GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD

(An Autonomous Institute of Government of Maharashtra)

Department of Computer Science & Engineering

Teaching and Evaluation Scheme

S.E.(Full-Time) in Computer Science &Engineering

Effective from academic year 2013-14

SEMESTER-I

THEORY COURSES														
S. No.	**Course Code**	**Subject**	**PO**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
								Theory			**Term Work**	**Practical/Viva-voce**	**Total**
				L	**T**	**P**		**Test**	**TA**	**ESE**			
1	GE241	Engineering Mathematics-III		03	01	-	04	20	20	60	-	-	100
2	GE242	Environmental Studies & Science		03	-	-	03	20	20	60	-	-	100
3	CS243	Microprocessor and Interfacing	2,3,5,8, 11	04	-	-	04	20	20	60	-	-	100
4	CS244	Programming Language	1,2,12	03	01	-	04	20	20	60	-	-	100
5	CS245	Computer Graphics	1,2,3,1 1	04	-	-	04	20	20	60	-	-	100
LABORATORY COURSES													
1	CS246	Lab Microprocessor and Interfacing	2,3	-	-	02	01	-	-	-	25	25	50
2	CS247	Lab Programming Language	1,2,12	-	-	02	01	-	-	-	25	25	50
3	CS248	Lab Computer Graphics	1,2,3	-	-	02	01	-	-	-	25	25	50
4	CS249	Lab Web Technology	3,7,10, 11	01	-	04	02	-	-	-	50	50	100
(A) Total of Semester – I				**18**	**02**	**10**	**24**	**100**	**100**	**300**	**125**	**125**	**750**

SEMESTER-II

S. No.	Course Code	Subject		Scheme of Teaching (Hrs/Week)			Total Credits	Scheme of Evaluation (Marks)					
				L	T	P		Theory			Term Work	Practical /Viva-voce	Total
								Test	TA	ESE			
THEORY COURSES													
1	CS250	Data Structures	1,2,3, 11	03	01	-	04	20	20	60	-	-	100
2	CS251	Discrete Mathematical Structures	1,2,3, 8,9	04	-	-	04	20	20	60	-	-	100
3	CS252	Object Oriented Programming	2,3,5, 8,11	03	01	-	04	20	20	60	-	-	100
4	CS253	Database Management System	1,4,10	03	01	-	04	20	20	60	-	-	100
5	CS258-CS259	Institute Elective		03	-	-	03	20	20	60	-	-	100
LABORATORY COURSES													
1	CS254	Lab Data Structure	1,2,3, 4,	-	-	02	01	-	-	-	25	25	50
2	CS255	Lab Discrete Mathematical Structures	2,3	-	-	02	01				25	25	50
3	CS256	Lab Object Oriented Programming	2,3	-	-	02	01	-			25	25	50
4	CS257	Lab Database Management System	5,6,8, 9,10, 11		-	04	02	-	-	-	50	50	100
(B) Total of Semester- II				**16**	**03**	**10**	**24**	**100**	**100**	**300**	**125**	**125**	**750**
Grand Total = (A) + (B)				**34**	**05**	**20**	**48**	**200**	**200**	**600**	**250**	**250**	**1500**

L-Lectures, T-Tutrials, P-Practical, TA-Teacher Assessment, ESE-End-Semester Examination

Institute Elective		PO
CS258	Enterprise Information System	3,8,12
CS259	Business Economics	3,8,12

GE 241 Engineering Mathematics-III

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Prerequisites:
Fundamental knowledge of differential equations and vector algebra

Course Educational Objectives:
To equip students with

1. Adequate knowledge of mathematics which will enable them in formulating problems and its solution
2. Solve related problems which will enable them to understand the subject and their applicat ions in engineering.

Course Outcomes Expected:
After completion of this course students will be able to:

1. The students will be able to apply mathematical concepts to formulate and solve engineering problems

UNIT 1	**n th order Linear differential equations** Methods of finding general solution of homogene ous and non- homogeneous linear differential equation with constant coefficients: General method, shortcut method, metho d of variation of Parameter; General solution of homogeneous and non-homogeneous linear differential equations with variable coefficients; Simultaneous Linear di fferential equations.	
UNIT 2	**Partial Differential equations** Introduction of partial differential equations, Formation of partial differential equations, Solution of First order Linear and non linear partial differential equations by char pt's method/Adomian method, Method of separation of variables, Boundary value problems.	
UNIT 3	**Applications of differential equations:(a)Applications of ordinary differential equations:** Mechanical oscillations : Free oscillations, Damped free Oscillations, Forced oscillations, Electrical circuits, Applic ations in civil Engineering: Deflection of beams. **(b)Applications of partial differential equations:** One dimensional heat flow equation, Two dimensional heat flow equation under steady state condition.	
UNIT 4	**Laplace transform and its applications** Definition, Laplace transform of some basic functi ons, Properties of Laplace transform ,Laplace transform of Unit step function, Unit impuls e function, error function, and periodic function, Use of Laplace transform to solve Linea r differential equations and simultaneous linear differential equations.	
UNIT 5	**Vector calculus** Differentiation, Tangential and normal components of velocity and acceler ation, Gradient of scalar point function, Divergence and Curl of vector point function an d their applications. Line, surface and volume integrals, Stoke's theorem and Gauss-Divergence theorem.	

TEXT BOOKS:

1. A Text Book of engineering Mathematics (Vol.1 &2) by P.N.Wartikar & J.N.Wartikar, engineering mathematics a tutorial Approach by Ravish R Singh, Mukul Bhatt.

2. Advanced Engineering Mathematics by Erwin Kreyszig, Willey Eastern Ltd. Mumbai. Pune Vidhyarthi Griha Prakashan, Pune

REFERENCE BOOKS:

1. Higher Engineering Mathematics by B. S. Grewal, Khanna publication, New Delhi
2. Advanced Engineering Mathematics by H. K. Dass, S. Chand and Sons.
3. Advanced Engineering Mathematics by Michael Greenberg,2/e, Pearson
4. Calculus by G. B. Thomas and R. L. Finney, Addison- Wesley, 1996
5. Elements of Partial Differential Equations by I.N.Sneddon

GE 242 Environmental Science

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
		Teacher Assessment	20 Marks
Total Credits	3	End-Semester Examination	60 Marks

Total Hours required for this course: 45 Hours.

Prerequisites: NIL

Course Educational Objectives:

Become aware of the importance of soil, water and air for humans and other life forms on the Earth. Become aware of the species extinction and loss of biodiversity. Become aware of the various national and international efforts that are in place for conserving the environment get acquainted with national laws and global environmental conservation guidelines

Course Outcomes Expected:

After completion of this course students will be able to:

1) Understand and appreciate the physical and chemical foundations of the Earth and its environment

2) Understand the origin and definition of life

3) Understand the origin and evolution of human societies and the major transformations brought by industrialization.

4) Learn about the basics of environmental economics.

UNIT 1 Natural Resources, Water resources: Use and over utilization of surface and ground water, Floods, drought, conflicts over water, dams: benefits and problems, Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Land resources: land degradation, soil erosion and desertification. Role of an individual in conservation of natural resources.

Unit 2 Global level efforts towards environment conservation and pollution control. Role of India at Global level pollution, conservation and policies of Government of India towards control of river pollution. Policy of Government of Maharashtra towards control of various pollution. Environment Protection Act, Vehicular emission standards, Noise Pollution (Regulation and Control) Rules, Concept of ISO 14000.

Unit 3 Biodiversity and its conservation, Bio-geographical classification of India, Biodiversity at global, National and local levels. India as a mega diversity nation, Hot spots of biodiversity, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity, Forest Conservation Act.

