

# **RCC INSTITUTE OF INFORMATION TECHNOLOGY**

Department of Information Technology



COURSE BOOKLET

B.TECH (IT)

[CURRICULUM (2010-2011)]

# **RCC INSTITUTE OF INFORMATION TECHNOLOGY**

Approved by AICTE, New Delhi and Affiliated to MAKAUT, W.B.

An ISO 9001 -2008 & ISO 14001 – 2004 Certified Institute

A Unit of RCC Institute of Technology an autonomous Society  
of Department of Higher Education, Govt. of West Bengal.



## **COURSE BOOKLET**

### **B.TECH (IT) [CURRICULUM (2010-2011)]**

## **DEPARTMENT OF INFORMATION TECHNOLOGY**

**RCC INSTITUTE OF INFORMATION TECHNOLOGY**  
**CANAL SOUTH ROAD, BELIAGHATA, KOLKATA- 700015, WEST BENGAL.**



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**RCC INSTITUTE OF INFORMATION TECHNOLOGY**  
Canal South Road, Beliaghata, Kolkata- 70015  
College Code: 117  
(Affiliated to Maulana Abul Kalam Azad University of Technology, W.B)

# **P23: Mapping of Course Outcomes with Program Outcomes**



# Department of Information Technology

## Vision

To empower students to become pacesetters in the industry or academia for ethically promoting and nurturing Information Technology based solutions addressing multidisciplinary needs of the society towards sustainable development.

## Mission

To groom the students to:

- M1.** Be able to develop effective solution, in different settings and capacity, by analyzing various problems cross cutting multiple domains through emphasis on the basic concepts of engineering and customized application of Information Technology.
- M2.** Be devoted for lifelong learning for adapting to modern tools and to engage in research and innovation on complex problems to meet societal and environmental needs.
- M3.** Be able to apply leadership qualities and professional ethics to work in a team with effective communication and interpersonal skills for designing economically feasible applications.

## Program Outcomes (PO)

[defined by NBA]

Engineering Graduates will be able to:

- PO-1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO-2. Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO-3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO-4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO-5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO-6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO-7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO-8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO-9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO-10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO-11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO-12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### Correlation between Mission and POs

Mission	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M1	√	√	√		√				√			
M2				√	√	√	√					√
M3								√	√	√	√	

## Program Educational Objective (PEO)



- PEO-1.** To learn core engineering principles for developing analytical and problem-solving skills for designing and using various applications of Information Technology.
- PEO-2.** To communicate and interact with external community and peer team members to understand and address different issues and challenges of environment, society and individual through applications of Information Technology and professional management skills.
- PEO-3.** To undertake research and development in frontiers of Information Technology through lifelong learning.
- PEO-4.** To become a professional with positive attitude, leadership skills, moral values and ethics.

<b>Correlation between Mission and PEOs</b>				
<b>Mission</b>	<b>PEO1</b>	<b>PEO2</b>	<b>PEO3</b>	<b>PEO4</b>
<b>M1</b>	<i>Strong</i>	<i>Strong</i>	<i>Weak</i>	<i>Weak</i>
<b>M2</b>	<i>Medium</i>	<i>Medium</i>	<i>Strong</i>	<i>Weak</i>
<b>M3</b>	<i>Weak</i>	<i>Strong</i>	<i>Weak</i>	<i>Strong</i>

### **Program Specific Outcomes (PSO)**

- PSO-1.** Ability to develop smart programming skills through comprehensive understanding of analytical and logical concepts and algorithms.
- PSO-2.** Ability to investigate social, environmental, ethical and economic feasibility of an IT solution to a complex/ composite problem in terms of long-term impact and sustainability of every intricate application.
- PSO-3.** Ability to keep pace with fast changing technology like Machine Learning, Cloud Computing, IOT, Pattern Recognition and adapt to new tools, systems& applications and manage challenging IT projects.



## B. TECH (IT) CURRICULUM (2010-2011)

### FIRST YEAR

#### SEMESTER-I

<b>A. THEORY</b>							
Sl. No.	Field	Theory	Contact Hours/Week				Credit Points
			L	T	P	Total	
1	HU101	ENGLISH LANGUAGE & TECHNICAL COMMUNICATION	2	0	0	2	2
2	PH101/ CH101	Chemistry -1 (Gr-B) / Physics – 1 (Gr-A)	3	1	0	4	4
3	M101	Mathematics-1	3	1	0	4	4
4	ES101	Basic Electrical & Electronic Engineering – 1 (GrA+GrB)	3	1	0	4	4
5	ME101	Engg. Mechanics	3	1	0	4	4
<b>Total of Theory</b>						<b>18</b>	<b>18</b>
<b>B. PRACTICAL</b>							
6	PH191/ CH191	Chemistry -1 (Gr-B)/ Physics – 1 (Gr-A)	0	0	3	3	2
7	ES191	Basic Electrical & Electronic Engineering -1	0	0	3	3	2
8	ME191 /192	Engg Drawing & Computer Graphics (Gr-B) / Workshop Practice (Gr-A)	1	0	3	4	3
<b>Total of Practical</b>						<b>10</b>	<b>7</b>
<b>C. SESSIONAL</b>							
9	HU181	Language Laboratory	0	0	2	2	1
10	XC181	Extra Curricular Activities(NSS/NCC/NSO etc)	0	0	2	2	1
<b>Total of Sessional</b>						<b>4</b>	<b>2</b>
<b>Total of Semester</b>						<b>32</b>	<b>27</b>



**SEMESTER-II**

<b>A. THEORY</b>							
Sl. No.	Field	Theory	Contact Hours/Week				Credit Points
			L	T	P	Total	
1	CS201	Basic Computation & Principles of Computer Programming	3	1	0	4	4
2	PH201/ CH201	Physics - 1(Gr-B) / Chemistry-1(Gr-A)	3	1	0	4	4
3	M201	Mathematics-2	3	1	0	4	4
4	ES201	Basic Electrical & Electronic Engineering-II	3	1	0	4	4
5	ME201	Engineering Thermodynamics & Fluid Mechanics	3	1	0	4	4
<b>Total of Theory</b>						<b>20</b>	<b>20</b>
<b>B. PRACTICAL</b>							
7	CS291	Basic Computation & Principles of Computer Programming	0	0	3	3	2
8	PH291/ CH291	Physics – 1 (Gr-B) /Chemistry-1 (Gr-A)	0	0	3	3	2
9	ES291	Basic Electrical & Electronic Engineering- II	0	0	3	3	2
10	ME291/ 292	Workshop Practice (Gr-B) / Basic Engg Drawing & Computer Graphics (Gr-A)	1	0	3	4	3
<b>Total of Practical</b>						<b>13</b>	<b>9</b>
<b>Total of Semester</b>						<b>32</b>	<b>29</b>

	<b>Group-A</b>	<b>Group-B</b>
<b>1<sup>st</sup> Sem</b>	Physics-I; Workshop Practice	Chemistry –1; Engg Drawing & Computer Graphics
<b>2<sup>nd</sup> Sem</b>	Chemistry –1; Engg Drawing & Computer Graphics	Physics-I; Workshop Practice





**SECOND YEAR**

**SEMESTER-III**

<b>A. THEORY</b>							
Sl.No.	Field	Theory	Contact Hours/Week				Cr. Points
			L	T	P	Total	
1	HU301	Values & Ethics in Profession	3	0	0	3	3
2	PH301	Physics-2	3	1	0	4	4
3	CH301	Basic Environmental Engineering & Elementary Biology;	3	0	0	3	3
4	CS301	Analog & Digital Electronics	3	0	0	3	3
5	CS302	Data Structure & Algorithm	3	1	0	4	4
6	CS303	Computer Organisation	3	1	0	4	4
<b>Total of Theory</b>						<b>21</b>	<b>21</b>
<b>B. PRACTICAL</b>							
7	PH391	Physics-2	0	0	3	3	2
8	CS391	Analog & Digital Electronics	0	0	3	3	2
9	CS392	Data Structure & Algorithm	0	0	3	3	2
10	CS393	Computer Organisation	0	0	3	3	2
<b>Total of Practical</b>						<b>12</b>	<b>8</b>
<b>Total of Semester</b>						<b>33</b>	<b>29</b>

