Software Reliability and Quality Management: Software Reliability - Statistical Testing -Software Quality - Software Quality Management System - ISO 9000. Software Maintenance: Characteristics of Software Maintenance - Software Reverse Engineering - Software Maintenance Process Models - Estimation of Maintenance Cost	**20**

ASSESSMENT PATTERN

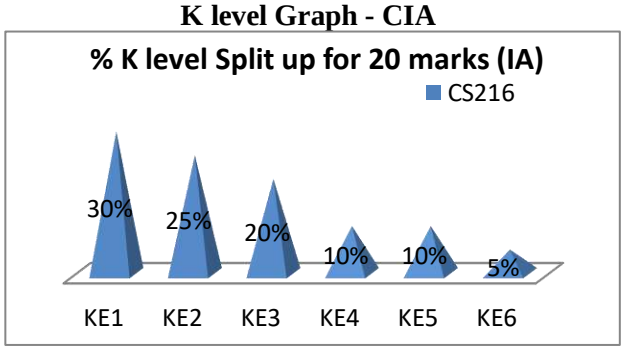
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

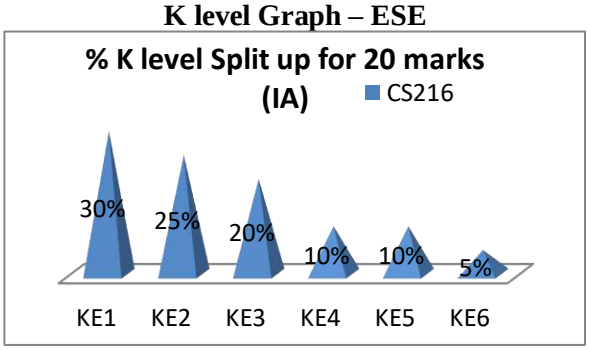
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (6)	2	1	3
Understand (5)	1	1	3
Apply (4)	1	1	2
Analyze (2)		1	1
Evaluate (2)	1		1
Create (1)		1	

Bloom's Category	Weightage %
Remember	35
Understand	25
Apply	20
Analyze	10
Evaluate	10

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Fundamentals of Software Engineering	Rajib Mall	Prentice Hall of India Private Limited	2008 3rd Edition

Reference Books:

S.No	Title of the book	Authors	Publishers	Year of Publication
1	Software engineering- A practitioner's Approach	Roger S.Pressman	Tata McGraw Hill	2010 7th Edition
2	Software Engineering Concepts	Richard Fairley	Tata McGraw Hill	2004

E-Resources

1. https://www.javatpoint.com/software-engineering-tutorial
2. https://www.geeksforgeeks.org/software-engineering/
3. https://www.tutorialspoint.com/software_engineering/index.htm

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER VI					
MOBILE COMPUTING					
SEMESTER	**:**	VI	**HOURS OF INSTRUCTION**	**:**	6
CORE	**:**	X	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS217

COURSE OBJECTIVES
The course aims at the student to learn the basics of mobile computing, familiar with GPRS, network, transport and application layer protocols and understand the basics of MANET and its routing algorithms

Course Outcome	Description	Knowledge Levels
CO1	**Study** the basics of mobile computing and its application, **Explain** the architecture of mobile and handheld devices its limitations and Learn the basics of GSM and GPRS, **Identify** their importance and study their architecture, protocols, security and data services **(E-Quiz: Basics of Mobile Computing [PO7, PO3]).**	**K1 K2 K3**
CO2	**Define** the basics of MAC, SDMA, FDMA, TDMA, CDMA and Wireless LAN, **Compare** them **Identify** the importance of Mobile Network Layer, explain about packet delivery, tunnelling, and routing algorithms. Lecture video with Discussion: https://nptel.ac.in/courses/106/106/106106147/**[PO9].**	**K1 K2 K3**
CO3	**Study** the basics of conventional, indirect and mobile TCP, Aquaint knowledge on transport layer protocols and the various database issues. **Understand** the concept of client-server computing, **Identify** the various query processing, data recovery and Qos issues and **Analyze**the same. **(Interactive – Practice (PPT) session on Transport Layer Protocols – Planned)**	**K1 K2 K3 K4**
CO4	**Study t**he basics of asymmetrical transmission and data delivery mechanism**. Explain** about broadcast models and **Make use** of them for data transmission and **Analyze** the same. Study on data synchronization and **Evaluate** the same. Interactive session through WHITE BOARD, PPT, **GMEET,** [PO7, PO9]. https://nptel.ac.in/courses/117/104/117104099/	**K1 K2 K3 K4 K5**
CO5	**Study t**he basics of MANET, explain routing and **Classification** of various routing algorithms, study the basics of mobile agents and service delivery, **Apply** the basic concepts of routing, **Analyze** and **Evaluate** the performance **[K5,PO3]** of MANET Routing and **creatively [K6,PO3]** present the work through a PPT**[PO7]** as a **group activity[PO5]** and face question session**[PO4].**	**K1 K2 K3 K4 K5 K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	2	2	1	1		2	1	1	1
CO2	3	2	1	1	1		2	1	1	1
CO3	3	1	1	1	1		1	1	1	1
CO4	3	2	1	1	1		2	1	1	1
CO5	3	2	2	1	2	1	3	1	1	2
AVG	**3**	2	1	**1**	1	1	**2**	1	1	1
TOTAL	**15**	**9**	**7**	**5**	**6**	**1**	**10**	**5**	**5**	**6**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Mobile Communications, Mobile Computing – Paradigm. Promises/Novel Applications and Impediments and Architecture: Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices. GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.	**18**
Unit II	Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11) - Mobile Network Layer IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunnelling and Encapsulation, Route Optimization, DHCP.	**18**
Unit III	Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks. Database Issues: Database Hoarding and Caching Techniques, Client-Server Computing & Adaptation	**18**
Unit IV	Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization.	**18**
Unit V	Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery.	**18**

ASSESSMENT PATTERN

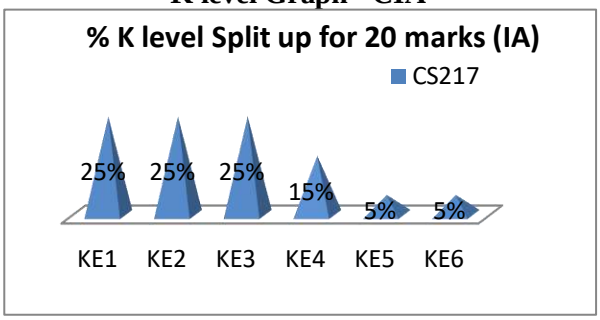
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

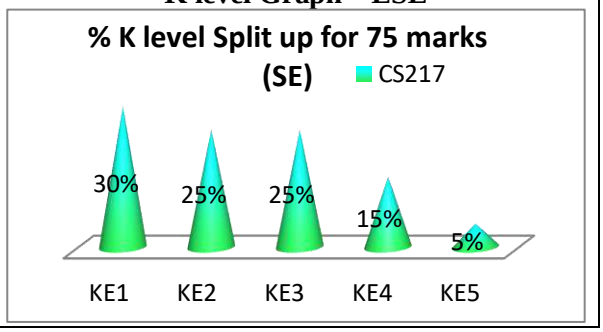
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	1	1	3
Understand (5)	2	1	2
Apply (5)	1	1	3
Analyze (3)	1	1	1
Evaluate (1)			1
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Mobile Communications	Jochen Schiller	Addison-Wesley	2009 2nd Edition