Unit 4 Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Noise pollution, Thermal pollution, Nuclear hazards, Electronic Waste. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Municipal solid waste (management and handling) rules

Unit 5 Urban problems related to water and energy, Water conservation, rain water harvesting, and watershed management, Climate change, nuclear accidents. Role of an individual in prevention of pollution. Disaster management: floods, earthquake, cyclone and landslides

ASSIGNMENT

Assignment shall consist of power point presentation of related topic by individual student.

TEXT & REFERENCE BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha, University Grants Commission, New Delhi.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Environment Protection Act 1986.

CS243 Microprocessor Fundamentals and Interfacing

Teaching Scheme		**Evaluation Scheme**	
Lectures	4 Hrs/Week	Test	20 Marks
		Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Prerequisites: NIL

Course Description: This course presents a conceptual and practical introduction to imperative and assembly level language programming, exemplified by Microcontroller. As well as providing grounding in the use of microcontroller, the course will cover general principles of programming in assembly level frameworks. This course introduces concepts like Digital electronics, memory & peripherals interfacing which provides real time programming approach in assembly level languages.

Course Educational Objectives:

- To familiarize with the Intel 8086 Microprocessor & instruction set.
- To develop & execute programs in assembly language .
- To demonstrate 8255 interfacing with 8086 microprocessor.

Course Outcomes :

After completion of this course students will be able to:

CO1: Solve K-MAPs and Boolean Algebra Experiments, A.C, D.C. Loading Characteristics, Registers & Counters functioning while designing with digital gates(K1).
CO2:Implement assembly languagePrograms using 16 bit registers.(K2)
CO3:Describe 8086 CPU Design(K1).
CO4:Explain microprocessor architecture of memory organization of 8086 microprocessor.(K1)
CO5:Demonstrate interface and program using legacy peripherals.(K3)

UNIT 1 **Basics of Digital Electronics :** Binary ,Octal & Hexadecimal number System, Parity Code,7-bit hamming code, Logic gates ,K-Map, Multiplexers &Demultiplexers , Flip-flops, Registers, Counters, Introduction to D/A,A/D convertor.

Unit 2 **8086 Microprocessor:**

8086 internal Architecture, memory Organization, Addressing modes , Accessing

immediate & Register data ,memory accessing.

Instruction set of 8086, Programming with 8086:

8086 data transfer instruction, Arithmetic instruction, Bit manipulation instruction, String instruction, Conditional & unconditional branch instruction ,Process control instruction.

Use of Assembler Debug, Development cycle, debugging software

Modular Programming, Procedures

Develop programs in assembly language

Unit 3 **Designing 8086 CPU**

Basic 8086 CPU hardware design, Generating CPU clock and reset signals, Bus types and buffering techniques, 8086 minimum mode CPU module, 8086 maximum mode CPU module

Design minimum mode CPU module using appropriate tool such as ORCAD

Unit 4 Main memory design-SRAM,DRAM,ROM & interfacing

Basic input-output-Parallel, serial programmed and interrupt driven I/O,DMA

Unit 5 **Peripheral Controllers**

8255, 8259, 8251

TEXT BOOKS:

1. John P. Uffenbeck ,"8086 Family , Programming and interfacing", PHI 2001
2. Yu Chen Liu & Glenn A Gibson : "Microcomputer Systems; The 8086/8088 Family", PHI
3. R P Jain "Modern Digital Electronics" TATA MCGRAW HILL

REFERENCE BOOKS:

1. Walter A.Triebel, Avatar Singh ,"8088 & 8086 Microprocessors Programming Interfacing, software, Hardware & Applications"
2. Barry B. Brey,"The Intel Microprocessors", Hard cover 8th edition

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		M	M		H			H			H	
CO1		M	M									
CO2		M	M									
CO3		M	M									
CO4		M	M									
CO5					H			H			H	

H – High M – Medium L - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following

1) Question answer based Theoretical Assignment
2) " Think More Write Less" Based (observation based) Assignment
3) Power point presentation of Topic which is related but out of syllabus
4) Class room Question & answer
5) Overall approach towards learning, creativity.

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	10	05	15
K2	Understand	10	10	25
K3	Apply	00	05	20
K4	Analyze	00	00	00
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K3	K2	K3
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	10	10	00	00	00
Teachers Assessment (20 Marks)	05	00	00	10	05
ESE Assessment (60 Marks)	15	20	10	05	10

Special Instructions if any: Nil

Designed by

- Mrs. VijayshreeA.Injamuri
- Mr. SudhirG.Shikalpure
- Mrs. MadhuriA.Aher

CS244 Programming Language

Teaching Scheme		Evaluation Scheme	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Prerequisites: Mathematics, English.

Course Description: One important practical objective for this course is to help you learn how to learn programming language concepts. This courses introduces basic skills in C. C is a general-purpose, high-level language that was originally developed by Dennis M. Ritchie to develop the UNIX operating system at Bell Labs. C belongs to the structured, procedural paradigms of languages. It is proven, flexible and powerful and may be used for a variety of different applications.

Course Objectives:

- To introduce the basic hardware & software components of a computer.
- To determine the program execution process.
- To discuss when and how to use the appropriate statements available in the C language
- To elaborate & execute simple and complex c programs by using different c features.

Course Outcomes:

After completion of this course students will be able to:

CO1: Describe general principles of computer languages such as loops (while/for), conditional branching (if/switch), block structure, functions (including parameter passing, prototypes and recursion), structures. K1
CO2 : Demonstrate how these principles are implemented in the C programming language.K2
CO3 : Apply the concept of pointers and functions for problem solving like sort, merging K3
CO4 : Apply the concept of file handling to manipulate file data .K3
CO5: Design a simple C program for various applications. K3

Detailed Syllabus:

UNIT 1	Basics computing concepts, Introduction to computer fundamentals – Computer Hardware, CPU organization, Memory – main memory, Secondary memory, cache memory, virtual memory, Semiconductor memory, Hard disk. Input devices – Keyboard, Mouse, Output devices – Monitors, Printers (Impact &Non impact printers), Computer Software: Operating System ,Programming languages, Classification of Programming Languages, Basics of Compilation, Linking and Loading **Introduction to C Language fundamentals :**The C character set, variables and constants, data types, keywords, expressions, statements, operators- arithmetic operators , unary operators, relational & logical operators, conditional operators, type conversions , type casting.	
UNIT 2	**Conditional execution –** if, nested if, it else, switch, goto statement, Loop execution - For loop, While loop, Do while loop, break, and continue statements. Functions - Defining a function, passing arguments to functions, returning values from function, command line arguments, Recursion, Local & Global variables concept.	
UNIT 3	A**rrays**- definition, passing array to the function, Multidimensional array, String operation- String copy, String length, String concatenation, String compare.	

UNIT 4	**Introduction to structure and union.** Array of structure, Passing structure as an object to function . Structure as an return type of function	
UNIT 5	**Pointers-** pointer as a variable, pointer to array, pointer as argument to function.String operations using pointers. File handling - file handling modes, File open, File close, File input and Output Functions, End of file functions.	

TEXT BOOKS:

1. V. Rajaraman, "Introduction to Information Technology", Prentice Hall of India 2003
2. E Balagurusamy,"Programming in C",TMH publication

REFERENCE BOOK:

1. Byron S. Gottfried, "Schaum's Outline Series Programming with C",TMH publication
2. Y.P. Kanetkar, "Let us C",Paperback",8th edition
3. B. Ram, "Computer Fundamentals",New Age International publications
4. Robert Lafore "Turbo C Programming"

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H										
CO2	M	H										
CO3	H	H										
CO4	H	H										
CO5	H	H										L

H – High M – Medium L - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following

1) Question answer based Theoretical Assignment
2) Surprise Test
3) Power point presentation of Topic which is related but out of syllabus
4) Quiz
5) Developing Small applications using C.