**SEMESTER-IV**

<b>A. THEORY</b>							
Sl.No.	Field	Theory	Contact Hours/Week				Cr. Points
			L	T	P	Total	
1	M(CS)401	Numerical Methods	2	1	0	3	2
2	M401	Mathematics-3	3	1	0	4	4
3	CS401	Communication Engg & Coding Theory	2	0	0	3	3
4	CS402	Formal Language & Automata Theory	3	1	0	4	4
5	IT401	Object Oriented Programming & UML	3	1	0	4	4
<b>Total of Theory</b>						<b>18</b>	<b>17</b>
<b>B. PRACTICAL</b>							
6	HU481	Technical Report Writing & Language Lab Practice	0	0	3	3	2
7	M(CS)491	Numerical Methods	0	0	2	2	1
8	CS491	Communication Engg & Coding Theory	0	0	3	3	2
9	CS492	Software Tools	0	0	3	3	2
10	IT491	Object Oriented Programming & UML (IT)	0	0	3	3	2
<b>Total of Practical</b>						<b>14</b>	<b>9</b>
<b>Total of Semester</b>						<b>32</b>	<b>26</b>



### THIRD YEAR

### SEMESTER-V

<b>A. THEORY</b>							
Sl.No	Field	Theory	Contact Hours/Week				Cr. Pts
			L	T	P	Total	
1	HU501	Economics for Engineers	3	0	0	3	3
2	IT501	Design & Analysis of Algorithm	3	1	0	4	4
3	IT502	Computer Architecture	3	1	0	4	4
4	IT503	Operating System	3	0	0	3	3
5	F. E.						
	IT504A	Circuit Theory & Network (EE)					
	IT504B	Data Communication (ECE)					
	IT504C	Digital Signal Processing (ECE)					
	IT504D	Operation Research (M)					
	IT504E	Microprocessors & Microcontrollers(CSE)	3	0/1	0	3/4	3/4
	IT504F	Programming Practices using C++					
<b>Total of Theory</b>						<b>17/18</b>	<b>17-18</b>
<b>B. PRACTICAL</b>							
6	IT591	Algorithm Lab	0	0	3	3	2
7	IT592	Computer Architecture	0	0	3	3	2
8	IT593	Operating System Lab	0	0	3	3	2
9	F.E.		0	0	3	3	2
	IT594A	A. Circuit Theory & Network (EE)					
	IT594B	B. Data Communication (ECE)					
	IT594C	C. Digital Signal Processing (ECE)					
	IT594D	D. Operation Research (M)					
	IT594E	E. Microprocessors & Microcontrollers(CSE)					
IT594F	F. Programming Practices using C++						
<b>Total of Practical</b>						<b>12</b>	<b>8</b>
<b>Total of Semester</b>						<b>29/30</b>	<b>25-26</b>



### SEMESTER-VI

A. THEORY							
SLNo.	Field	Theory	Contact Hours/Week				Cr. Pts
			L	T	P	Total	
1	HU601	Principles of Management	2	0	0	2	2
2	IT.601	Data Base Management System	3	0	0	3	3
3	IT602	Computer Networking	3	0	0	3	3
4	IT603	Software Engg	3	0	0	3	3
5	P.E. IT604A IT604B IT604C IT604D	Information Theory & Coding Computer Graphics Pattern Recognition ERP	3	0	0	3	3
6	F. E. IT605A IT605B IT605C IT605D	Discrete Mathematics (M) Human Resource Management (HSS) Compiler Design (CSE) Artificial Intelligence (CSE)	3	0/1	0	3/4	3/4
<b>Total of Theory</b>						<b>17/18</b>	<b>17-18</b>
B. PRACTICAL							
7	IT691	Data Base Management System	0	0	3	3	2
8	IT692	Lab	0	0	3	3	2
9	IT693	Computer Networking Software Engineering	0	0	3	3	2
10	IT681	Seminar	0	0	3	3	2
<b>Total of Practical</b>						<b>12</b>	<b>8</b>
<b>Total of Semester</b>						<b>29/30</b>	<b>25-26</b>



**FOURTH YEAR**

**SEMESTER-VII**

2.1.1.1.1. A. THEORY								
Sl. No.	Field	Theory	Contact Hours/Week				Cr. Pts	
			L	T	P	Total		
1	IT701	Internet Technology	3	0	0	3	3	
2	IT702	Multimedia	3	0	0	3	3	
3	IT703	A. E-Commerce B. Soft Computing C. Image Processing	3	0	0	3	3	
4	IT704	A. Distributed Operating System B. Cloud Computing C. Data Warehousing & Data Mining D. Sensor Networks E. Mobile Computing	3	0	0	3	3	
5	IT705	A. Bio Informatics (BI) B. Control System (EE) C. Modelling & Simulation (M) D. Microelectronics & VLSI Design(ECE) E. Advanced Data Communication & Coding	3	0	0	3	3	
<b>Total of Theory</b>						<b>15</b>	<b>15</b>	
<b>B. PRACTICAL</b>								
6	HU781	Group Discussion	0	0	3	3	2	
7	IT791	Internet Technology	0	0	3	3	2	
8	IT792	Multimedia	0	0	3	3	2	
9	IT793	A. E-Commerce B. Soft Computing C. Image Processing	0	0	3	3	2	
10	IT794	Industrial training	4 wks during 6 <sup>th</sup> -7 <sup>th</sup> Sem-break					2
11	IT795	Project-1				3	2	
<b>Total of Practical</b>						<b>15</b>	<b>12</b>	
<b>Total of Semester</b>						<b>30</b>	<b>27</b>	

**FOURTH YEAR**

**SEMESTER-VIII**

2.1.1.1.2. A. THEORY							
Sl. No.	Field	Theory	Contact Hours/Week				Cr. Pts
			L	T	P	Total	
1	HU801A HU801B	A. Organisational Behaviour B. Project Management	2	0	0	2	2
2	IT801	A. Advanced Computer Architecture B. Parallel Computing C. Natural Language Processing D. Cryptography & Network Security	3	0	0	3	3
3	IT802	A. Technology Management (HSS) B. Cyber Law & Security Policy (HSS) C. Optical Networking (ECE) D. Low Power Circuits & Systems (ECE) E. Business Analytics(CSE) F. Robotics(EE & ME)	3	0	0	3	3
<b>Total of Theory</b>						<b>8</b>	<b>8</b>
2.1.1.1.3. B. PRACTICAL							
4	IT891	Design Lab / Industrial problem related practical training	0	0	6	6	4
5	IT892	Project-2	0	0	12	12	6
6	IT893	Grand Viva					3
<b>Total of Practical</b>						<b>18</b>	<b>13</b>
<b>Total of Semester</b>						<b>26</b>	<b>21</b>



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## **CO Statements and Course Articulation Matrix for B. Tech. (IT) [Curriculum (2010-2011)]**

### **COURSE BOOKLET FOR B. TECH (IT) FIRST YEAR**



## SEMESTER – I THEORY

<b>Course Title: Mathematics –I</b>	<b>Code: M101</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 1<sup>st</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISITES: Higher Secondary Mathematics.**