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	Mobile Computing	Raj Kamal	Oxford University Press	2007 ISBN: 0195686772. 2nd Edition

E-Resources

1. http://www.nettech.in/e-books/Wireless-networks-and-mobile-computing.pdf
2. http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511546969
3. https://www.thebalancesmb.com/definition-of-mobile-computing-2533640

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER V					
ELECTIVE I:WIRELESS NETWORK					
SEMESTER	**:**	V	**HOURS OF INSTRUCTION**	**:**	6
ELECTIVE	**:**	I	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS213A

COURSE OBJECTIVES
The course aims at the student to learn about Wireless Networks, Protocol Stack and Standards. The student acquires knowledge on fundamentals of 3G/4G Services, Its Protocols and Applications

Course Outcome	Description	Knowledge Levels
CO1	**Acquire** knowledge on wireless LAN and able to **explain** the spread spectrum and Bluetooth architecture. This helps to **compare** with different techniques and **plan** how to allocate spectrum for WIMAX. **(e-Quiz: WLAN Technologies) [PO7]**	**K1 K2 K3 K4**
CO2	Able to illustrate mobile network layer functions and **compare** different routing algorithms based on lowest metric and **choose** best path to direct internet traffic efficiently. **Assignment on Mobile Ad-Hoc Network [PO7]**	**K1 K2 K3 K4**
CO3	**Acquaint** with the fundamentals of traditional TCP and classical TCP improvements, learn by **building** various TCP improvements and realize their applications. **Lecture video with Discussion: https://nptel.ac.in/courses/106/105/106105160/ [PO9]**	**K1 K2 K3**
CO4	**Initiate** to learn about the basics of UMTS core network architecture, **choose** High Speed Downlink Packet Access (HSDPA) and **examine** how the mobile switching centre is responsible for routing voice calls and SMS. **Interactive session through WHITEBOARD,GMEET https://nptel.ac.in/courses/106/105/106105160/[PO7, PO9]**	**K1 K2 K3 K4**
CO5	Be **familiar** with 4G technologies and define 4G features, challenges and applications with latest network strategies, **apply** 4G concepts and performance **evaluation [K5,PO3]** of 4G technologies, **creatively [K6,PO3]** present the work through a PPT or excel worksheet **[PO7]** as a group activity **[PO5]** and face question session **[PO4]**.	**K1 K2 K3 K5 K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	**3**	1	2				**2**	1		1
CO2	**3**	1	1				**2**	1		1
CO3	**3**	1	1	**1**		1	**1**	1	1	1
CO4	**3**	1	1		2		**2**	1	1	1
CO5	**3**	2	2	**1**	2	1	**2**	1		1
AVG	**3**	1	1	**1**	2	1	**2**	1	1	1
TOTAL	**15**	**6**	7	**2**	4	2	**10**	**5**	**2**	**5**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction to WLAN Technologies: Infrared - UHF Narrowband - Spread Spectrum. IEEE 802.11: System Architecture - Protocol Architecture - Physical Layer - MAC Layer - 802.11b - 802.11a. Hiper LAN: WATM, BRAN, HiperLAN2. Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, Security – IEEE 802.16. WIMAX: Physical Layer, MAC, Spectrum Allocation For WIMAX.	**15**
Unit II	Introduction to Mobile IP: IP Packet Delivery - Agent Discovery - Tunneling And Encapsulation - IPV6 - Network Layer in the Internet - Mobile IP Session Initiation Protocol. Mobile Ad-Hoc Network: Routing - Destination Sequence Distance Vector - Dynamic Source Routing.	**15**
Unit III	TCP Enhancements for Wireless Protocols - Traditional TCP: Congestion Control - Fast Retransmit/Fast Recovery - Implications of Mobility. Classical TCP Improvements: Indirect TCP - Snooping TCP - Mobile TCP - Time Out Freezing - Selective Retransmission - Transaction Oriented TCP - TCP Over 3G Wireless Networks.	**20**
Unit IV	Overview Of UMTS Terrestrial Radio Access Network - UMTS Core Network Architecture: 3G-MSC - 3G-SGSN - 3G-GGSN - SMS-GMSC/SMS-IWMSC - Firewall - DNS/DHCP - High Speed Downlink Packet Access (HSDPA) - LTE Network Architecture and Protocol.	**20**
Unit V	Introduction to 4G Vision - 4G Features and Challenges - Applications Of 4G. 4G Technologies: Multicarrier Modulation, Smart Antenna Techniques, OFDM - MIMO Systems - Adaptive Modulation And Coding With Time Slot Scheduler - Cognitive Radio.	**20**

ASSESSMENT PATTERN

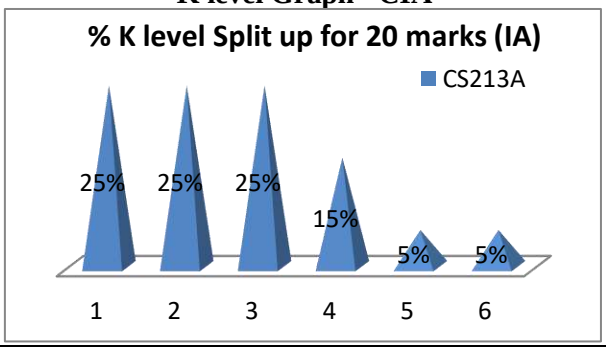
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

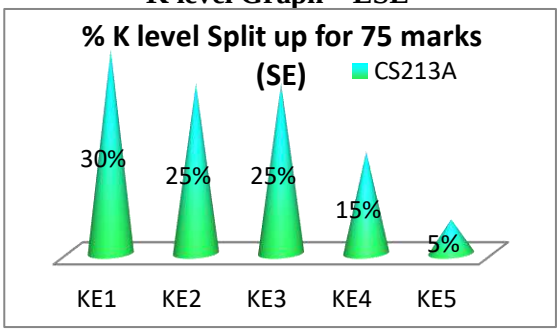
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	2	1	2
Understand (5)	1	1	3
Apply (5)	1	1	3
Analyze (3)	1	1	1
Evaluate (1)			1
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Mobile Communications (Unit I,II,III)	Jochen Schiller	Pearson Education	2012 2nd Edition
2	Wireless Communications And Networking (Unit IV,V)	Vijay Garg	Elsevier	2007 1st Edition

Reference Books:

S.No	Title of the book	Authors	Publishers	Year of Publication
1	3G Evolution HSPA And LTE for Mobile Broadband	Erik Dahlman, Stefan Parkvall, Johan Skold And Per Beming	Academic Press	2008. 2nd Edition
2	Wireless Networking	Anurag Kumar, D.Manjunath, Joy Kuri	Elsevier	2011 1st Edition
3	Modern Wireless Communications	Simon Haykin, Michael Moher, David Koilpillai	Pearson Education	2013 1st Edition