Assessment Pattern

Assessment Pattern Level No.	**Knowledge Level**	**Test**	**Teachers Assessment/ Assignment**	**End Semester Examination**
K1	Remember	10	05	20
K2	Understand	10	05	20
K3	Apply	00	10	20
K4	Analyze	00	00	00
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K3	K3	K3
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	10	10	00	00	00
Teachers Assessment (20 Marks)	05	05	00	00	10
ESE Assessment (60 Marks)	20	20	05	05	10

Special Instructions if any: Nil

Designed by

- Mrs Vrushali Chakkarwar
- Mr. Vikul J.Pawar
- Mr. Prashant P. Pathak

CS245 Computer Graphics

Teaching Scheme		Evaluation Scheme	
Lectures	4 Hrs/Week	Test	20 Marks
		Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.
Prerequisites: NIL
Course Description: Overview of different hardware devices used for Graphical interface is give in this course. This course contains derivation of basic graphics formulae and complex functions like transformations and clipping. Introduction of 3D concepts , animation and Multimedia is also given in this course.

Course Educational Objectives:

- To familiarize with the graphics techniques and algorithms.
- To make aware of the multimedia concepts and various I/O technologies.
- To elaborate different graphics command s/functions and algorithms for programming & animation.
- To make students able to develop their creativity & imagination in graphics designing.
- To evaluate mathematical concepts of graphics functions and methods.

Course Outcomes Expected:

After completion of this course students will be able to:

CO1: Applycomputer programming to computer graphics, applications and problem solutions.(K1)
CO2: Apply graphics functions to create animation as games, cartoons etc.(K2)
CO3: Ready to work in virtual reality environment. (K2)
CO4: Match graphics objects with real world application.(K3)
CO5: Develop advanced application in image processing, scientific, research & various fields.(K3)

UNIT 1 Computer Graphics System

Overview of Computer Graphics, Computer Graphics Application and Software, Video display devices :- Color CRT Monitors, Raster scan & Random Scan Display Systems, DVST, Flat Panel Display :- LCD ,LED, Plasma display. 3D Viewing devices, Input & Output Devices.

Unit 2 Graphics Output Primitives

Scan Conversion, Rasterization, Line drawing algorithms, Circle drawing algorithms, Ellipse drawing algorithms, Character generation, Color Models & color application, Filled area algorithms, Aliasing & anti-aliasing.

Unit 3 Two Dimensional Transformations, Clipping and windowing

Basic transformations: Translation, Rotation, Scaling, Matrix representation and Homogeneous Coordinates, Composite transformations, Other Transformations: Reflection & Shear, Line Clipping algorithm, Viewing transformation, Polygon

clipping algorithm, Interior/Exterior clipping, Text clipping.

Unit 4 Basic 3D concepts and Computer Animation

Different 3D display methods: Parallel projection, Perspective projection and Depth cueing, Basic 3D transformations, Spline representation, B-Spline curves & surfaces, Bezier curves & surfaces, Fractal geometry methods, classification of fractals, Design of animation sequences, animation functions, morphing, simulation, Virtual reality environments.

Unit 5 Multimedia

An Introduction , Multimedia applications , Multimedia System Architecture, Evolving technologies for Multimedia, Multimedia Databases, Compression & Decompression, Data & File Format standards, Multimedia I/O technologies, Digital voice and audio, Video image and animation, Compression through spatial & temporal redundancy, Multimedia authoring.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H											
CO2		H										
CO3			H									
CO4											L	
CO5											L	

H – High M – Medium L - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following

1) Question answer based Theoretical Assignment
2) Surprise Test
3) Power point presentation of Topic which is related but out of syllabus
4) Quiz
5) Developing Small applications using C.

Assessment Pattern

Assessment Pattern Level No.	**Knowledge Level**	**Test**	**Teachers Assessment/ Assignment**	**End Semester Examination**
K1	Remember	10	05	20
K2	Understand	10	05	25
K3	Apply	00	10	15

K4	Analyze	00	00	00
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K2	K3	K3
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	10	10	00	00	00
Teachers Assessment (20 Marks)	05	05	00	00	10
ESE Assessment (60 Marks)	20	20	05	05	10

Special Instructions if any: Nil

Designed by

- Mrs. Arjumand M. Khan
- Mrs. Vrushali A. Chakkarwar
- Mr. Vikul J. Pawar

CS 246–LAB Microprocessor & Interfacing

Teaching Scheme		**Evaluation Scheme**	
Practical	2 Hrs/Week	Team Work	25 Marks
Credits	1	Practical /Viva-voce	25 Marks

Total Hours required for this practical course: 30 Hours.

Prerequisites:Theory- Microprocessor & Interfacing

Laboratory Course Outcome:

After completion of this course student will be able to

CO1: Describe the internal architecture of 8086

CO2: Execute ALP programs based on simple Addition, Subtraction etc.

CO3: Incorporate ALP concepts like 16-bit addition, subtraction, multiplication, division for resembling real time situation.

CO4: Demonstrate the use of memory designing & Interfacing.

CO5: Develop ALP programs for peripherals interfacing

Suggestive list of programs.

Practical Statements should be as or more hard than mentioned below

1. Introduction to 8086.
2.16-bit addition, subtraction, multiplication and division in Debug.
3. Assembly language program for 16-bit addition, subtraction, multiplication and division
4. Assembly language program for finding sum of series of 8-bit numbers in an array.
5. Assembly language program for finding largest and smallest number in an array.
6. Assembly language program for BCD multiplication.
7. Assembly language program for BCD division.
8. Assembly language program for BCD string addition.
9. Assembly language program for packed BCD to ASCII.
10.8255 interfacing with 8086.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H	H									
CO2		H	H									
CO3		H	H									
CO4		H	H									
CO5		H	H									

H – High M – Medium L - Low

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	07	07	05	03	03
Practical Examination & Viva Voce (25 Marks)	05	05	05	05	05

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	05	05
S2	Manipulation	08	10
S3	Precision	12	10
S4	Articulation	00	00
S5	Naturalization	00	00
Total		25	25

Preparation (S1)	04	05
Conduct of Experiment (S2)	04	07
Observation and Analysis of Results (S3)	08	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	06	05
Total	**25**	**25**

Special Instructions if any: Nil

Designed by

- Mrs. Vijayshree A. Injamuri
- Mr. Sudhir G.Shikalpure
- Mrs. Madhuri A. Aher

CS 247 Lab Programming Language

Teaching Scheme		**Evaluation Scheme**	
Practical	2Hrs/Week	Team Work	25 Marks
Credits	1	Practical/Viva-voce	25 Marks

Total Hours required for this practical course: 30 Hours.
Prerequisites: NIL

Course Educational Objectives:

- To demonstrate basic knowledge of computer and its functionality.
- To elaborate syntax & Semantic of c programming language
- To develop logic building & program writing skills

- To encourage students to solve simple & complex real time problems.

Laboratory Course Outcomes :
After completion of this course student will be able to
CO1: Write , compile and execute C programs based on simple constructs like arrays,loops , structures, conditional statements etc
CO2: Apply the concepts of pointer and functions to solve problems.
CO3: Demonstrate the use file handling operations.
CO4: Develop simple c program for small applications.