**COURSE OBJECTIVE:**

- Understand different types of matrix, their eigen values and eigen vectors and rank which are essential for understanding of physical and engineering problems. In particular, apart from other uses eigen values and eigenvectors are particularly useful to determine natural frequencies (or eigen frequencies) of vibration, shapes of those vibrational modes and its stability. Understand transient nature of the physical world with the help of differential calculus, integral calculus, vector calculus as well as differential equation.
- Understand Mathematical tools such as successive derivate, series expansion of functions and evaluation of integrals by analytic techniques that are required for engineering problems and learn to reduce the computational complexity in problems of various engineering disciplines with the series expansion of functions. Understand the utility of integral transforms for solutions of circuit problems, control theories, data processing etc.
- Apply the knowledge to solve the real life problems prevalent in nature and physical world which comprises of several variables or attributes and identify extreme points of different surfaces of higher dimension and achieve skill on calculus of functions of several variables which are essential for engineering curriculums.
- Apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines through the application of different convergence tests and solve various problems of statics and dynamics related to engineering subjects by acquiring the knowledge of vector algebra and vector calculus.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
M-101.CO1	<b>Explain</b> with different types of Matrix, their determinants and different properties. Rank of a matrix and their applications in solving different algebraic system of equations.	Understanding (Level II)
M-101.CO2	<b>Examine</b> the existence of any system of linear algebraic equations and its possible solutions which can be used in all branches of mathematics and engineering sciences.	Analyzing (Level IV)
M-101.CO3	<b>Define</b> higher order differentiation of different types of functions.	Remembering (Level I)
M-101.CO4	<b>Demonstrate</b> of different functions in the form of infinite series and use of reduction formulae in the evaluation of integrals.	Understanding (Level II)
M-101.CO5	<b>Apply</b> knowledge of functions of several variables and their corresponding limit, continuity and differentiation.	Applying (Level III)
M-101.CO6	<b>Use</b> of vector algebra and vector calculus in the study of physical and engineering problems.	Applying (Level III)



**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	0	0	0	0	0	0	0	0	0	2	2	-
CO2	2	3	3	0	0	0	0	0	0	0	0	0	2	2	-
CO3	2	3	3	0	0	0	0	0	0	0	0	0	2	2	-
CO4	3	1	3	0	0	0	0	0	0	0	0	0	2	2	-
CO5	3	2	1	0	0	0	0	0	0	0	0	0	2	2	-
CO6	3	2	2	0	0	0	0	0	0	0	0	0	2	2	-
AVG.	2.67	2.33	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	0

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<p><b>Module-1</b></p> <p>Matrix : Determinant of a square matrix, Minors and Cofactors, Laplace’s method of expansion of a determinant, Product of two determinants, Adjoint of a determinant, Jacobi’s theorem on adjoint determinant. Some problems on the above topics. Singular and nonsingular matrices, Adjoint of a matrix, Inverse of a nonsingular matrix and its properties, orthogonal matrix and its properties, Trace of a matrix.</p> <p>Rank of a matrix and its determination using elementary row and column operations, Solution of simultaneous linear equations by matrix inversion method, Consistency and inconsistency of a system of homogeneous and inhomogeneous linear simultaneous equations and solution some standard examples. Eigen values and eigen vectors of a square matrix (of order 2 or 3), Eigen values of APTP, kA, AP-1P, Caley Hamilton theorem and its applications and solving some problems on Eigen values and Eigen vectors.</p>	9
2	<p><b>Module-2</b></p> <p>Successive differentiation: Higher order derivatives of a function of single variable, Leibnitz’s theorem statement only and its application, problems of the type of recurrence relations in derivatives of different orders and also to find (yn)0.</p> <p>Mean Value Theorems &amp; Expansion of Functions: Rolle’s theorem and its application, Mean Value theorems – Lagrange &amp; Cauchy and their application, Taylor’s theorem with Lagrange’s and Cauchy’s form of remainders and its application, Expansions of functions by Taylor’s and Maclaurin’s theorem. Maclaurin’s infinite series expansion of the functions: sin x, cosx, log(1+x), (a+x)<sup>n</sup>, n being an integer or a fraction (assuming that the remainder R<sub>n</sub> → 0 as n → ∞ in each case). Reduction formula: Reduction formulae both for indefinite and definite integrals of types ∫ sin<sup>m</sup> x dx, ∫ cos<sup>n</sup> x dx, ∫ sin<sup>m</sup> x cos<sup>n</sup> x dx, ∫ cos<sup>m</sup> x sin<sup>n</sup> x dx, ∫ dx/(x<sup>2</sup>+a<sup>2</sup>)<sup>n</sup>, where m,n are positive integers.</p>	9
3	<p><b>Module-3</b></p> <p>Calculus of Functions of Several Variables: Introduction to functions of several variables with examples, Knowledge of limit and continuity, Partial derivatives and related problems, Homogeneous functions and Euler’s theorem and related problems up to three variables, Chain rules, Differentiation of implicit functions. Total differentials and their related problems, Jacobians up to three variables and related problems, Maxima, minima and saddle points of functions and related problems, Concept of line integrals, Double and triple integrals.</p>	9





Unit	Content	Hrs./Unit
4	<b>Module-4</b> Infinite Series: Preliminary ideas of sequence, Infinite series and their convergence/divergence, Infinite series of positive terms, Tests for convergence: Comparison test, Cauchy's Root test, D' Alembert's Ratio test and Raabe's test (statements and related problems on these tests), Alternating series, Leibnitz's Test (statement, definition) illustrated by simple example, Absolute convergence and Conditional convergence.	5
5	<b>Module-5</b> Vector Algebra and Vector Calculus: Scalar and vector fields – definition and terminologies, dot and cross products, scalar and vector triple products and related problems, Equation of straight line, plane and sphere, Vector function of a scalar variable, Differentiation of a vector function, Scalar and vector point functions.	8

**RESOURCE:**

1. Higher Engineering Mathematics-Das & Pal
2. Engineering Mathematics-Kar & Karmakar
3. Engineering Mathematics-B.S. Grewal
4. Fundamental of Engineering Mathematics: Mukherjee & Bej

<b>Course Title: Physics-I</b>	<b>Code: PH101</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 1<sup>st</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** Basic Physics at 10+2 level.

**COURSE OBJECTIVE:**

- Once the student has successfully completed this course, he/she must be able to answer the following questions or perform/demonstrate the following:
- Knowledge on vector calculus. Theorems and applications of vector calculus. Computation of Line integral, Surface integral and Volume integral.
- Solving various kinds of problems related to Mechanics. Rigid body problems, harmonic oscillation related problems
- Solving different kinds of problems related to diffraction and polarization
- Differentiate between different types of light spectrum like single slit, double slit and plane transmission grating
- Solving various kinds of problems related to LASER
- Applying different application of LASER in daily day life of modern society
- Maxwell's equations and characteristics of time varying electromagnetic field.
- Derivation of wave equation for plane progressive electromagnetic wave and the properties of EM waves in different medium when the medium is perfect dielectric, perfect conductor or free space.