E-Resources

1. https://www.javatpoint.com/wireless-lan-introduction
2. https://www.cse.iitb.ac.in/~sri/talks/manet.pdf
3. https://people.cs.pitt.edu/~xex1/Courses/WirelessNets/Materials/LTE-1-revised.pdf

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER V					
ELECTIVE I:DATA MINING					
SEMESTER	**:**	V	**HOURS OF INSTRUCTION**	**:**	6
ELECTIVE	**:**	I	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS213B

COURSE OBJECTIVES
To introduce the basic concepts and techniques of Data Mining
To study the basic concepts of cluster analysis
To study a set of typical clustering methodologies, algorithms, and applications

Course Outcome	Description	Knowledge Levels
CO1	**Acquire** knowledge of the Data mining tools and the applications of Data Warehousing, **What** is Data mining and Data Warehousing, **List** the data pre-processing steps, **Choose** the best data cleaning technique, **Perform** the pre-processing work and **Analyze** the pre-processed data. (**Assignment** on **choosing** a dataset from open repositories [**PO1**], **creatively applying** the appropriate pre-processing task and **analysing** the pre-processed data [**PO3**]. **Present** it as a PPT [**PO2**])	**K1 K2 K3 K4 K5**
CO2	**Learn** the terminologies in Data mining, **Compare** different categories of data, **Understand** the system architecture, **Explain** the various statistical measures, **Creatively choose** appropriate measure and **Evaluate** its performance [**PO3**].	**K1 K2 K3 K5 K6**
CO3	**Define** Association Rules, **Learn, compare and contrast** the various Association Rule and **Generate** the Association Rules based on the database **[PO7]**.	**K1 K2 K3 K4 K5**
CO4	**Learn** the basics of classification and prediction, **What** are the issues in it, Illustrate the various classification techniques, **Identify** the best classifier for real life problem, **Compare and contrast** the various classifier and **Justify** the selection of a classifier based on the accuracy [**PO3**]. (A **group activity [PO5]** on **identifying** the classification techniques available, their applications in real life problems [**PO1**] from various e-resources [**PO7]**, **creatively choose** the appropriate techniques [**PO3**] and present their work through PPT [**PO2**])	**K1 K2 K3 K4 K5**
CO5	**Learn** the basics of clustering, **Illustrate** the various clustering techniques, **Identify** the best clustering technique for real life problem, **Compare and contrast** the various clustering techniques and **Justify** the selection of a clustering technique based on the accuracy [**PO3**]. (A **group activity [PO5]** on **identifying** the clustering techniques available, their applications in real life problems [**PO1**] from various e-resources[**PO7]**, get a dataset from the open repositories, **implement** few clustering techniques using any open source datamining tool [**PO7**], **analyse** their performance using EXCEL[**PO7, PO10**], **creatively choose** the appropriate technique [**PO3**] and present their work through PPT [**PO2**])	**K1 K2 K3 K4 K5**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	2	2	2	1	1	2	1	1	2
CO2	3	1	1	2	1	1	1	1	1	1
CO3	3	1	1	2	1	1	1	1	1	1
CO4	3	2	2	2	2	1	3	1	1	1
CO5	3	2	2	2	2	2	3	1	1	2
AVG	**3**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**1**
TOTAL	**15**	**8**	**8**	**10**	**7**	**6**	**10**	**5**	**5**	**7**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction: Data mining - Functionalities - Classification. Introduction to Data Warehousing. Data Preprocessing : Preprocessing the Data - Data cleaning - Data Integration and Transformation - Data Reduction	**16**
Unit II	Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining Systems. Data Generalization and Summarization - Analytical Characterization - Mining Class Comparison - Statistical	**16**
Unit III	Mining Association Rules: Basic Concepts - Single Dimensional Boolean Association Rules from Transaction Databases, Multilevel Association Rules from transaction databases - Multi dimension Association Rules from Relational Database and Data Warehouses.	**18**
Unit IV	Classification and Prediction: Introduction - Issues - Decision Tree Induction - Bayesian Classification - Classification of Back Propagation. Classification based on Concepts from Association Rule Mining - Other Methods. Prediction: Introduction - Classifier Accuracy.	**20**
Unit V	Cluster Analysis: Introduction - Types of Data in Cluster Analysis, Partitioning Methods - Hierarchical Methods - Density Based Methods - GRID Based Method - Model based Clustering Method	**20**

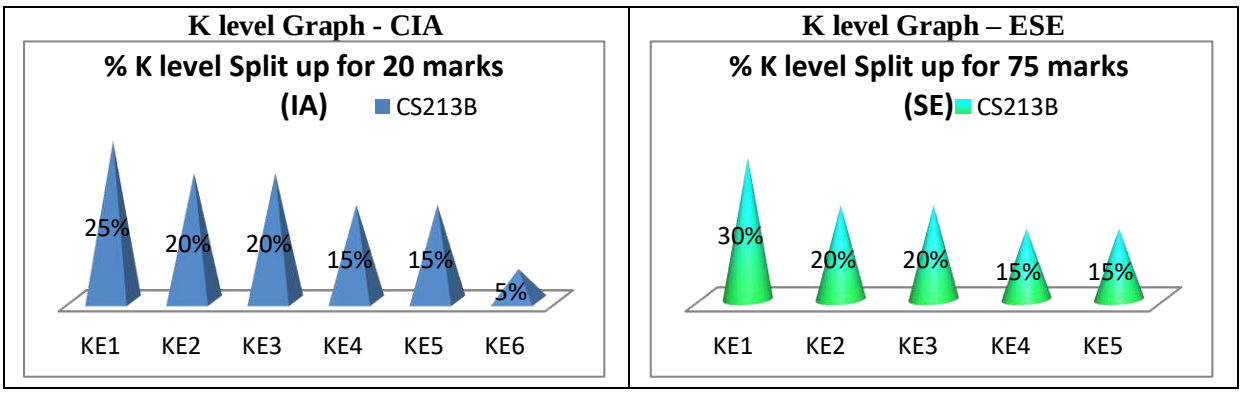
ASSESSMENT PATTERN

CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	2		3
Understand (4)	1	1	2
Apply (4)	1	1	2
Analyze (3)	1	1	1
Evaluate (3)		1	2
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	20
Apply	20
Analyze	15
Evaluate	15



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Data Mining Concepts and Techniques	J.Han and M. Kamber	Harcourt India Pvt. Ltd	2001

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	Insight into Data Mining Theory and Practice	K.P. Soman , ShyamDiwakar, V.Ajay	Prentice Hall of India Pvt. Ltd.	

E-Resources

1. http://www.tutorialspoint.com/data_mining/index.htm
2. http://www.autonlab.org/tutorials/
3. http://web.engr.illinois.edu/~hanj/bk2/toc.pdf

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER V					
ELECTIVE I:E-COMMERCE TECHNOLOGIES					
SEMESTER	**:**	V	**HOURS OF INSTRUCTION**	**:**	6
ELECTIVE	**:**	I	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS213C

COURSE OBJECTIVES
To inculcate knowledge on E-Commerce concepts in the present IT world. Understand concept of E-commerce and its types. Study the various online payment and marketing on Web. Understand various E-business Strategies.