Suggestive list of experiments for C programming part

1. Write a program to find area, perimeter of a rectangle by using formula.
2. Write a program using if else conditional statements
3. Write a program to find average often given numbers using concept of loops.
4. If a five digit number is input through keyboard, write a program to reverse the number using concept of loops.
5. Write a program using arrays.
6. Write a program using pointers.
7. Write a program using structures.
8. Write a program using functions.
9. Write a program using file handling.
10. Write a program using strings.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H										
CO2	H	H										
CO3	H	H										
CO4	H	H										M

H – High M – Medium L - Low

Assessment Table

Assessment Tool	S1	S2	S3	S3
	CO1	CO2	CO3	CO4
Term Work (25 Marks)	06	06	05	08
Practical Examination & Viva Voce (25 Marks)	05	06	06	08

Assessment Pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	06	05
S2	Manipulation	06	06
S3	Precision	13	14
S4	Articulation	00	00
S5	Naturalization	00	00
Total		25	25

Preparation (S1)	04	05
Conduct of Experiment (S2)	05	07
Observation and Analysis of Results (S3)	07	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	06	05
Total	**25**	**25**

Special Instructions if any: Nil

Designed by

- Mrs. Vrushali Chakkarwar
- Mr. Vikul J.Pawar
- Mr. Prashant P. Pathak

CS 248 Lab Computer Graphics

Teaching Scheme		**Evaluation Scheme**	
Practical	2 Hrs/Week	Team Work	25 Marks
Credits	1	Practical/Viva-voce	25 Marks

Total Hours required for this practical course: 30 Hours.
Prerequisites: NIL

Course Educational Objectives:

- To elaborate basic graphics functions/commands and algorithms for programming and animation.
- To elaborate multimedia concepts in programming related to audio and video.
- To enable the students to develop their programming creativity and imagination.
- To implement mapping of various functions related to real world applications

Course Outcomes:

After completion of this course students will be able to:

CO1: Apply different graphics functions and design GUI Platforms.

CO2: Create animations used in computer based games.

CO3:Apply different algorithms to create graphical application.

CO4: Ready to work in virtual reality environment.

CO5: develop advanced application in image processing , scientific, research & various fields.

Suggestive List of Programs –

1] To demonstrate basic graphics functions.
2] To illustrate DDA Line drawing Algorithm
3] To demonstrate Bresenhams Line drawing Algorithm
4] To perform Circle drawing Algorithm
5] To demonstrate Ellipse drawing algorithm
6] To perform program on Character generation.
7] To illustrate filled area algorithm.
8] To evaluate program for 2 D transformations.
9] To demonstrate Line clipping Algorithm
10] To perform program for Polygon clipping algorithm.
11] Program for demonstrating computer animation.
12] To perform programs for multimedia.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H									
CO2		H	H									
CO3		M	M									

H – High M – Medium L - Low

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	07	07	05	03	03
Practical Examination & Viva Voce (25 Marks)	05	05	05	05	05

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**

S1	Imitation	05	05
S2	Manipulation	08	10
S3	Precision	12	10
S4	Articulation	00	00
S5	Naturalization	00	00
Total		25	25

Preparation (S1)	04	05
Conduct of Experiment (S2)	04	07
Observation and Analysis of Results (S3)	08	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	06	05
Total	**25**	**25**

Special Instructions if any: Nil

Designed by

- Mrs. Arjumand M. Khan
- Mrs. Vrushali A. Chakkarwar
- Mr. Vikul J. Pawar

CS 249: LAB: Web Technology			
Teaching Scheme		**Examination Scheme**	
Lectures:	**1 Hrs/Week**	**Term Work :**	**50 Marks**
Practical:	**4Hrs/Week**	**Practical /Viva :**	**50 Marks**
Credits:	**2**		

Prerequisites: -

Course description: This course aims at developing skill and awareness amongst students in area of Web Technology using HTML and CSS. After completion of this course student will be able to understand concepts of Web development, they will learn the new technologies associated with web

Course Objectives:

- To make students familiar with concepts of web designing
- To create awareness of latest web technologies amongst students
- To give students knowledge of advanced concepts of CSS helpful in creating professional Websites

Course Outcomes

After completing the course, students will able to:

CO1	Understand Presentational, and basic formatting tags of HTML
CO2	Implement CSS rules to give style to HTML Elements
CO3	Implement the Basic JavaScript functions and understand how to use them
CO4	Host website using Domain Nam e+ Hosting Services
CO5	Understand latest versions i.e. HTML 5, CSS 3

Detailed Syllabus:

Unit 1	Introduction to web, Introducing HTML Tags and Elements (Presentational, Basic Formatting, Lists, Links & Navigation, Images , Tables, Form Controls, Frame Element etc.), Properties of Tags & Events of the Elements.
Unit 2	Introduction to CSS – Adding CSS Rules, CSS Properties, CSS Selectors, Design Issues, Minimizing CSS, Inheritance in CSS, Reset in CSS, Browser Compatibility using CSS
Unit 3	Learning JavaScript – Adding Scripts to your pages, Document Object Model, Starting Program with JavaScript, Functions, Operators, Conditional Statements, and Looping.
Unit 4	Deployment – Introduction to domain and Hosting, Uploading website, Testing of website, Introduction to SEO, Using Analytics, AdWords and AdSense, Introduction to DHTML and XHTML.
Unit 5	Introduction to HTML 5, Introduction to CSS 3, Introduction to JQuery, Introduction to AJAX.

Text Books

1. Thomas Powell,"HTML& CSS: The Complete Reference", Fifth Edition by.
2. Jon Duckett ,"Beginning HTML, XHTML, CSS, and JavaScript". – Wrox Publication.
3. Head First HTML with CSS & XHTML – O'Reilly Publication.
4. HTML, CSS, JavaScript for Dummies.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			M				M			M	M	
CO2			H				H			H	M	
CO3			H				H			H	M	
CO4			H				H			H	M	
CO5			H				H			H	M	

1 – High 2 – Medium 3 - Low

List of Experiments

Sr. No.	Details
1	Working with Basic Formatting & Presentational Tags.
2	Working with Form Elements like Button, Textbox etc.
3	Creating Tables, Frames and Layouts
4	Creating Inline, External style sheets.
5	Working with Advanced CSS.
6	Using JavaScript.
7	Writing Functions, Operators and Control Structures with JavaScript.
8	Using JQuery to add Animation Effects.
9	Using HTML 5 and CSS 3 Properties.
10	Mini Project

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	07	07	05	03	03
Practical Examination & Viva Voce (25 Marks)	05	05	05	05	05

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	05	05
S2	Manipulation	08	10
S3	Precision	12	10
S4	Articulation	00	00
55	Naturalization	00	00
Total		25	25

Preparation (S1)	08	10
Conduct of Experiment (S2)	08	14
Observation and Analysis of Results (S3)	16	10
Record (S2)	06	06
Mini-Project / Presentation/ Viva-Voce (S3)	12	10

Total	**50**	**50**

Special Instructions if any: Nil

Designed by

- Mr. Prashant P. Pathak
- Mrs. VrushaliChakkarwar
- Mr. VikulJ.Pawar

Semester II

CS250 Data Structures

Teaching Scheme		Evaluation Scheme	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.
Prerequisites: Programming Language

Course Description: This course presents a conceptual and practical introduction to organizing data in a computer so that it can be used efficiently. Practical introduction of data structure iscover using C language by implementation of various data structures. This course introduces concepts like ADT, stack, queue, linked lists, tree, graph, sorting technique and searching technique.

Course Educational Objectives:

- To discuss data structures like stack, queue, linked list, tree & graph.
- To implement all data structures in high level language & use them in various applications.
- To analyze & differentiate between different searching & sorting methods.

Course Outcomes Expected:

After Completing the course students will be able to :

CO1: Awareness of abstraction concepts.

CO2: Implement various data structures viz. stacks, queues, linked lists, trees and graphs.

CO3: Identify different applications of data structures.

CO4: Analyze &Compare various searching and sorting techniques.

CO5: Implement user defined data structures in a high level language.