- Pointing vector and pointing theorem related to the flow of electromagnetic energy.
- Properties of different kinds of magnetic materials and their application, characteristic of para, ferro and dia magnetic substances
- Basic concept of Quantum mechanics
- Solving various kinds of quantum mechanical problems using Schrödinger Wave equation.
- Important application of Wave-Particle Duality in quantum mechanics.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
PH101.CO1	Apply basic concepts of mechanics	Applying (Level III)
PH101.CO2	Discuss Physical optics and study principles of lasers with applications	Creating (Level VI)
PH101.CO3	Categorize di electric and magnetic properties of materials	Analyzing(Level IV)
PH101.CO4	Analyze Electromagnetic laws in Engineering	Analyzing(Level IV)
PH101.CO5	Distinguish between Classical Physics and Quantum Physics by introducing Planck's law	Analyzing(Level IV)
PH101.CO6	Apply wave particle duality in real life problems followed by simple quantum mechanics calculations	Applying (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	1	3	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	2	-	-
CO4	1	3	2	-	-	-	-	-	-	-	-	-	2	-	-
CO5	1	3	2	0	-	-	-	-	-	-	-	-	2	-	-
CO6	-	1	3	2	-	-	-	-	-	-	-	-	2	-	-
<b>AVG.</b>	<b>1.80</b>	<b>2.33</b>	<b>1.83</b>	<b>1.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2.00</b>	<b>0</b>	<b>0</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hours
1	<b>Mechanics:</b> Problems including constraints & friction. Basic ideas of vector calculus and partial differential equations. Potential energy function $F = -\text{grad } V$ , equipotential surfaces and meaning of gradient. Conservative and non-conservative forces. Conservation laws of energy & momentum. Non-inertial frames of reference. Harmonic oscillator; Damped harmonic motion forced oscillations and resonance. Motion of a rigid body in a plane and in 3D. Angular velocity vector, Moment of inertia.	7
2	<b>Optics:</b> Distinction between interference and diffraction, Fraunhofer and Fresnel diffraction, Fraunhofer diffraction at single slit, double slit, and multiple slits ( only the expressions for max; min, & intensity and qualitative discussion of fringes); diffraction grating(resolution formulac only), characteristics of diffraction grating and its applications.	5



	<b>Polarization:</b> Introduction, polarization by reflection, polarization by double reflection, scattering of light, circular and elliptical polarization, optical activity. <b>Lasers:</b> Principles and working of laser: population inversion, pumping, various modes, threshold population inversion with examples.	
3	<b>Electromagnetism and Dielectric Magnetic Properties of Materials:</b> Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielectrics, internal fields in a solid, Clausius- Mossotti equation(expression only), applications of dielectrics.  Magnetisation, permeability and susceptibility, classification of magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.	8
4	<b>Quantum Mechanics:</b> Introduction to quantum physics, black body radiation, explanation using the photon concept, Compton effect, de Broglie hypothesis, wave-particle duality, verification of matter waves, uncertainty principle,	16

**RESOURCE:**

1. Principles of Physics, 10ed, David Halliday, Robert Resnick Jearl Walker, Wiley
2. An Introduction to Mechanics (SIE), David Kleppner, Robert Kolenkow, McGraw Hill Education
3. Textbook of Physical Optics, B. Ghosh, Laxmi Publications
4. Introduction to Electrodynamics, David J. Griffiths, Pearson Education India Learning Private Limited
5. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, Robert Eisberg, Robert Resnick, Wiley

**Reference Books:**

1. Classical mechanics, Narayan Rana, Pramod Joag, McGraw Hill Education
2. Introduction to Classical Mechanics, R Takwale, P Puranik, McGraw Hill Education
3. Optics, Ghatak, McGraw Hill Education India Private Limited
4. Concepts of Modern Physics, A. Beiser, McGraw Hill Education; Seventh edition
5. Fundamentals of Statistical and Thermal Physics, Reif, Sarat Book Distributors



<b>Course Title: English Language &amp; Technical Communication</b>	<b>Code: HU 101</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: First</b>	<b>Contact Hours: 2L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** English as Compulsory Paper at 10+2 Level

**COURSE OBJECTIVE:**

To make the students **Confident Communicators** both in **Formal and Informal Situations** wherever **English** is used as **language for Oral and Written Communication**

**COURSE OUTCOMES (COs)**

On completion of the students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
HU101.CO1	<b>Understand</b> English Speech Sounds for enhancing English Communication.	Understanding (Level II)
HU101.CO2	<b>Apply</b> English Language Presentation Skill in Academic and in Professional Communication.	Applying (Level III)
HU101.CO3	<b>Apply</b> Receptive Skills of English in Academics and in Engineering Profession.	Applying (Level III)
HU101.CO4	<b>Apply</b> Writing Skill of English in Academics and in Profession.	Applying (Level III)
HU101.CO5	<b>Demonstrate</b> Grammar Skill of English in Academic and in Professional Communication	Understanding (Level II)
HU101.CO6	<b>Demonstrate</b> Technical Communication Skill of English in Academic and in Professional Communication	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	-	-	-	-	-	2	2	-	2	3	-	2	1	1	1
<b>CO2</b>	-	-	-	-	-	2	2	-	2	3	-	3	1	1	1
<b>CO3</b>	-	-	-	-	-	2	2	-	2	3	-	2	1	1	1
<b>CO4</b>	-	-	-	-	-	2	2	-	2	3	-	2	1	1	1
<b>CO5</b>	-	-	-	-	-	2	2	-	2	3	-	2	1	1	1
<b>CO6</b>	-	-	-	-	-	2	2	-	2	3	-	1	1	1	1
<b>AVG.</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2.00</b>	<b>2.00</b>	<b>0</b>	<b>2.00</b>	<b>3.00</b>	<b>0</b>	<b>2.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs
1	<b>A. English Language Grammar:</b> Correction of Errors in Sentences, Building Vocabulary, Word formation, Single Word for a group of Words, Fill in the blanks using correct Words, Sentence Structures and transformation, Active & Passive Voice, Direct & Indirect Narration (MCQ Practice during classes)	5
2	<b>B. Reading Comprehension:</b> Strategies for Reading Comprehension Practicing Technical & Non-Technical Texts for Global/Local/Inferential/Referential comprehension;	4
3	<b>C. Technical Communication:</b> The Theory of Communication –Definition & Scope, Barriers of Communication, Different Communication Models Effective Communication (Verbal / Nonverbal), Presentation / Public Speaking Skills, (MCQ Practice during classes)	5
4	<b>D. Mastering Technical Communication:</b> Technical Report (formal drafting) , Business Letter (formal drafting) [4L], Job Application (formal drafting) , Organizational Communication , Group Discussion – Principle & Practice	16
5	<b>Additional Topics:</b> Value Based Text Reading: Following essay with emphasis on Mechanics of writing (i) Humanistic and Scientific approaches to human activity by Moody E. Prior (ii) Language of literature and science by A Huxley. (iii) Man and Nature by J. Bronowski. (iv) The Social; function of literature by Ian Watt.	8

**RESOURCES:**

1. Mark McCormack : “Communication”
2. John Mitchell “ How to write reports”
3. S R Indira & V Saraswathi Enrich your English – a) Communication skills b) Academic skills  
“Publisher CIEFL & OUP
4. Board of Editors. (2010) “Contemporary Communicative English for Technical Communication”  
Pearson Education. New Delhi. India 2010.



<b>Course Title: Basic Electrical &amp; Electronic Engineering – 1</b>	<b>Code: ES101</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 1st</b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** Basic Physics at 10+2 level.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
ES101.CO1	<b>Understand</b> the basic fundamentals of DC circuit analysis and theorems and its application.	Understanding (Level II)
ES101.CO2	<b>Solve</b> the given problem by Using the knowledge of series, parallel and electromagnetic circuits.	Applying (Level III)
ES101.CO3	<b>Distinguish</b> between conductors, non-conductors and semiconductors based on energy band theory and classify different types of semiconductors	Analyzing (Level IV)
ES101.CO4	<b>Demonstrate</b> the operating principle and output characteristics of pn junction diodes, zener diode, Varactor diode, BJT, rectifiers and different diode circuits.	Understanding (Level II)
ES101.CO5	<b>Explain</b> the basic principles and laws of Electromagnetism and its application in engineering.	Understanding (Level II)
ES101.CO6	<b>Describe</b> the basic fundamentals of transient analysis for RLC circuits and phasor diagram representation for different electrical loads and also calculation of power, Q factor and resonance for series and parallel R-L-C circuits.	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	3	3	-	2	1	-	-	2	1	-	2	3	1	1
<b>CO2</b>	3	3	3	-	2	1	-	-	2	1	-	1	2	2	1
<b>CO3</b>	3	3	3	-	1	1	-	-	2	-	-	2	3	2	1
<b>CO4</b>	3	3	3	-	3	2	-	-	2	1	-	2	3	2	2
<b>CO5</b>	3	3	3	-	3	2	-	-	2	-	-	1	3	3	2
<b>CO6</b>	3	3	3	-	3	2	-	-	2	1	-	1	3	2	1
<b>AVG.</b>	<b>3.00</b>	<b>3.00</b>	<b>3.00</b>	<b>0</b>	<b>2.33</b>	<b>1.50</b>	<b>0</b>	<b>0</b>	<b>2.00</b>	<b>1.00</b>	<b>0</b>	<b>1.50</b>	<b>2.83</b>	<b>2.00</b>	<b>1.33</b>