Course Outcome	Description	Knowledge Levels
CO1	**Define** and **understand** the basic concepts of internet, WWW and ecommerce. Able to **apply** the basic concepts for the challenges faced by Indian corporates due to ecommerce and the benefits given to the users. https://nptel.ac.in/content/storage2/courses/106108103/pdf/PPTs/mod13.pdf	**K1** **K2** **K3**
CO2	**Learn** the various business models and fundamental framework of E-commerce and **apply and analyze** the model in the area of commercial trade.	**K1** **K2** **K3** **K4**
CO3	**Recall and understand** the technologies needed for ecommerce. Can able to **apply and analyze** traditional way of doing business and ecommerce. A **group activity** like debate can be conducted and face question session**. [PO5][PO2]**	**K1** **K2** **K3** **K4** **K5**
CO4	**Explain** the various modes of payment system available in electric payment system and able to **compare** them. Assignment can be given to **apply** the concepts. **[PO3]**	**K1** **K2** **K3** **K4**
CO5	**Illustrate** the various network infrastructure and communication strategy for ecommerce. Seminar with **PPT** presentation can be given to **apply** the concepts learned.**[PO7]**	**K1** **K2** **K3** **K4** **K5** **K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	1					1	1	1	1
CO2	3	1					1	1		1
CO3	3	1	1	1	1	1	1	1		1
CO4	3	1	1	1	1		1	1		1
CO5	3	1	1	1	1	1	1	1		1
AVG	3	1	1	1	1	1	1	1	1	1
TOTAL	15	5	3	3	3	2	5	5	1	5

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	History of E-commerce and Indian Business Context: E-Commerce - Emergence of the Internet - Emergence of the WWW - Advantages of E-Commerce - Transition to E-Commerce in India - The Internet and India - E-transition Challenges for Indian Corporate.	**15**
Unit II	Business Models for E-commerce: Business Model - E-business Models Based on the Relationship of Transaction Parties - E-business Models Based on the Relationship of Transaction Types.	**15**
Unit III	Enabling Technologies of the World Wide Web: World Wide Web - Internet Client-Server Applications - Networks and Internets - Software Agents - Internet Standards and Specifications - ISP. E-Marketing: Traditional Marketing - Identifying Web Presence Goals - Online Marketing - E-advertising – Ebranding.	**20**
Unit IV	E-Payment Systems: Main Concerns in Internet Banking - Digital Payment Requirements - Digital Token-based e-payment Systems - Classification of New Payment Systems - Properties of Electronic Cash-Cheque Payment Systems on the Internet.	**20**
Unit V	Information systems for Mobile Commerce: Introduction - Wireless Applications - Cellular Network - Wireless Spectrum - Technologies for Mobile Commerce - Wireless Technologies.	**20**

ASSESSMENT PATTERN

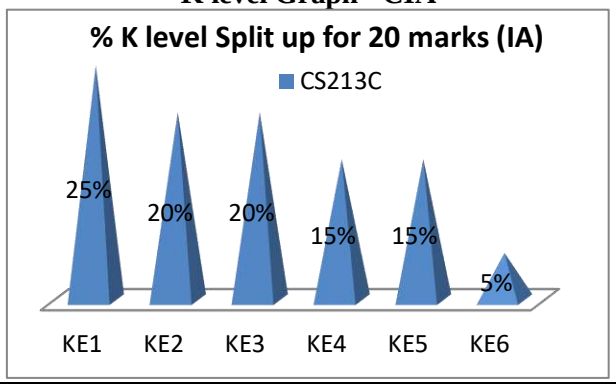
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

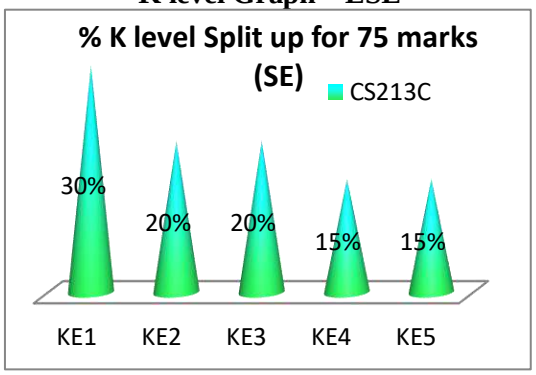
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	1	1	3
Understand (4)	1	1	2
Apply (4)	1	1	2
Analyze (3)	1	1	1
Evaluate (3)	1		2
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	20
Apply	20
Analyze	15
Evaluate	15

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No	Title of the book	Authors	Publishers	Year of Publication & Edition
1	E-Commerce - An Indian Perspective	P.T.Joseph	PHI	2012 4th Edition
2	World Wide Web Design with HTML	C Xavier	Tata McGraw Hill,	2006 13th Reprint
3	Introduction to Information Technology	A.Leon and M.Leon	Vijay Nicole Publications	2013 1st Edition

Reference Books:

S.No	Title of the book	Authors	Publishers	Year of Publication
1	E-Commerce Strategy, Technologies and Applications	David Whiteley	Tata McGraw Hill	2001 1st Edition
2	E-Commerce - The cutting edge of Business	Kamalesh K Bajaj and Debjani Nag	Tata McGraw Hill	2005. 2nd Edition
3	Internet for Everyone	Alexis Leon and Mathews Leon	UBS Publications	2012 15th Anniversary Edition
4	E-commerce	RitendraGoel	New Age International Publishers	2016

E-Resources

1. https://www.tutorialspoint.com/e_commerce/e_commerce_tutorial.pdf
2. https://www.javatpoint.com/online-marketing
3. https://www.geeksforgeeks.org/e-commerce/

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER VI					
ELECTIVE II:NETWORK SECURITY					
SEMESTER	**:**	VI	**HOURS OF INSTRUCTION**	**:**	6
ELECTIVE	**:**	II	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS218A

COURSE OBJECTIVES
To study the number theory used for network security To understand the design concept of cryptography and authentication To develop experiments on algorithm used for security