UNIT 1	**Introduction to data structure & The Stack & Queues –** The Arrays as an ADT: Using One-Dimensional Arrays, Using Two-Dimensional Arrays, Using Multidimensional Arrays, Definition and Examples, Primitive Operation, The stack as an ADT, The queue and its sequential representation, The queue as an ADT, Basic Definition and examples: Infix, Postfix, and Prefix, Program to evaluate a Postfix expression, Limitations of the program.	
Unit 2	**Linear Data Structure & their representation** Definition, concept, operation on linked lists, Circular linked lists, Doubly linked lists, Operations like insertion, deletion, insertion in order, searching, updating , Applications of linked lists such as polynomial manipulation, Comparison of singly linked, circularly linked & doubly linked list	
Unit 3	**Trees** Definition, Basic terminology, operation on binary trees, linked storage representation for binary search trees, Basic operation on binary search tree such as creating a binary search tree, searching, modifying an element, inserting &deleting the element, destroy a binary search tree, tree traversals ,in-order, pre-	

	order, post-order , tree application for expression evaluation & for solving sparse matrices. height balanced trees2-3 tree, B trees, B+ trees	
Unit 4	**Graphs** Definitions, basic terminology, matrix representation & implementation of graphs, graph travels, DFS, BFS, Shortest path, spanning tree	
Unit 5	**Sorting& searching** Different sorting tech, classification on the basis of big-O notation, tech such as straight selection sort, bubble sort, merge sort, quick sort, heap sort, shell sort, radix sort, comparisons between different sorting techniques .Sequential searching, binary searching.	

TEXT BOOKS:

1. YedidyahLangsam, Moshe J. Augenstein, Aaron M. Tenenbaum, "Data Structures using C and C++" ,Pearson Edition
2. G.S. Baluja," Principles of Data Structures using C and C++".

REFERENCE BOOKS:

1. Niklaus Wirth, "Algorithms + Data Structure = Programs" ,Amazon
2. Adam Drozdek,"Data Structures and Algorithms in C++",Amazon
3. Rajesh K. Shukla ,"Data Structures Using C & C++",Willy
4. Prof P.S.Deshpande& Prof O.G.Kakde, "C& Data Structures",dreamtech

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	M	M	M								M	
CO1	M		M									
CO2		M	M									
CO3		M	M									
CO4		M	M									
CO5											M	

H – High M – Medium L - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following

1) Assignments
2) Tutorials
3) Power point presentation

4) Participation and enthusiasm towards problem solving
5) Creativity.

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	10	05	18
K2	Understand	10	10	24
K3	Apply	00	05	18
K4	Analyze	00	00	00
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K3	K2	K3
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	10	10	00	00	00
Teachers Assessment (20 Marks)	05	05	05	05	00
ESE Assessment (60 Marks)	18	12	12	12	06

Special Instructions if any: Nil

Designed by

- Mr. Nitin Dhutraj
- Mrs. Meghana B. Nagori
- Mrs. Pallavi V. Kulkarni

CS251 Discrete Mathematical Structure

Teaching Scheme		**Evaluation Scheme**	
Lectures	4 Hrs/Week	Test	20 Marks
		Teacher Assessment	20 Marks
Total Credits	04	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.
Prerequisites: NIL

Course Description
This course will cover the mathematical topics most directly related to computer science. Topics included: logic, relations, functions, basic set theory, countability and counting arguments, proof techniques, mathematical induction, graph theory, combinatorics, discrete probability, recursion, recurrence relations, and number theory.

Course Objectives:
- To explain with examples the basic terminology of functions, relations, and sets.
- To perform the operations associated with sets, functions, and relations.
- To relate practical examples to the appropriate set, function, or relation model, and interpret the associated operations and terminology in context.
- To demonstrate basic counting principles, including uses of diagonalization and the pigeonhole principle.

Course Outcomes:
After completing this course students will be able to:
CO1: Define the fundamental discrete mathematical structures.(K1)
CO2:Identify and describe various types of relations.(K1)
CO3:Compute the number of solutions to several arrangement problems.(K2)
CO4:Analyze simple algorithms and identify values of variables at various stages of completion.(K3)
CO5:Combine definitions and results produced in class to create rigorous proofs of basic statements about discrete mathematical structures.(K3)

Unit 1 Set, Relations and Functions
Combination of sets, finite and infinite sets, unaccountably infinite sets, mathematical induction, multisets, Properties of Binary Relations, Equivalence relation and partitions, Partial ordering Relations and Lattices. Chain and Antichains, A Job-Scheduling problem, Functions and Pigeonhole principles

Unit 2 Discrete Numerical Functions and Recurrence Relations
Manipulation and Numerical Functions, Asymptotic behavior, Generating functions and Combinatorial Problems, Recurrence relations, Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular Solutions, Total Solutions, Solutions by the method of generating

functions.

Unit 3 Groups,

Introduction to Algebraic structures, Groups, Sub groups, Generators and Evaluation of powers, Cosets and Lagrange's Theorem, Permutation Group, Isomorphism and Automorphism, Homomorphism, Normal subgroup.

Unit 4 Rings and Fields

Rings, integral domains and fields. Ring Homomorphisms, polynomial rings and cyclic codes.

Unit 5 Z-transform

Z- transform- definition and properties, Z- transform of elementary functions, Inverse Z- transform- definition and properties, Inverse Z-transform, Application to difference equation.

TEXT BOOKS:

1. C.L.Liu, "Elements of Discrete Mathematics", Tata McGraw-Hill Publication
2. B.K.Kolman,R.C.Busby and S.Ross, "Discrete Mathematical Structures", PHI
3. Trembley, Manohar, "Discrete mathematical Structures with Application to Computer Science", McGraw Hill Publication
4. B.S.Grewal, Higher Engineering Mathematics, KhannaPublication,New Delhi.

REFERENCE BOOKS:

1. Rm. Somasundaram, "Discrete Mathematical Structures", Prentice-Hall of India Pvt. Limited, 2004
2. Johnsonbaugh, "Discrete Mathematics", Pearson Education India, 2007.
3. K.D.Joshi, Foundations of Discrete Mathematics, Wiley eastern.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H											
CO2	M	H							L			
CO3	H	H	M									
CO4	H	H										
CO5	M	H						L				

H – High M – Medium L - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following

1) Question answer based Theoretical Assignment
2) Problem Solving Assignment
3) Power point presentation
4) Class room Question & answer
5) Overall approach towards learning, creativity.

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	10	05	35
K2	Understand	10	05	10
K3	Apply	00	10	15
K4	Analyze	00	00	00
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		**20**	**20**	**60**

Assessment table

Assessment Tool	K1	K1	K2	K3	K3
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	05	10	00	00
Teachers Assessment (20 Marks)	05	00	05	05	05
ESE Assessment (60 Marks)	15	20	10	05	10

Special Instructions if any: Nil

Designed by

- Mr. Nouman Pathan
- Mrs. Meghana B. Nagori
- Mrs. Pallavi V. Kulkarni

CS252 Object Oriented Programming

Teaching Scheme		Evaluation Scheme	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Prerequisites: CS244:Programming Language

Course Description: This course presents a conceptual and practical introduction to imperative and object oriented programming, exemplified by Java. As well as providing grounding in the use of Java, the course will cover general principles of programming in object oriented frameworks. This course introduces concepts like Exception handling, interfaces & multithreading which provides real time programming approach in object oriented programming.

Course Objectives:

- To identify issues related to the definition, creation and usage of classes, objects and methods.
- To discuss the principles of inheritance and polymorphism and demonstrate through problem analysis assignments how they relate to the design of methods, abstract classes and interfaces.
- To provide the foundation of good programming skills by discussing key issues to the design of object-oriented software, including programming design patterns.