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs/Unit
1	<b>DC Network Theorem:</b> Definition of electric circuit, network, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, Kirchoff's law, Principle of superposition. Source equivalence and conversion, Thevenin's theorem, Norton Theorem, nodal analysis, mesh analysis, stardelta conversion. Maximum power transfer theorem with proof.	7
2	<b>Electromagnetism:</b> Biot-savart law, Ampere's circuital law, field calculation using Biot-savart & ampere's circuital law. Magnetic circuits, Analogous quantities in magnetic and electric circuits, Faraday's law, Self and mutual inductance. Energy stored in a magnetic field, B-H curve, Hysteretic and Eddy current losses, Lifting power of Electromagnet.	5
3	<b>AC fundamental:</b> Production of alternating voltage, waveforms, average and RMS values, peak factor, form factor, phase and phase difference, phasor representation of alternating quantities, phasor diagram, behavior of AC series, parallel and series parallel circuits, Power factor, Power in AC circuit, Effect of frequency variation in RLC series and parallel circuits, Resonance in RLC series and parallel circuit, Q factor, band width of resonant circuit.	9

**RESOURCE**

1. Sedra & Smith: Microelectronics Engineering.
2. Millman & Halkias: Integrated Electronics.
3. Malvino: Electronic Principle.
4. Schilling & Belove: Electronics Circuits.
5. Millman & Grabal: Microelectronics.
6. Salivahanan: Electronics Devices & Circuits.

<b>Course Title: Engg. Mechanics</b>	<b>Code: ME101</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 1st</b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** Basic Physics and Mathematics

**COURSE OBJECTIVE:**

- Predict the effect of forces.
- Understand the fundamentals of Mechanics, equation of static equilibrium & dynamic equilibrium of particles and rigid bodies.
- Learn kinematics, kinetics of particle and rigid body, related principles and implement them to solve practical problems.



**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
ME101.CO1	<b>Identifies</b> the various forces and its effects subjected on structural members.	Remembering (Level I)
ME101.CO2	<b>Understanding</b> of scalar and vector analytical technique used for solving problem statically determinant structure.	Understanding (Level II)
ME101.CO3	<b>Illustrate</b> the mechanics problems associated with friction force, centroid, first moment and second moment of area.	Applying (Level III)
ME101.CO4	<b>Analyze</b> the velocity and acceleration of rigid bodies in rectilinear and curvilinear motion.	Analyzing (Level IV)
ME101.CO5	<b>Examine</b> the forces acting on rigid body during translation motion.	Analyzing (Level IV)
ME101.CO6	<b>Implementation</b> of basic knowledge of mathematics and physics to solve real world problems	Evaluating (Level V)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	1	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	1	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	1	-	-	-	-	-	-	-	-	-
CO4	3	3	1	1	-	1	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	1	-	-	-	-	-	-	-	1	-
CO6	3	3	2	1	-	1	1	-	-	-	-	-	-	1	1
AVG.	3.00	3.00	1.83	1.00	0	1.00	1.00	0	0	0	0	0	0	1.00	1.00

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs/Unit
1.	Importance of Mechanics in engineering; Introduction to Statics; Concept of Particle and Rigid Body; Types of forces: collinear, concurrent, parallel, concentrated, distributed; Vector and scalar quantities; Force is a vector; Transmissibility of a force (sliding vector).	2L
	Introduction to Vector Algebra; Parallelogram law; Addition and subtraction of vectors; Lami's theorem; Free vector; Bound vector; Representation of forces in terms of i,j,k; Cross product and Dot product and their applications.	4L+1T
	Two dimensional force system; Resolution of forces; Moment; Varignon's theorem; Couple; Resolution of a coplanar force by its equivalent force-couple system; Resultant of forces.	4L+2T
2.	Concept and Equilibrium of forces in two dimensions; Free body concept and diagram; Equations of equilibrium.	3L+1T
	Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction.	3L+1T
3.	Distributed Force: Centroid and Centre of Gravity; Centroids of a triangle, circular sector, quadrilateral, composite areas consisting of above figures.	4L+1T
	Moments of inertia: MI of plane figure with respect to an axis in its plane, MI of plane figure with respect to an axis perpendicular to the plane of the figure; Parallel axis theorem; Mass moment of inertia of symmetrical bodies, e.g. cylinder, sphere, cone.	3L+1T





	Concept of simple stresses and strains: Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Factor of safety.	2L+1T
4.	Introduction to Dynamics: Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to gravity; Rectilinear motion of particles; determination of position, velocity and acceleration under uniform and non-uniformly accelerated rectilinear motion; construction of x-t, v-t and a-t graphs.	3L+1T
	Plane curvilinear motion of particles: Rectangular components (Projectile motion); Normal and tangential components (circular motion).	3L+1T
5.	Kinetics of particles: Newton's second law; Equation of motion; D. Alembert's principle and free body diagram; Principle of work and energy ; Principle of conservation of energy; Power and efficiency.	5L+2T

**RESOURCES:**

1. Engineering Mechanics [Vol-I & II] by Meriam & Kraige, 5th ed. – Wiley India.
2. Engineering Mechanics: Statics & Dynamics by I.H.Shames, 4th ed. – PHI
3. Engineering Mechanics by Timoshenko , Young and Rao, Revised 4th ed. – TMH
4. Elements of Strength of Materials by Timoshenko & Young, 5th ed. – E.W.P
5. Fundamentals of Engineering Mechanics by Debabrata Nag & Abhijit Chanda– Chhaya Prakashani
6. Engineering Mechanics by Basudeb Bhattacharyya– Oxford University Press.
7. Engineering Mechanics: Statics & Dynamics by Hibbeler & Gupta, 11th ed

**SEMESTER – I**  
**PRACTICAL**

<b>Course Title: Physics-I Laboratory</b>	<b>Code: PH191</b>
<b>Type of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 1<sup>st</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** Basic Physics and Mathematics

**COURSE OBJECTIVE**

1. The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies.
2. To achieve perfectness in experimental skills and the study of practical applications will bring more confidence and ability to develop and fabricate engineering and technical equipment.
3. Design of circuits using new technology and latest components and to develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.