Course Outcome	Description	Knowledge Levels
CO1	**Acquire** knowledge on security systems and **learn** the security architecture and possible types of attacks that can be performed on systems. **Apply** DES standards. **(e-quiz: On DES) [PO7].**	**K1** **K2** **K3**
CO2	**Gain** idea about number theory used for network security, able to **understand** and **apply** the theorem and algorithm. Group discussion on RSA algorithm by referring e-resources. Report a summary in google class room. Lecture video with Discussion: https://nptel.ac.in/courses/106/105/106105031/ **[PO2, PO4, PO5, PO7, PO8, PO9]**.	**K1** **K2** **K3**
CO3	**What** is authentication?Whydo we need authenticationand how to **apply** it? **Classify** and **evaluate** the hash functions and **understand** the digital signature concepts. Group discussion on authentication issues **[PO5]**.	**K1** **K2** **K3** **K4** **K5**
CO4	**Recall** authentication applications, **Define** and explain how to **apply** authentication services, **compare** IP security and web security. Interactive session on authentication services. JAM on web security issues, upload in google class room. https://nptel.ac.in/courses/106/106/106106129/**[PO7, PO9]**.	**K1** **K2** **K3** **K4**
CO5	**Define** intrusion detection system, **learn** about viruses and related threats. **Apply**, a**nalyse** and **evaluate** firewall design principles. Gain idea to **implement** cryptography and security concepts.	**K1** **K2** **K3** **K4** **K5** **K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	1	1	1			1	1	1	1
CO2	3	2	1	1	2	1	2	2	1	2
CO3	3	1	2	2	1			1	1	1
CO4	3	2	1	1	2	1	3	1	1	2
CO5	3	1	2	2				1	1	1
AVG	**3**	**1**	**1**	**1**	**1**		**1**	**1**	**1**	**1**
TOTAL	**15**	**7**	**7**	**7**	**5**	**2**	**6**	**7**	**5**	**7**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Model of network security - Security attacks, services and attacks - OSI security architecture - Classical encryption techniques - SDES - Block cipher Principles. DES - Strength of DES - Block cipher design principles - Block cipher mode of operation - Evaluation criteria for AES - RC4 - Differential and linear cryptanalysis - Placement of encryption function - Traffic confidentiality.	**15**
Unit II	Number Theory - Prime number - Modular arithmetic - Euclid's algorithm - Fermet's and Euler's theorem - Primality - Chinese remainder theorem - Discrete logarithm - Public key cryptography and RSA - Key distribution - Key management - Diffie Hellman key exchange - Elliptic curve cryptography.	**15**
Unit III	Authentication requirement - Authentication function - MAC - Hash function - Security of hash function and MAC - SHA - HMAC - CMAC - Digital signature and authentication protocols - DSS.	**20**
Unit IV	Authentication applications - Kerberos - X.509 Authentication services- E-mail security - IP security - Web security.	**20**
Unit V	Intruder - Intrusion detection system - Virus and related threats - Countermeasures - Firewalls design principles - Trusted systems - Practical implementation of cryptography and security.	**20**

ASSESSMENT PATTERN

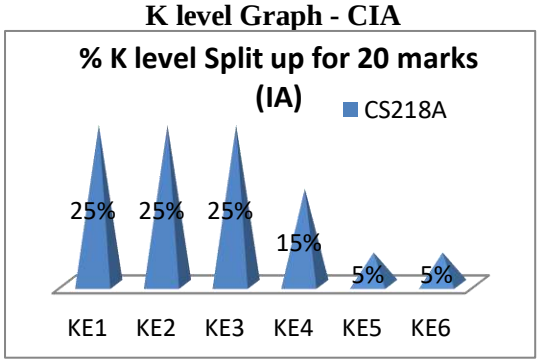
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

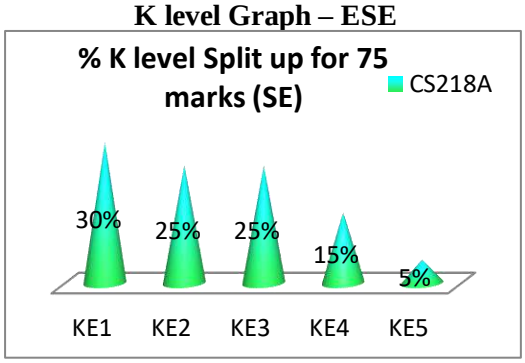
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	2	1	2
Understand (5)	1	1	3
Apply (5)	1	1	3
Analyze (3)	1	1	1
Evaluate (1)			1
Create (1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Cryptography & Network Security	William Stallings	Pearson Education	2010 4th Edition

Reference Books:

S.No	Title of the book	Authors	Publishers	Year of Publication
1	Network Security, Private communication in public world	Charlie Kaufman, Radia Perlman, Mike Speciner	PHI	2002 2nd Edition
2	Practical Cryptography	Bruce Schneier, Neils Ferguson	Wiley Dreamtech India Pvt Ltd,	2003. 1st Edition
3	Cryptography – Theory and practice	Douglas R Simson	CRC Press	1995 1st Edition

E-Resources

1. https://www.khanacademy.org/computing/computer-science/cryptography
2. https://acodez.in/data-encryption-algorithms/
3. https://www.geeksforgeeks.org/intrusion-detection-system-ids/

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER VI					
ELECTIVE II:SYSTEM ADMINISTRATION AND MAINTENANCE					
SEMESTER	**:**	V	**HOURS OF INSTRUCTION**	**:**	6
ELECTIVE	**:**	II	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS218B

COURSE OBJECTIVES
The students will learn and apply the basic concepts and methodologies of system administration

Course Outcome	Description	Knowledge Levels
CO1	**Describe** internal parts and software of a computer system. Learn the safety measures of using a computer system. A**pply** the knowledge gained to work with the system. https://www.coursera.org/lecture/system-administration-it-infrastructure-services/	**K1 K2 K3**
CO2	**Learn** to assemble a computer system as a **group activity.** Able to **analyze** the problem when occurred and **apply** the concepts to troubleshoot it.	**K1 K2 K3 K4 K6**
CO3	**Define** OS and able to **describe** the characteristics of an OS. Able to **analyse** the problem during OS installation and **apply** the concepts to troubleshoot it.	**K1 K2 K3 K4 K6**
CO4	**Compare** the laptop and desktop devices. Able to **analyze** and configure printers and scanners in laptop and desktop systems and troubleshoot if problem arises	**K1 K2 K3 K4 K5**
CO5	**Define** network. Able to **Compare** different network technologies and can **describe** different security measures that has to been taken and **apply** the concepts to troubleshoot it when problem arises. **Seminar** with PPT presentation can be given.	**K1 K2 K3 K4 K5**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	1	1				3	1	3	1
CO2	3	1	1	1	1	1		1		1
CO3	3	1	2					1		1
CO4	3	1	2					1		1
CO5	3	1	2	1	1	1	3	1		1
AVG	**3**	**1**	**2**	**1**	**1**	**1**	**3**	**1**	**3**	**1**
TOTAL	**15**	**5**	**8**	**2**	**2**	**2**	**6**	**5**	**3**	**5**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction to Personal Computer: Computer System - Purposes and Characteristics of Cases - Power Supplies - Internal Components - Ports - Cables - Input devices - Output devices. Safe Lab Procedures and Tool Use: Safe Working Conditions and Procedures - Tools and Software used with PC components.	**15**
Unit II	Computer Assembly: Open Case - Install Power Supply - Attach Components to Motherboard. Installation: Motherboard - Internal Drives - Drives in External Bayes - Adapter Cards - Internal cables connections - Reattach side panels - Connection of external cables - Boot the Computer. Preventive Maintenance and Troubleshooting: Purpose of Preventing Maintenance - Steps of Troubleshooting Process.	**15**
Unit III	Handling Operating System: Purposes - Characteristics of Modern Operating Systems - Concepts Comparisons, Limitations, and Compatibilities - Determination of Operating System based on Customer Needs - Installation of Operating System - Navigate a GUI (Windows) - Common Preventive Maintenance Techniques - Troubleshoot.	**20**
Unit IV	Managing Portable Devices and Portable Systems: Common Uses - Components of Laptop - Comparison of the components of Desktop and Laptops - Configure Laptops - Mobile Phone Standards - Preventive Maintenance Techniques - Troubleshoot Laptop and Portable Devices. Fundamental Printers and Scanners: Types of Printers and Scanners - Installation and Configuration Process of Printers and Scanners - Preventive Maintenance Techniques - Troubleshoot.	**20**
Unit V	Network Principles: Principles - Types - Concepts and Technologies - Physical Components - LAN Topologies and Architectures- Standard Organizations - Ethernet Standards - OSI and TCP/IP Models - Configuration of NIC and Modem - Establishing Connectivity - Preventive Maintenance Techniques - Troubleshoot. Fundamental Security: Security Threats - Security Procedures - Preventive Maintenance Techniques - Troubleshoot Security.	**20**