Course Outcomes:

After completion of this course students will be able to:

CO1: Define the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading. K1

CO2: Identify classes, objects, members of a class and the relationships among them needed for a specific problem.K2

CO3:Use OOP concepts like inheritance, Interface & package in real time situations.K3

CO4: Identify situations for exceptions and multithreading &incorporate in program.K2

CO5: Develop Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, multithreading, error exception handling)K3

Detailed Syllabus:

UNIT 1	**Introduction :** Difference between OOP and other conventional programming – advantages and disadvantages. An overview of OOP concepts: Class, object, message passing, inheritance, encapsulation, polymorphism. Importance of Java in the internet, Java applets and applications, security, portability, the byte code. An overview of Java, OOP, Two paradigms, abstraction, the three OOP Principles. **Data Types, Variable and arrays :** Simple types, integers, floating point types, characters, Booleans, variables – declaring variable, dynamic initialization, the scope and life time of variables, type conversion and casting, arrays-one dimensional arrays and multi dimensional arrays. **Operators and control statements :**	

	Arithmetic operators, bitwise operators, relational operators, logical operators,assignment operators, ternary operators, operator precedence. Control statements – if, switch, while, do-while, for nested loops, break, continue. All with examples.	
Unit 2	**Classes and Object:** Class fundamentals, declaring objects, assigning object references variables, introducingmethods, constructors, overloading method, using objects as parameters, argumentpassing, returning objects, recursion, use of static and final key word, nested and innerclass, using command line arguments. Operator Overloading, Friend Function	
Unit 3	**Inheritance & reusability** Inheritance – basics, using super, creating a multi-level hierarchy, when constructor are called, method overriding, dynamic method dispatch, using abstract classes, using final with inheritance, Wrapper classes. packages, defining a package, use of CLASSPATH, package example, access Protection, importing packages, Interfaces – defining an interface, implementing interfaces, applying interfaces, variables in interfaces, extending interfaces.	
Unit 4	**Exception Handling & Multithreading :** Fundamentals, exception types, uncaught exception, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, Java's built in exception, creating exception subclasses, using exception. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, interthread communication, deadlocks for threads, suspending & resuming threads.	
Unit 5	**Input/Output :** Java I/O classes and Interfaces, File – directories, using filename filter, the stream classes, the byte streams-input stream, output stream, file input stream, file output stream, byte array in put stream, byte array output stream, random access files. The character streams-Reader, Writer, FileReader, FileWriter, char ArrayReader, CharArrayWriter, BufferedReader, BufferedWriter. Serialization, Serialiabel, Externalizable, Object Output,Object Output Stream, Object Input, Object Input Stream.	

TEXT BOOKS:

1. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" – TMH
2. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed.2000 – TMH

REFERENCE BOOK:

1. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson
2. Aaron Walsh and John Fronckowiak, " Java Programming Bible",IDG Books, 1st Edition, 2000, India.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		M	M		H			H			H	
CO1		M	M									
CO2		M	M									
CO3		M	M									
CO4		M	M									
CO5					H			H			H	

H – High M – Medium L - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following

1) Question answer based Theoretical Assignment
2) " Think More Write Less" Based (observation based) Assignment
3) Power point presentation of Topic which is related but out of syllabus
4) Class room Question & answer
5) Overall approach towards learning, creativity.

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	10	05	15
K2	Understand	10	10	25
K3	Apply	00	05	20
K4	Analyze	00	00	00
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K3	K2	K3
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	10	10	00	00	00
Teachers Assessment (20 Marks)	05	00	00	10	05
ESE Assessment (60 Marks)	15	20	10	05	10

Special Instructions if any: Nil

Designed by

- Mrs. Pallavi V.Kulkarni
- Mrs. Meghana B. Nagori
- Mr. Nitin Dhutraj

CS253 : Database Management System

Teaching Scheme		Evaluation Scheme	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorial	1 Hr/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.
Prerequisites: Data Structures

Course Educational Objectives:

- To have knowledge of DBMS.
- To familiarize with basic database storage structures and access techniques: file and page organizations, indexing methods including B-tree, and hashing
- To master the basics of query evaluation techniques and and query optimization.
- To familiarize with the basic issues of transaction processing, concurrency control.
- To identify the need behind object databases.

Course Outcomes :

After completion of this course students will be able to:

CO1:Identify the information that is needed to design a database management system
CO2: Design conceptual and logical database models for various problems.
CO3: Build a database management system that satisfies relational theory and provides users with queries, forms, and reports.
CO4: Awareness of the core terms, concepts, and tools of relational database management systems.
CO5: Work in teams and utilize effective group techniques to manage a complex project.

Detailed Syllabus:

UNIT 1	Characteristics of Database approach, Advantages of using DBMS approach, Data models, schemas and instances; Three-schema architecture and data independence, Entity-Relationship ModelEntity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two, Enhanced Entity-Relationship and Object Modeling**,** Subclasses, Super classes, and Inheritance, Specialization and Generalization ,constraints, languages, design, and programming.	
Unit 2	Relational Database Design Using ER-to-Relational Mapping, Mapping, EER Model Constructs to Relations ,SQL Data Definition and Data Types, Specifying Basic Constraints in SQL, schema Change Statements in SQL, Basic Queries in SQL, more Complex SQL Queries Insert, Delete, and Update Statements in SQL, Additional Features of SQL, Views, Indexing	
Unit 3	Functional Dependencies and Normalization for Relational Databases: Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form , Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Formclasses.	

Unit 4	Disk Storage, Basic File Structures, and Hashing: Secondary Storage Devices, Buffering of Blocks, Placing File Records on Disk, Operations on Files, Hashing Techniques, Indexing Structures for Files, Single-Level Ordered Indexes ,Multilevel Indexes, Dynamic Multilevel Indexes Using B-Trees and B+-Trees ,Introduction to Query Processing and Optimization	
Unit 5	Desirable Properties of Transactions, serial, non -serial and conflict-serializable schedules, uses of Serializability, Concurrency Control Techniques :Two-Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Database Recovery Techniques	

TEXT BOOKS:

1. Elmasri,Navathe, "Fundamentals of Database Systems", Addison-Wesley ,Sixth Edition
2. AviSilberschatz , Henry F. Korth , and S. Sudarshan, "Database System Concepts, McGraw-Hill, Sixth edition"

REFERENCE BOOK:

1.Raghu Ramakrishnan, Johannes Gehrke,"Database Management Systems", McGraw-Hill ,Third Edition

2.Thomas M. Connolly, Carolyn E. Begg, "Database Systems: A Practical Approach to Design, Implementation and Management", Addison Wesley,fifth Edition

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				H								
CO2	H											
CO3				M						H		
CO4	H											
CO5												

H – High M – Medium L - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on thefollowing :-

1) Assignment
2) PowerpointPresentation
3) Quiz/Multiple choice questions test

Assessment Pattern

Assessment Pattern	Knowledge Level	Test	Teachers Assessment/	End Semester Examination

Level No.			**Assignment**	
K1	Remember	10	05	20
K2	Understand	10	05	20
K3	Apply	00	05	10
K4	Analyze	00	05	10
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K3	K4
	CO1	CO2,CO3	CO4	CO5
Class Test (20 Marks)	10	10		
Teachers Assessment (20 Marks)	05	05	05	05
ESE Assessment (60 Marks)	20	20	10	10

Special Instructions if any: Nil

Designed by

- Mr. Vivek Kshirsagar
- Mrs. Meghana B. Nagori
- Mrs. Pallavi V. Kulkarni

CS258 Enterprise Information System

Teaching Scheme		Evaluation Scheme	
Lectures	3 Hrs/Week	Test	20 Marks
		Teacher Assessment	20 Marks
Total Credits	3	End-Semester Examination	60 Marks

Total Hours required for this course: 45 Hours.

Prerequisites: NIL

Course Description:

This course describes importance of information management, various strategies to manage information for an Enterprise. This course also describes methods for defining, describing and specifying various processes and their execution and testing techniques.

Course Objectives:

- Discuss the terminologies of Information Management System.
- Demonstrate Information Management System for Enterprises.
- Develop solutions for designing IMS.
- Discuss the techniques to analyze , test IMS.