**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
PH191.CO1	<b>Examine</b> and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics	Analyzing (Level IV)
PH191.CO2	<b>Organize</b> sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit	Applying (Level III)
PH191.CO3	<b>Illustrate</b> physical properties of light and to observe spectral lines of light to verify medium specific characteristics using optical instrument. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant	Understanding (Level II)
PH191.CO4	<b>Determine</b> Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.	Evaluating (Level V)
PH191.CO5	<b>Apply</b> concepts of quantum mechanics to verify Bohr's atomic orbital theory	Applying (Level III)
PH191.CO6	<b>Define</b> Planck's constant and Stefan's constant applying modern Physics	Remembering (Level I)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	1	-	-	-	-	-	-	-	-	2	-	-
CO2	2	3	1	1	-	-	-	-	-	-	-	-	2	-	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	2	-	-
CO4	2	3	1	2	-	-	-	-	-	-	-	-	2	-	-
CO5	2	2	3	1	-	-	-	-	-	-	-	-	2	-	-
CO6	2	1	3	2	-	-	-	-	-	-	-	-	2	-	-
AVG.	2.00	2.33	2.00	1.33	0	0	0	0	0	0	0	0	2.00	0	0

**UNIVERSITY SYLLABUS:**

Unit	Content
1	<b>Experiments from Higher Secondary knowledge of Physics:</b> 1. Determination of thermal conductivity of a good conductor by Seals Method 2. Determination of thermal conductivity of a bad conductor by Lee and Charlton's Method 3. Determination of dispersive power of a metal by prism method Use of Carry foster's bridge to determine unknown resistance
2	<b>Experiments on general properties of matter:</b> 1. Determination of young's module by flexure method and calculation of blending moment and shear force at a point. 2. Determination of module rigidity by static/ dynamic method Determination of coefficient of viscosity by Poiseulles capillary method
3	<b>Optics method</b> 1. Determination of wavelength of light by Newton's ring method 2. Determination of wavelength of light by Frensel's biprism method 3. Determination of wavelength of light by Laser diffraction method Determination of numerical aperture and energy losses related to optical fibre experiment.

## RESOURCES

1. Practical Physics, Prof. B. Ghosh.

<b>Course Title: Basic Electrical &amp; Electronic Engineering -1</b>	<b>Code: ES191</b>
<b>Type of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 1st</b>	<b>Contact Hours:</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Basic knowledge of circuit design.

## COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
ES191.CO1	<b>Implement</b> concepts of electrical components, electrical circuits and DC network theorems.	Applying (Level III)
ES191.CO2	<b>Create</b> series & parallel circuit & the effect of resonance.	Creating (Level VI)
ES191.CO3	<b>Distinguish</b> between conductors, nonconductors and semiconductors based on energy band theory and classify different types of semiconductors.	Analyzing (Level IV)
ES191.CO4	<b>Demonstrate</b> the operating principle and output characteristics of pn junction diodes, zener diode, Varactor diode, BJT, rectifiers and different diode circuits.	Understanding (Level II)
ES191.CO5	<b>Verify</b> different parameters for characterizing different circuits like rectifiers, regulators etc. using diodes and BJTs.	Evaluating (Level V)
ES191.CO6	<b>Implement</b> the concept of Energy Band Theory and Fermi Levels to explain the operating principle of semiconductors	Applying (Level III)

## Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	-	-	-	2	2	-	2	2	1	-
CO2	3	3	3	3	1	-	-	-	1	1	-	1	2	1	-
CO3	3	3	3	2	2	-	-	-	1	2	-	1	3	2	-
CO4	3	3	3	3	1	-	-	-	1	2	-	1	3	2	-
CO5	3	3	2	3	1	-	-	-	2	2	-	1	2	1	-
CO6	3	3	3	2	2	-	-	-	1	2	-	1	3	2	-
<b>AVG.</b>	<b>3.00</b>	<b>3.00</b>	<b>2.83</b>	<b>2.67</b>	<b>1.33</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1.33</b>	<b>1.83</b>	<b>0</b>	<b>1.17</b>	<b>2.50</b>	<b>1.50</b>	<b>0</b>



**UNIVERSITY SYLLABUS:**

Unit	Content
1	Characteristics of Fluorescent lamps
2	Characteristics of Tungsten and Carbon filament lamps
3	(a) Verification of Thevenin's theorem. (b) Verification of Norton's theorems.
4	Verification of Maximum power theorem.
5	Verification of Superposition theorem
6	Study of R-L-C Series circuit
7	Study of R-L-C parallel circuit

<b>Course Title: Workshop Practice</b>	<b>Code: ME192</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 1st</b>	<b>Contact Hours:</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Basic knowledge on Mathematics, physics.

**COURSE OBJECTIVE:**

- Students will be able to manufacture components with their own hands.
- Accustomed with different manufacturing processes
- Able to make hardware (mechanical) part of their research work.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
ME192.CO1	<b>Demonstrate</b> the hand tools and machine tools used in workshops	Understanding (Level II)
ME192.CO2	<b>Discuss</b> the safety measures required to be taken while using the tools.	Creating (Level VI)
ME192.CO3	<b>Select</b> the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Remembering (Level I)
ME192.CO4	<b>Construct</b> components with their own hands.	Creating (Level VI)
ME192.CO5	<b>Compare</b> practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes	Analyzing (Level VI)
ME192.CO6	<b>Create</b> different components, able to produce small devices of their own interest	Creating (Level VI)



**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1
<b>CO2</b>	1	-	-	-	-	1	-	1	-	-	1	-	1	-	1
<b>CO3</b>	1	-	-	-	-	1	-	1	1	-	2	-	1	-	1
<b>CO4</b>	1	-	-	-	-	-	2	-	2	1	1	-	-	1	1
<b>CO5</b>	1	-	-	-	-	-	2	-	2	1	1	1	1	-	1
<b>CO6</b>	1	-	-	-	-	-	2	-	2	1	2	1	-	1	1
<b>AVG.</b>	<b>1.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1.00</b>	<b>2.00</b>	<b>1.00</b>	<b>1.75</b>	<b>1.00</b>	<b>1.40</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs/Unit
1	<b>Carpentry (Wood Working):</b> Timber, Seasoning and Preservation, Plywood and Ply boards, Carpentry Tools, Engineering applications. Different Joints <b>Practical job:</b> T-Lap joints and Bridle joint	5
2	<b>Metal Joining:</b> Definitions of welding, brazing and soldering processes, and their applications. Oxy-acetylene gas welding process, equipment and techniques. Types of flames and their applications. Manual metal arc welding technique and equipment. AC and DC welding, electrodes, constituents and functions of electrodes. Welding positions. Types of weld joint. Common welding defects such as cracks, slag inclusion and porosity. <b>Practical job :</b> Square butt joint by MMA Welding, Lap joint by MMA Welding	8
3	<b>Bench work and Fitting</b> Tools for laying out, chisels, files, hammers and hacksaw, their specifications and uses. <b>Practical job:</b> Making a MS gauge using different fitting operations.	7
4	<b>Metal Cutting</b> Introduction to machining and common machining operations. Cutting tool materials, geometry of cutting tool, cutting fluid. Definition of machine tools, specification and block diagram of lathe, shaper, milling, drilling machine and grinder. Common lathe operations such as turning, facing and chamfering and parting. Difference between drilling and boring. Use of measuring instruments like micrometer/vernier caliper. <b>Practical job:</b> Jobs on lathe with turning, facing, chamfering and parting off etc operations. Job on shaper and milling machine for machining two sides of a job.	18
5	<b>Tin Smithy</b> –Surface development, Shearing and Bending of sheets, Making simple products by Tin Smithy practice. <b>Practical job:</b> Make a rectangular tray of GI sheet.	4

**RESOURCES:**

1. M.L.Begeman and B.H.Amstead, “Manufacturing Process” John Wiley, 1968
2. W.A.J.Chapman and E.Arnold, “Workshop Technology” Vol.1,2&3
3. B.S .Rghuwanshi, “Workshop Technology” Vol.1&2–Dhanpt Rai and Sons.
4. S.K.Hajra Choudhury, “Elements of Workshop Technology” Media Promoters of Publishers
5. Khanna, O.P. “Workshop Technology” Dhanpat Rai Publications
6. S.Crawford “Basic Engineering Processes” Hodder & Stoughton



## SEMESTER – I SESSIONAL

<b>Course Title: Language Laboratory</b>	<b>Code: HU181</b>
<b>Type of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 1st</b>	<b>Contact Hours: 2P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISITIES:** English as Compulsory Paper at 10+2 Level

**COURSE OBJECTIVE:**

To make the students Confident Communicators both in Formal and Informal Situations wherever English is used as language for Oral and Written Communication.