ASSESSMENT PATTERN

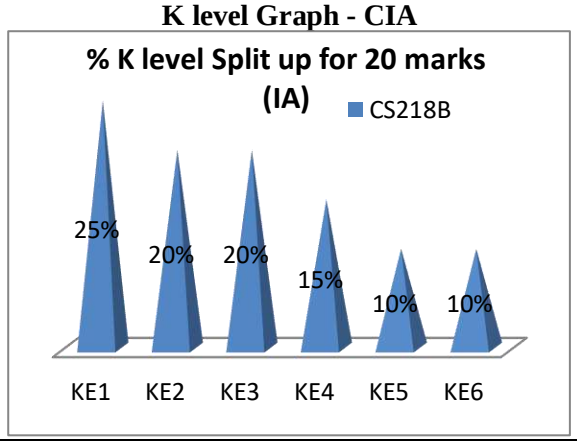
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

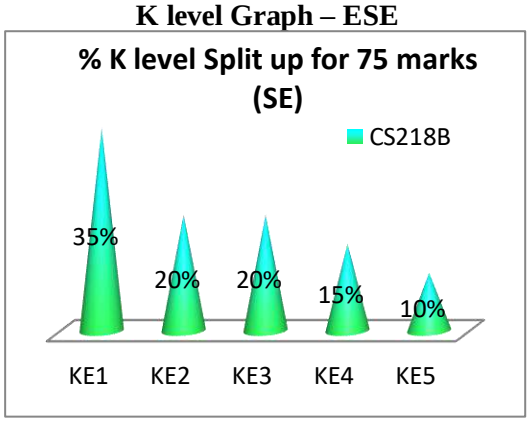
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember(5)	2	1	2
Understand(4)	1	1	2
Apply(4)	1	1	2
Analyze(3)	1	1	1
Evaluate(2)			2
Create(2)		1	1

Bloom's Category	Weightage %
Remember	35
Understand	20
Apply	20
Analyze	15
Evaluate	10

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No	Title of the book	Authors	Publishers	Year of Publication & Edition
1	ITEssentials: PCHardwareand Software Companion Guide	David Anfinson& Ken Quamme	Pearson	2008 3rdEdition

Reference Books:

S.No	Title of the book	Authors	Publishers	Year of Publication
1	CompTIA A+ Complete Review Guide: Exam 220-901, Exam 220-902	Quentin Docter, Emmett Dulaney and Toby Skandier	Wiley Publications	2015 3rd Edition

E-Resources

1. https://edu.gcfglobal.org/en/computerbasics/basic-troubleshooting-techniques/1/
2. https://www.tutorialspoint.com/computer_fundamentals/ computer_hardware.htm
3. https://www.brainbell.com/tutors/A+/Hardware/

DEPARTMENT OF COMPUTER SCIENCE					
THIRD YEAR – SEMESTER VI					
ELECTIVE II:SOFTWARE TESTING					
SEMESTER	**:**	V	**HOURS OF INSTRUCTION**	**:**	6
ELECTIVE	**:**	II	**CREDIT**	**:**	5
Lect. Hrs	**:**	90	**CODE NO**	:	CS218C

COURSE OBJECTIVES
This Course aims to study various Software techniques and the fundamental concepts in software testing. It also help to Identify suitable tests to be carried out, Prepare test planning based on the document, Design test cases suitable for a software development for different domains and Develop and validate a test plan

Course Outcome	Description	Knowledge Levels
CO1	**Acquire** thorough **knowledge** on the various types of Productivity and Quality in Software. **Define t**he Purpose of testing. **Differentiate** between Testing and Debugging. **Learn** different Model for Testing, Bugs, Types of Bugs. Create Testing and Design Style. **Create** own Bugs and test cases on their own **Present test cases in Gmeet**	**K1** **K2** **K3** **K4** **K5** **K6**
CO2	**Analyze** different types of Flow / Graphs and Path Testing, Achievable paths, Path instrumentation. **Learn** the various Application and infer the Transaction Flow Testing Techniques**. Apply** the various testing techniques Test case problems to be presented in groups	**K1** **K2** **K3** **K4** **K5**
CO3	**Acquaint** with the design and working of Data Flow Testing Strategies. Domain Testing: Domains and Paths. **Find and Apply systems** Interacting with Domains and Interface Testing.	**K1** **K2** **K3**
CO4	**Learn** and **apply** Linguistic, Metrics, Structural Metric, Path Products and Path Expressions. **Applying the acquired knowledge in** Syntax Testing, Formats, Test Cases and Create the various test cases.	**K1** **K2** **K3**
CO5	**Applying the acquired knowledge in** Logic Based Testing, Decision Tables, Transition Testing States, State Graph and State Testing. **Differentiate** between various testing methods. **Present the entire testing module in online**	**K1** **K2** **K3** **K4** **K5** **K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	2	3	2	2	1	3	1	1	1
CO2	3	2	3	2	3	2	3	1	1	1
CO3	3	2	3	3	2	1	3	1	1	1
CO4	3	3	3	3	2	1	3	1	1	1
CO5	3	3	3	3	2	1	3	1	1	1
AVG	**3**	**2**	**3**	**3**	**2**	**1**	**3**	**1**	**1**	**1**
TOTAL	**15**	**12**	**15**	**13**	**11**	**6**	**15**	**5**	**5**	**5**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction: Purpose - Productivity and Quality in Software -Testing Vs Debugging - Model for Testing - Bugs - Types of Bugs - Testing and Design Style.	**18**
Unit II	Flow / Graphs and Path Testing - Achievable paths - Path instrumentation - Application - Transaction Flow Testing Techniques.	**18**
Unit III	Data Flow Testing Strategies. Domain Testing: Domains and Paths - Domains and Interface Testing.	**18**
Unit IV	Linguistic - Metrics - Structural Metric - Path Products and Path Expressions. Syntax Testing - Formats - Test Cases.	**18**
Unit V	Logic Based Testing - Decision Tables - Transition Testing States - State Graph - State Testing.	**18**