Course Outcomes:

After completion of this course students will be able to:

CO1: Describe an Information Management System.(K1)

CO2: Illustrate strategies to gather information, analyze it and specify requirements for a system.(K2)

CO3: Construct & evaluate solutions for decided Goal and construct DFD's.(K3)

CO4: Optimize the process via decision table by correcting errors and eliminating redundancy.(K3)

CO5: List & Explain various standards for security of information system. (K1)

Detailed Syllabus

UNIT 1 Information and Management

Types of information, why do we need a computer based information system? Management structure, Management and information requirements, qualities of information.

Examples of Information Systems

Various functions in organizations, Information processing for a store- An overview, Varieties of information systems.

Information Systems Analysis & Design Overview:

Overview of design of an information system. The role and tasks of a systems analysts, Attributes of a systems analyst, Tools used by system analyst, System Development Life Cycle

Unit 2 Information Gathering

Strategy to gather information, Information sources, Methods of searching for

information, Interviewing techniques, Questionnaires, Other methods of information search, Case example-Hostel information system.
System Requirements Specification:
System requirements specification: Example, Data dictionary, Steps in Systems Analysis, Modularizing requirements specifications, Conclusions.

Unit 3 **Feasibility Analysis, Data flow diagrams:**
Deciding on project goals, Examining alternative solutions, Evaluating proposed solution, Cost-benefit analysis, Payback period, Feasibility report, System proposal. Symbols used in DFD's Describing a system with a DFD, Good conventions in developing DFDs Leveling of DFDs, Logical and Physical DFDs. Process Specifications - Process specification methods, structured English Some examples of process specification.

Unit 4 **Decision Making**
Decision table terminology and development, Extended entry decision tables, Establishing the logical correctness of decision tables, Use of Karnaugh maps to detect logical errors in decision tables, Eliminating redundant specifications.

Unit 5 Control, audit and security of information systems
Review of following standards – CMM, ISO 17799, ISO 27001, BS 7799

TEXT BOOKS

1. Kennth C. Laudon, Jane P. Laudon," Management Information Systems **"**, 9th Ed. Pearson

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
			M					M				M
CO1			M									
CO2			H									
CO3			H									
CO4			H									L
CO5								H				

H – High M – Medium L - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following

1) Question answer based Theoretical Assignment
2) " Think More Write Less" Based (observation based) Assignment

3) Power point presentation of Topic which is related but out of syllabus
4) Class room Question & answer
5) Overall approach towards learning, creativity.

Assessment Pattern

Assessment Pattern Level No.	**Knowledge Level**	**Test**	**Teachers Assessment/ Assignment**	**End Semester Examination**
K1	Remember	10	05	25
K2	Understand	10	00	20
K3	Apply	00	15	15
K4	Analyze	00	00	00
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K3	K3	K1
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	10	10	00	00	00
Teachers Assessment (20 Marks)	00	00	05	10	05
ESE Assessment (60 Marks)	15	20	10	05	10

Special Instructions if any: Nil

Designed by

CS259 Business Economics

Teaching Scheme		Evaluation Scheme	
Lectures	3 Hrs/Week	Test	20 Marks
		Teacher Assessment	20 Marks
Total Credits	3	End-Semester Examination	60 Marks

Total Hours required for this course: 45 Hours.

Prerequisites: NIL

Course Description:

This course gives introduction to economic analysis, with an emphasis on firms and their operating environment. Pricing and output decisions and cost and profit determination in competitive, imperfectly competitive and monopolistic markets.

Course Objectives:

The objective of this course is to help students learn and understand Economics concepts and principles and to apply them to a variety of economic situations.

Course Outcomes:

After completion of this course students will be able to:

- Apply "supply and demand analysis" to relevant economic issues;
- Apply marginal analysis to the "firm" under different market conditions
- Analyze the causes and consequences of different market structures
- Apply economic models to examine current economic issues and evaluate policy options for addressing these issues;
- Analyze the causes and effects of changes in real GDP

UNIT 1	**BASIC CONCEPTS** Positive and normative economics; constructing a model, scientific method; concepts of opportunity cost, rate of growth, elasticity, and of total, average and marginal functions. **FACTOR MARKETS** Factor pricing in the case of single and many variable factors; demand for Labor in a product market with perfect competition and monopoly. Monophony, bilateral monopoly and role of Labour unions. Economic rent and quasi rent.	
Unit 2	**CONSUMER DEMAND** Cardinal theory: derivation of demand in case of one or more goods; Ordinal theory: Budget sets and Preferences under different situations. Indifference curves and the rate and elasticity of substitution. Consumer equilibrium; effects of change in prices and income; Engels curve. Derivation of demand curve. Income and substitution effects. Market demand: elasticity, shifts and movement; inverse demand function. Revenue and Expenditure, elasticity and marginal revenue; income elasticity of demand; consumer surplus.	
Unit 3	**PRODUCTION**	

	Production functions: single variable – average and marginal product, variable proportions, stages of production. Two variables – isoquants, returns to scale and to a factor; factor prices; cost minimisation and output maximization; Elasticity of substitution. Expansion path and the cost function.	
Unit 4	**COST** Concept of economic cost; Short run and long run cost curves; increasing and decreasing cost industries; envelope curve; L-shaped cost curves; economies of scale.**Prices as parameters**:Firm equilibrium and profit; short and long-run supply function; taxes and subsidies.	
Unit 5	**MARKETS** Perfect competition: Equilibrium of the market. Long run industry supply; producer and consumer surplus; effects of taxes and subsidies.	

TEXT BOOKS:

1. Varian, Hal R.: Intermediate Microeconomics, Sixth edition
2. Bernheim, B. Douglas &Whinston, Michael D.: Microeconomics ,TMH, 2009
3. Dr. Jaswinder Singh ,Managerial Economics, dreamtech

REFERENCE BOOKS:

1. Pindyck, Robert S. &Rubinfeld, Daniel L.: Microeconomics, Sixth Edition, PHI
2. Browning, Edgar K. &Zupan,: Microeconomic Theory and Applications

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
			M					M				M
CO1			M									
CO2			H									
CO3			H									
CO4			H									L
CO5								H				

H – High M – Medium L - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following

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K1	Remember	10	05	25
K2	Understand	10	00	20
K3	Apply	00	15	15
K4	Analyze	00	00	00
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K3	K3	K1
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	10	10	00	00	00
Teachers Assessment (20 Marks)	00	00	05	10	05
ESE Assessment (60 Marks)	15	20	10	05	10

Special Instructions if any: Nil

Designed by

CS 254 –Lab: Data Structures

Teaching Scheme		**Evaluation Scheme**	
Practical	2 Hrs/Week	Team Work	25 Marks
Credits	1	Practical/Viva-voce	25 Marks

Total Hours required for this practical course: 30 Hours.
Prerequisites: Lab Programming Language

Course Outcomes:

After Completing the course students will be able to:

CO1: Use basic data structures
CO2:Apply data structure for solving simple mathematical problems
CO3:Implement complex data structures like trees &graphs .
CO4: Implement basic searching & sorting methods.
CO5:Awareness to some real –world applications

Assignments should be completed which will be based on the subject and record for the same shall be submitted

1. Write a program for implementing Stack and Queue.
2. Implement a program on applications of stacks Tower of Hanoi/Infix to prefix expression.
3. Write a program for Singly Linked List and Doubly Linked List.
4. Write a program for Circular Queue using Linked List.
5. Write a program for Creation of Binary Tree and operations on it.
6. Write a program for Creation of Binary Threaded Tree.
7. Write a program for Depth First search and Breadth First search.
8. Write a program for Bubble Sort and Bucket Sort.
9. Write a program for Merge Sort and Heap Sort.
10. Write a program for Insertion Sort and Quick sort.
11. Implement a program for sorting students roll nos(name etc)/searching for a roll no(name etc)
12. Write a program for Binary Search to search an element in the given sequence.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1	M											
CO2		M	M									
CO3		M	M									
CO4		M	M									
CO5				M				M				L