**COURSE OUTCOMES (COs)**

On completion of the Course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
<b>HU181.CO1</b>	<b>Understand</b> English Speech Sounds for enhancing English Communication.	Understanding (Level II)
<b>HU181.CO2</b>	<b>Apply</b> English Language Presentation Skill in Academic and in Professional Communication.	Applying (Level III)
<b>HU181.CO3</b>	<b>Apply</b> Receptive Skills of English in Academics and in Engineering Profession.	Applying (Level III)
<b>HU181.CO4</b>	<b>Apply</b> Writing Skill of English in Academics and in Profession.	Applying (Level III)
<b>HU181.CO5</b>	<b>Demonstrate</b> Grammar Skill of English in Academic and in Professional Communication	Understanding (Level II)
<b>HU181.CO6</b>	<b>Demonstrate</b> Technical Communication Skill of English in Academic and in Professional Communication	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	-	-	-	-	-	2	2	-	2	3	-	2	1	1	1
<b>CO2</b>	-	-	-	-	-	2	2	-	2	3	-	3	1	1	1
<b>CO3</b>	-	-	-	-	-	2	2	-	2	3	-	2	1	1	1
<b>CO4</b>	-	-	-	-	-	2	2	-	2	3	-	2	1	1	1
<b>CO5</b>	-	-	-	-	-	2	2	-	2	3	-	2	1	1	1
<b>CO6</b>	-	-	-	-	-	2	2	-	2	3	-	1	1	1	1
<b>AVG</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2.00</b>	<b>2.00</b>	<b>0</b>	<b>2.00</b>	<b>3.00</b>	<b>0</b>	<b>2.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>



## UNIVERSITY SYLLABUS:

Unit	Content	Hrs/Unit
1	Honing 'Listening Skill' and its sub skills through Language Lab Audio device;	3
2	Honing 'Speaking Skill' and its sub skills;	2
3	Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/Voice modulation/ Stress/ Intonation/ Pitch & Accent) of connected speech;	2
4	Honing 'Conversation Skill' using Language Lab Audio –Visual input; Conversational Practice Sessions (Face to Face / via Telephone, Mobile phone & Role Play Mode);	2
5	Introducing 'Group Discussion' through audio –Visual input and acquainting them with key strategies for success;	2
6	GD Practice Sessions for helping them internalize basic Principles (turn- taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD;	4
7	Honing 'Reading Skills' and its sub skills using Visual / Graphics/Diagrams /Chart Display/Technical/Non-Technical Passages; Learning Global / Contextual / Inferential Comprehension;	2
8	Honing 'Writing Skill' and its sub skills by using Language Lab Audio –Visual input; Practice Sessions	2

## RESOURCES

1. Board of Editors. (2010) "Contemporary Communicative English for Technical Communication" Pearson Education. New Delhi. India 2010
2. D. Sudharani. (2011) English Language Laboratory. Pearson Education.



<b>Course Title: Extra-Curricular Activities</b>	<b>Code: XC181</b>
<b>Type of Course: Sessional</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 1st</b>	<b>Contact Hours: 2P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** Some basic knowledge of environmental protection and other extracurricular activities.

**COURSE OBJECTIVE:**

- Extra-curricular are not solely about imparting stronger professional skills and supplementing education.
- These programs are also fun and offer students the opportunity to spend time with others of similar interests

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
XC181.CO1	<b>Create</b> awareness in social issues.	Creating(Level VI)
XC181.CO2	<b>Collaborate</b> in mass education program.	Creating(Level VI)
XC181.CO3	<b>Develop</b> some proposals for local slum area development and waste disposal.	Applying(Level III)
XC181.CO4	<b>Plan</b> environmental awareness.	Creating(Level VI)
XC181.CO5	<b>Combine</b> in relief and rehabilitation work during natural calamities.	Creating(Level VI)
XC181.CO6	<b>Organize</b> production oriented programs.	Applying(Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	1	2	1	2	-	3	2	-	3	3	2	2	2	3	1
<b>CO2</b>	2	2	1	1	1	3	2	1	3	3	2	2	1	2	1
<b>CO3</b>	3	3	3	2	3	3	2	1	3	3	2	2	3	3	1
<b>CO4</b>	2	2	2	2	3	3	2	-	3	3	2	2	1	3	1
<b>CO5</b>	3	2	2	2	3	3	2	1	3	3	2	2.25	3	2	1
<b>CO6</b>	2	1	2	3	2	3	2	-	3	3	3	2	2	3	1
<b>AVG.</b>	<b>2.17</b>	<b>2.00</b>	<b>1.83</b>	<b>2.00</b>	<b>2.40</b>	<b>3.00</b>	<b>2.00</b>	<b>1.00</b>	<b>3.00</b>	<b>3.00</b>	<b>2.17</b>	<b>2.04</b>	<b>2.00</b>	<b>2.67</b>	<b>1.00</b>





**UNIVERSITY SYLLABUS:**

Unit	Content
1	a) Creating awareness in social issues b) Participating in mass education programmes c) Proposal for local slum area development d) Waste disposal e) Environmental awareness f) Production Oriented Programmes g) Relief & Rehabilitation work during Natural calamities
2	Creating awareness in social issues: 1. Women's development – includes health, income-generation, rights awareness. 2. Hospital activities – Eg. writing letters for patients, guiding visitors 3. Old age home – visiting the aging in-mates, arranging for their entertainment. 4. Children's Homes - visiting the young in-mates, arranging for their entertainment 5. Linking with NGOs to work on other social issues. (Eg. Children of sex-workers) 6. Gender issues- Developing an awareness, to link it with Women's Cell of college
3	Participating in mass education programmes 1. Adult education 2. Children's education Proposal for local slum area development One or two slums to be identified and according to the needs, activities to be developed and proposals and reports are to be submitted. Environmental awareness
4	<ul style="list-style-type: none"> <li>• Resource conservation – Awareness to be developed on water, energy, soil.</li> <li>• Preservation of heritage monuments- Marches, poster campaigns</li> <li>• Alternative energy consciousness amongst younger school-children.</li> <li>• Plantation and beautification- Plantation of trees, their preservation and upkeep, developing NSS parks.</li> <li>• Waste disposal- Proper methods of domestic waste disposal.</li> </ul> Production Oriented Programmes.
5	Working with people and explaining and teaching improved agricultural practices Rodent control land pest control practices; Soil-testing, soil health care and soil conservation; Assistance in repair of agriculture machinery; Work for the promotion and strengthening of cooperative societies in villages; Assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
6	Popularization of small savings and Assistance in procuring bank loans Relief & Rehabilitation work during Natural calamities Assisting the authorities in distribution of rations, medicine, clothes etc.; Assisting the health authorities in inoculation and immunization, supply of medicine etc.; Working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.; Assisting and working with local authorities in relief and rescue operation; Collection of clothes and other materials, and sending the same to the affected areas;



## SEMESTER – II

### THEORY

<b>Course Title: Chemistry-1</b>	<b>Code: CH201</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 2<sup>nd</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISITIES:** Overall knowledge of basic concepts of Chemistry as covered in Std XI & XII, Analytical & mathematical approach towards Chemistry

**COURSE OBJECTIVE:**

- Be able to understand principles of thermodynamics and thermochemical behavior of a reaction
- Be able to apply the fundamental knowledge of science and engineering to assess better fuel and design eco-friendly, efficient electrochemical cells.
- Be able to understand the reaction kinetics, types of defects in solid crystals, structure and reactivity of organic molecules, and polymeric structure to develop innovative technology
- Be able to solve scientific problem related to engineering chemistry