ASSESSMENT PATTERN

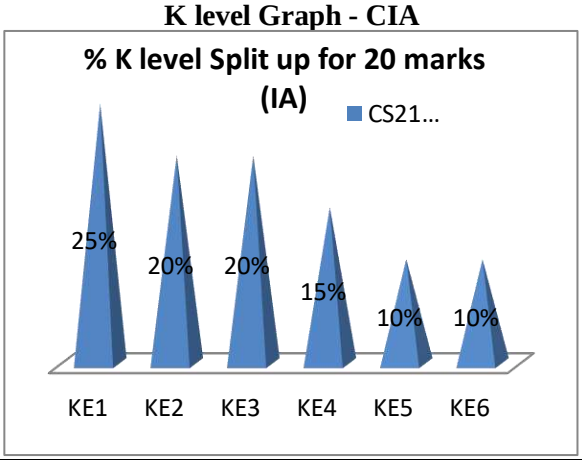
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

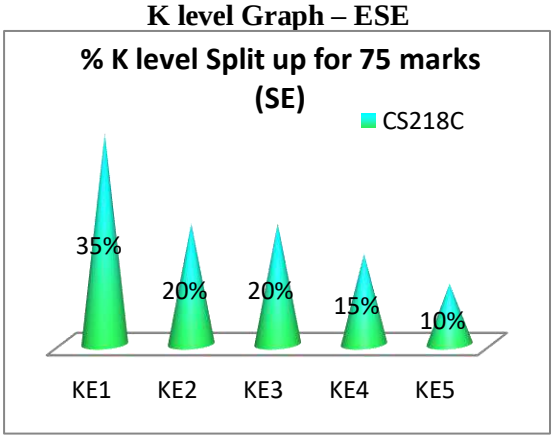
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember(5)	1	1	3
Understand(4)	1	1	2
Apply(4)	1	1	2
Analyze(3)	1	1	1
Evaluate(2)	1		1
Create(2)		1	1

Bloom's Category	Weightage %
Remember	35
Understand	20
Apply	20
Analyze	15
Evaluate	10

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No	Title of the book	Authors	Publishers	Year of Publication & Edition
1	IT Essentials: PC Hardware and Software Companion Guide	David Anfinson & Ken Quamme	Pearson	2008 3rd Edition

Reference Books:

S.No	Title of the book	Authors	Publishers	Year of Publication
1	CompTIA A+ Complete Review Guide: Exam 220-901, Exam 220 - 902	Quentin Docter, Emmett Dulaney and Toby Skandier	Wiley Publications	2015 3rd Edition

E-Resources

1. https://edu.gcfglobal.org/en/computerbasics/basic-troubleshooting-techniques/1/
2. https://www.tutorialspoint.com/computer_fundamentals/ computer_hardware.htm
3. https://www.brainbell.com/tutors/A+/Hardware/

DEPARTMENT OF COMPUTER SCIENCE					
SECOND YEAR – SEMESTER III					
NON MAJOR ELECTIVE :PC SOFTWARE					
SEMESTER	**:**	III	**HOURS OF INSTRUCTION**	**:**	I
NME	**:**	I	**CREDIT**	**:**	2
Lect. Hrs	**:**	15	**CODE NO**	:	CSNM7

COURSE OBJECTIVES
The course aims at the student to acquire knowledge on the basics of Computers, and to learn about the basics of Microsoft Office components. The student acquires thorough knowledge in creating documents using MS-WORD and work with MS-EXCEL

Course Outcome	Description	Knowledge Levels
CO1	**Learn** the basics of Computers, **Explain** the components of Computers, and **Apply** the Fundamental concepts of Microsoft Office Components. **(E-Quiz: Basics of Computers [PO7, PO3]).**	**K1** **K2** **K3**
CO2	**Learn** the basics of MS-WORD, **Apply** them to Create documents in MS-WORD, **Explain** about text manipulation in MS-WORD, explain how to work with bullets and numbering in MS-WORD and **Analyze** the same. Lecture video with Discussion: https://nptel.ac.in/courses/106/105/106105163/**[PO9].**	**K1** **K2** **K3** **K4**
CO3	**Define** headers and footers in MS-WORD, and Apply them in a word document **understand** the concept of tables and **Apply** them to insert tables in a word document and learn the basics of Mail Merge in MS-WORD and send documents using Mail Merge. **(Interactive – Practice (PPT) session on ail Merge)**	**K1** **K2** **K3**
CO4	**Study t**he basics of MS-EXCEL, **Explain** about creating worksheet and inserting data to worksheet and rearranging worksheets **Develop** simple MS-EXCEL worksheets, **Analyse** and **Evaluate** the same. Explain using WHITE BOARD, PPT, GMEET [PO7, PO9]. Lecture video https://nptel.ac.in/courses/127/106/127106019/	**K1** **K2** **K3** **K4** **K5**
CO5	**Study t**he basics of PowerPoint**, Apply** them to Create a Presentation, Explain about inserting and Formatting Text images, charts and **Preparing** Slide shoes and Animation. **Evaluate the** performance **[K5, PO3]** for an Application Scenario and **creatively [K6, PO3]** present the work through a PPT **[PO7]** as a **group activity [PO5]** and face question session **[PO4].**	**K1** **K2** **K3** **K4** **K5** **K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3	1	1	1	1		1	1	1	1
CO2	3	2	1	1	1		1	1	1	1
CO3	3	2	1	1	1		1	1	1	1
CO4	3	1	1	1	1		2	1	1	1
CO5	3	2	2	1	2	1	2	1	1	1
AVG	**3**	2	1	**1**	1	1	**2**	1	1	1
TOTAL	**15**	**8**	**6**	**5**	**6**	**1**	**7**	**5**	**5**	**5**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction: Basics of Computers, overview of Microsoft office Components.	**3**
Unit II	MS WORD: Text Manipulations, Usage of numbering, Bullets.	**3**
Unit III	MS WORD: Footer and Headers, Tables, Mail Merge.	**3**
Unit IV	EXCEL: Overview of Excel Features, Creating Worksheet, Rearranging Worksheets.	**3**
Unit V	POWERPOINT: Basics of PowerPoint, Work with Text, Images and Charts. Preparing Slide show and Animate Slide Content	**3**

ASSESSMENT PATTERN

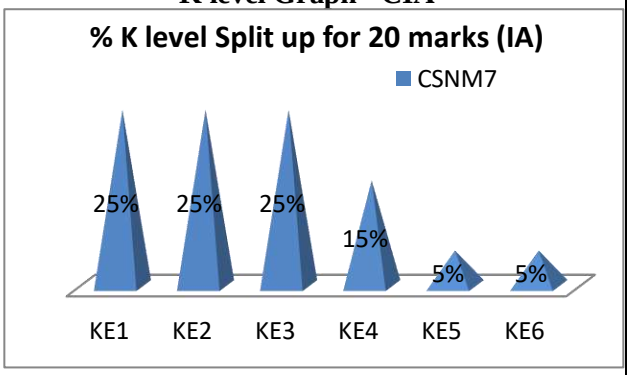
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