H – High M – Medium L – Low

Assessment Table

Assessment Tool	S1	S2	S3	S3
	CO1	CO2	CO3	CO4
Term Work (25 Marks)	04	10	05	06
Practical Examination & Viva Voce (25 Marks)	03	08	07	07

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	04	03
S2	Manipulation	10	08
S3	Precision	11	14
S4	Articulation	00	00
S5	Naturalization	00	00
Total		25	25

Preparation (S1)	04	03
Conduct of Experiment (S2)	06	06
Observation and Analysis of Results (S3)	06	06
Record (S2)	04	02
Viva-Voce (S3)	05	08
Total	**25**	**25**

Special Instructions if any: Nil

Designed by

- Mr. Nitin Dhutraj
- Mrs. Meghana B. Nagori
- Mrs. Pallavi V. Kulkarni

CS 255 Lab Discrete Mathematical Structure

Teaching Scheme		**Evaluation Scheme**	
Practical	2 Hrs/Week	Team Work	25 Marks
Credits	1	Practical/Viva-voce	25 Marks

Prerequisites:CS247: Lab Programming Language
Total Hours required for this practical course: 30 Hours.
Laboratory Course Outcome:
After completion of this course student will be able to
CO1: Demonstrate set operations implement formulae on set properties.
CO2: Apply DMS concepts to solve Computer based problems.
CO3: Implement different mathematical techniques &Theorems.

Suggestive list of programs.

1. Explore various set operations(union,intersection,diff,add ,subsets etc)
2. Develop a formula that relates the number of subsets and the number of permutations that can be formed from n distinct objects.
3. Implement a C Program to demonstrate properties of binary relations
4. Design & implement a Program in C on Job scheduling problem
5. Implement Linear search & write recurrence relation
6. Write recursive program to implement merge sort and write recurrence relation
7. Write a program on combinatorial problems(for eg generating all 2-element and 3-element from a given set)
8. Write a program on polynomial rings and cyclic code
9. Implement Lagrange's Theorems
10. Implementing various recursive techniques
11. Implement Program on generating function

Mapping of Course outcome with Program Outcomes

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1		H	H									
CO2		H	H									
CO3		H	H									

H – High M – Medium L - Low

Assessment Table

Assessment Tool	S1	S2	S3
	CO1	CO2	CO3

Term Work (25 Marks)	10	10	05
Practical Examination & Viva Voce (25 Marks)	10	10	05

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	10	10
S2	Manipulation	10	10
S3	Precision	05	05
S4	Articulation	00	00
S5	Naturalization	00	00
Total		25	25

Preparation (S1)	02	02
Conduct of Experiment (S2)	10	10
Observation and Analysis of Results (S3)	05	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	05	05
Total	**25**	**25**

Special Instructions if any: Nil

Designed by

- Mr. Nouman Pathan
- Mrs. Meghana B. Nagori
- Mrs.Pallavi V. Kulkarni

CS 256 Lab: Object Oriented Programming

Teaching Scheme		**Evaluation Scheme**	
Practical	2 Hrs/Week	Team Work	25 Marks
Credits	1	Practical /Viva-voce	25 Marks

Total Hours required for this practical course: 30 Hours.

Prerequisites:CS247: Lab Programming Language

Laboratory Course Outcome:

After completion of this course student will be able to

CO1: Execute JAVA programs based on simple constructs like arrays,loops , decision statements, functions etc

CO2: Incorporate object oriented concepts like classes , objects , inheritance , polymorphism resembling real time situation.

CO3: Demonstrate the use of packages and interfaces.

CO4: Develop OOP programs containing User created Exception handling & Threading.

CO5: Familiarize with Java development Environment such as Eclipse, NetBeans etc.

Suggestive list of programs.

1. Demonstrate the installation of JAVA with necessary path settings & Execute " Hello World " Program.
2. Execute simple program based on basic syntactical constructs of java like :
   a. Operators and Expression.
   b. Looping Statements.
   c. Decision making statements.
3. Construct & Execute a Java Program to define a class, describe its constructors, overload the constructors and instantiated its object.
4. Implement inheritance by applying various access controls to its data members and methods. Demonstrate use of method overriding.
5. Demonstrate use of implementing interfaces.
6. Implement Package and Sub-Packages.
7. Write a program to implement Wrapper classes and their methods.
8. Demonstrate use of I/O stream.
9. Implement the concept Exception Handling using predefined exception by creating user defined exception.
10. Implement the concept of multi threading.
11. Demonstrate database connectivity and add, delete, update and retrieve records from database using JDBC.
12. Design Applet to display a message in the Applet for configuring

Applets by passing parameters.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1		H	H									
CO2		H	H									
CO3		H	H									
CO4		H	H									
CO5		H	H									

H – High M – Medium L - Low

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	07	07	05	03	03
Practical Examination & Viva Voce (25 Marks)	05	05	05	05	05

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	05	05
S2	Manipulation	08	10
S3	Precision	12	10
S4	Articulation	00	00
S5	Naturalization	00	00
Total		25	25

Preparation (S1)	04	05
Conduct of Experiment (S2)	04	07
Observation and Analysis of Results (S3)	08	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	06	05
Total	**25**	**25**

Special Instructions if any: Nil

Designed by

- Mrs. Pallavi V.Kulkarni
- Mrs. Meghana B. Nagori
- Mr. Nitin Dhutraj

CS257: Lab Database Management System

Teaching Scheme		**Evaluation Scheme**	
Practical	2 Hrs/Week	Team Work	25 Marks
Credits	1	Practical /Viva-voce	25 Marks

Total Hours required for this practical course: 30 Hours.
Prerequisites:

Laboratory Course Outcome:
After completion of this course student will be able to

CO1:Know the scope of SQL and use it to query,update and manage a database
CO2:Use PL/SQL
CO3:Identify functions of database administrator.
CO4:Demonstrate competence with advanced functions.
CO5:Design and build a simple database management system.

Suggestive list of experiments:-

1) To execute all the Basic DDL (Data Definition language) commands (i.e. Create, Alter, Drop, and Truncate) with example.
2) To execute all the Basic DML (Data Manipulation language) commands (i.e. Insert, Select, Update, and Delete) with example.
3) To Execute the Database Functions (i.e. Numeric, Date, Group, Character, and count function) with example.
4) To Execute the join Commands (i.e. Cartesian product, natural join, Inner join, left outer join, right outer join, equi join, non- equi join, and full join).
5) Implement the Program for Arithmetic operations (like addition, Subtraction, Multiplication and Division)' using PL/SQL (programming language in SQL).
6) Implement the concept for cursors in PL/SQL and demonstrate competence for loop constructs
7) To implement the program for updating the values using cursor.
8) To implement the Concept of Views and Sql Sub-Queries.
9) Mini-Project

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										H		

CO2										M		
CO3										M		
CO4									M			
CO5					L	H		M		M	H	

H – High M – Medium L - Low

Assessment Table

Assessment Tool	S1	S2	S3	S4	S5
	CO1,CO2,CO3	CO4	CO5		
Term Work (25 Marks)					
Practical Examination & Viva Voce (25 Marks)					

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	10	10
S2	Manipulation	05	05
S3	Precision	10	10
S4	Articulation	00	00
S5	Naturalization	00	00
Total		25	25

Preparation (S1)	05	00
Conduct of Experiment (S2)	05	06
Observation and Analysis of Results (S3)	00	10
Record (S3)	05	09
Mini-Project / Presentation/ Viva-Voce (S3)	10	10
Total	**25**	**25**

Special Instructions if any: Nil

Designed by

- Mr.Vivek Kshirsagar
- Mrs. Meghana B. Nagori
- Mrs. Pallavi V. Kulkarni