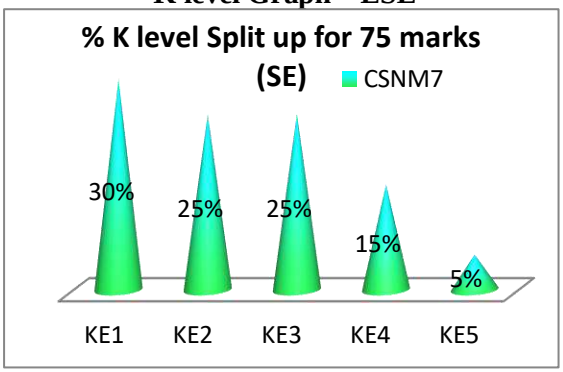
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember (5)	2	1	2
Understand (5)	1	1	3
Apply (5)	1	1	3
Analyze (3)	1	1	1
Evaluate (1)			1
Create (1)		1	

lBloom's Category	Weightage %
Remember	30
Understand	25
Apply	25
Analyze	15
Evaluate	5

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No.	Title of the book	Authors	Publishers	Year of Publication & Edition
1	Working in Microsoft Office	Ron Mansfield	TMH	Reprint 2010. 1st Edition

Reference Books:

S.No.	Title of the book	Authors	Publishers	Year of Publication
1	P.C. Software made simple	P K Taxali	2nd Edition	2001 2nd Edition
2	MS WORD 2000 in a Nutshell	A.Saxena		2001

E-Resources

1. https://www.microsoft.com/en-in/microsoft-365/word
2. https://office.live.com/start/word.aspx.
3. https://www.computerhope.com/jargon/m/microsoft-word.html

DEPARTMENT OF COMPUTER SCIENCE					
SECOND YEAR – SEMESTER IV					
NON MAJOR ELECTIVE :WEB DESIGN					
SEMESTER	**:**	IV	**HOURS OF INSTRUCTION**	**:**	I
NME	**:**	II	**CREDIT**	**:**	2
Lect. Hrs	**:**	15	**CODE NO**	:	CSNM8

COURSE OBJECTIVES
To understand the basics of Web Design using HTML tags and to demonstrate web page design with the help of various components of HTML.

Course Outcome	Description	Knowledge Levels
CO1	**Introduce** the concepts of HTML and **recognize** the role of HTML in web designing	**K1** **K2**
CO2	**Introduce** various attributes of HTML and **apply** commands for executing them. **Construct** HTML forms with various attribute tags and **visualize** the forms for better understanding	**K1** **K2** **K3** **K4**
CO3	**Understand** the concepts of Table design in HTML and **construction** of table. Analyze various ordering and unordering list for better understanding.	**K1** **K2** **K3** **K4**
CO4	**Understand and Identify** various features of Frames and **construction** of frames with the help of commands. **Analyze** frame attributes and **evaluate** the same.	**K1** **K2** **K3** **K4** **K5**
CO5	**Understand** and **Define** the form attributes. **Design** the Form with the help of HTML commands. **Evaluate** the pros and cons for designing forms with attributes**. Create** an application with the help of forms (A Small application will be presented in the GOOGLE MEET by the students)	**K1** **K2** **K3** **K5** **K6**

Strongly correlated	-	3		Moderately correlated	-	2		Weakly correlated	-	1

CO/ PO/ PSO	PO									
	1 Knowledge and skills	**2** Skilled Communicator	**3** critical thinker and problem solver	**4** Sense of inquiry	**5** Team player / worker	**6** Skilled project manager	**7** Digitally Efficient	**8** Ethical awareness/ reasoning	**9** National and International perspective	**10** Lifelong learners
CO1	3						2	1		1
CO2	3	1	2	1			1	1		1
CO3	3	1	1	1			1	1	1	1
CO4	3		1	1	1	1	1	1	1	1
CO5	3	2	2	1	2	1	2	1		1
AVG	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
TOTAL	**15**	**4**	**6**	**4**	**3**	**1**	**7**	**1**	**2**	**5**

	Course Outline	
Unit. No	**Content**	**Hours**
Unit I	Introduction to HTML - History of HTML - Sample HTML documents.	**3**
Unit II	Header Section - Title- Links - Colorful Web Page - Comment Lines Heading Printing - Aligning the Headings - Horizontal Rule - Paragraph Tab Settings - Images and Pictures.	**3**
Unit III	Ordered and Unordered Lists - Table Handling	**3**
Unit IV	Frames - Frame Definition - Nested Framesets	**3**
Unit V	Forms - Action Attribute - Method Attribute - Enctype Attribute - Drop Down List - Sample Forms.	**3**

ASSESSMENT PATTERN

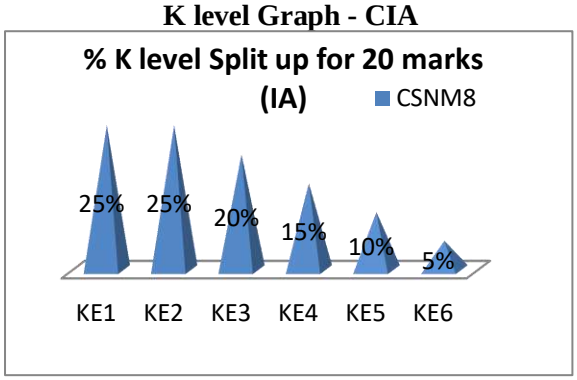
CIE- Continuous Internal Evaluation (25 Marks) ESE- Semester End Examination (75 Marks; weightage 75 %)

Attendance/Discipline/ Moral values (5 marks)

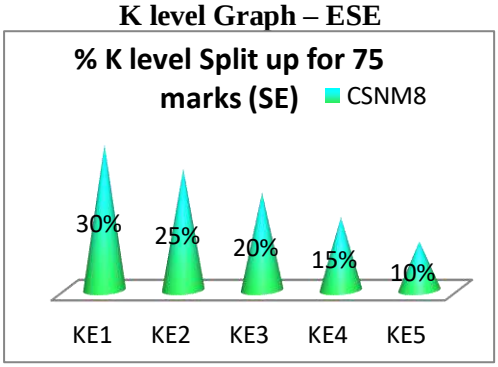
Bloom's Category Marks (out of 25)	Test (5)	Assignment (5)	Model exam (10)
Remember(5)	1	1	3
Understand(5)	1	1	3
Apply(4)	1	1	2
Analyze(3)	1	1	1
Evaluate(2)	1		1
Create(1)		1	

Bloom's Category	Weightage %
Remember	30
Understand	25
Apply	20
Analyze	15
Evaluate	10

K level Graph - CIA



K level Graph – ESE



Recommended Textbooks:

S.No	Title of the book	Authors	Publishers	Year of Publication & Edition
1	World Wide Web Design with HTML	Xavier. C	TMH	14th Reprint 2006.

Reference Books:

S.No	Title of the book	Authors	Publishers	Year of Publication
1	How to do everything with HTML	James H. Pence	TMH	2001

E-Resources

1. https://html.com/
2. https://www.w3schools.com/
3. https://developer.mozilla.org/en-US/docs/Web/HTML