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CH201.CO1	<b>Apply</b> first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behaviour of a reaction.	Applying (Level III)
CH201.CO2	<b>Analyze</b> the design and working principle of different electrochemical cells using the concept of conductance of ions.	Analyzing (Level IV)
CH201.CO3	<b>Develop</b> rate of a reaction at a specified temperature under different medium	Creating (Level VI)
CH201.CO4	<b>Explain</b> the mechanism considering the structure of the molecules and type of electronic effect present in them.	Evaluating (Level V)
CH201.CO5	<b>Categorize</b> different types of fuels for industrial application.	Analyzing (Level IV)
CH201.CO6	<b>Distinguish</b> different types of polymers for diverse application	Analyzing (Level IV)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	1	1	1	-	-	-	-	-	-	-	-	1	-	-
CO6	3	1	1	1	-	-	-	-	-	-	-	-	1	-	-
AVG.	3.00	1.67	1.00	1.00	0	0	0	0	0	0	0	0	1.00	0	0



UNIVERSITY SYLLABUS:

Unit	Content	Hrs./Unit
1	<p><b>Chemical Thermodynamics-I</b></p> <p><b>Concept of Thermodynamic system:</b> Definition with example of diathermal wall, adiabatic wall, isolated system, closed system, open system, extensive property, intensive property.</p> <p><b>Introduction to first law of thermodynamics:</b> different statements, mathematical form.</p> <p><b>Internal energy:</b> Definition, Example, Characteristics, Physical significance, Mathematical expression for change in internal Energy, Expression for change in internal energy for ideal gas.</p> <p><b>Enthalpy:</b> Definition, Characteristics, Physical significance, Mathematical expression for change in Enthalpy, Expression for change in enthalpy for ideal gas.</p> <p><b>Heat Capacity:</b> Definition, Classification of Heat Capacity (Cp and CV): Definition and General expression of Cp - CV. Expression of Cp - CV for ideal gas.</p> <p><b>Reversible and Irreversible processes:</b> Definition, Work done in Isothermal Reversible and Isothermal Irreversible process for Ideal gas, Adiabatic changes: Work done in adiabatic process, Interrelation between thermodynamic parameters (P, V and T), slope of P-V curve in adiabatic and isothermal process.</p> <p><b>Application of first law of thermodynamics to chemical processes:</b> exothermic, endothermic processes, law of Lavoisier and Laplace, Hess's law of constant heat summation, Kirchoff's law.</p> <p><b>2nd law of thermodynamics:</b> Statement, Mathematical form of 2nd law of thermodynamics (Carnot cycle). Joule Thomson and throttling processes; Joule Thomson coefficient for Ideal gas, Concept of inversion temperature. Evaluation of entropy: characteristics and expression, entropy change in irreversible cyclic process, entropy change for irreversible isothermal expansion of an ideal gas, entropy change of a mixture of gases.</p> <p>Work function and free energy: Definition, characteristics, physical significance, mathematical expression of <math>\Delta A</math> and <math>\Delta G</math> for ideal gas, Maxwell's Expression (only the derivation of 4 different forms), Gibbs Helmholtz equation. Condition of spontaneity and equilibrium reaction.</p>	10
2	<p><b>Reaction Dynamics</b></p> <p>Reaction laws: rate and order; molecularity; zero, first and second order kinetics. Pseudo uni molecular reaction, Arrhenius equation. Mechanism and theories of reaction rates (Transition state theory, Collision theory). Catalysis: Homogeneous catalysis (Definition, example, mechanism, kinetics).</p> <p><b>Solid state Chemistry</b></p> <p>Introduction to stoichiometric defects (Schottky &amp; Frenkel) and non – stoichiometric defects (Metal excess and metal deficiency). Role of silicon and germanium in the field of semiconductor.</p>	5
3	<p><b>Electrochemistry</b></p> <p><b>Conductance</b></p> <p>Conductance of electrolytic solutions, specific conductance, equivalent conductance, molar conductance and ion conductance, effect of temperature and concentration (Strong and Weak electrolyte). Kohlrausch's law of independent migration of ions, transport numbers and hydration of ions. Conductometric titrations: SA vs SB &amp; SA vs WB; precipitation titration KCl vs AgNO<sub>3</sub>.</p> <p><b>Electrochemical cell</b></p> <p>Cell EMF and its Thermodynamic derivation of the EMF of a Galvanic cell (Nernst equation), single electrode potentials, hydrogen half cell, quinhydrone half cell and calomel half cell (construction, representation, cell reaction, expression of potential, Discussion, Application) Storage cell, fuel cell (construction, representation, cell reaction, expression of potential, Discussion, Application). Application of EMF measurement on a) Ascertain the change in thermodynamic function (<math>\Delta G</math>, <math>\Delta H</math>, <math>\Delta S</math>) b) ascertain the equilibrium constant of a reversible chemical reaction c) ascertain the valency of an ion.</p>	5
4	<p><b>Structure and reactivity of Organic molecule</b></p> <p>Electronegativity, electron affinity, hybridisation, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free radicals. Brief study</p>	8



	<p>of some addition, eliminations and substitution reactions.</p> <p><b>Polymerization</b>            Concepts, classifications and industrial applications.            Polymer molecular weight (number avg. weight avg. viscosity avg.: Theory and mathematical expression only), Poly dispersity index (PDI). Polymerization processes (addition and condensation polymerization), degree of polymerization, Copolymerization, stereo-regularity of polymer, crystallinity (concept of T<sub>m</sub>) and amorphicity (Concept of T<sub>g</sub>) of polymer. Preparation, structure and use of some common polymers: plastic (<b>PE</b>: HDPE, LDPE, LLDPE, UHMWPE)), rubber (natural rubber, SBR), fibre (nylon 6.6). Vulcanization. Conducting and semi-conducting polymers.</p>	
5	<p><b>Industrial Chemistry</b>            Solid Fuel: Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Coal analysis: Proximate and ultimate analysis. Liquid fuel: Petroleum, classification of petroleum, Refining, Petroleum distillation, Thermal cracking, Octane number, Cetane number, Aviation Fuel (Aviation Gasoline, Jet Gasoline), Bio-diesel. Gaseous fuels: Natural gas, water gas, Coal gas, bio gas.</p>	5

**RESOURCES:**

1. Physical Chemistry, P. C. Rakshit, Sarat Book
2. Engineering Chemistry, Satyaprakash, Khanna Book Publishing, De
3. Fuels and Combustion, Sarkar Samir
4. Engineering Chemistry (TMH WBUT Series), Paladhi, TMH
5. Engineering Chemistry, Sunita Ratan

<b>Course Title: Basic Computation &amp; Principles of Computer Programming</b>	<b>Code: CS201</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 2<sup>nd</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** Basic knowledge on computer.

**COURSE OBJECTIVE:**

- The course is designed to provide complete knowledge of C language.
- Students will be able to develop logics which will help them to create programs, applications in C.
- Also by learning the basic programming constructs they can easily switch over to any other language in future.



### COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS201.CO1	<b>Describe</b> the concepts of Computer generation, Computer classification, parts of Computer, Assembly language, high level language, compiler and assembler.	Understanding (Level II)
CS201.CO2	<b>Knowledge</b> of representation of signed and unsigned binary number system, BCD, ASCII, MS DOS, MS WINDOW, UNIX, Algorithm & flow chart	Remembering (Level I)
CS201.CO3	<b>Understand</b> the fundamentals of C programming.	Understanding (Level II)
CS201.CO4	<b>Develops</b> the ability to analyze a problem, develop an algorithm or flowchart to solve it.	Developing (Level III)
CS201.CO5	<b>Compare</b> among various Flow of Control	Analyzing (Level IV)
CS201.CO6	<b>Implement</b> different Operations on arrays, functions, pointers, structures, unions and files.	Creating (Level VI)

### Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	-	2	-	2	3	-	1	1	3	3	3
CO2	3	1	1	1	3	-	-	2	3	-	2	-	3	2	2
CO3	3	2	3	1	-	-	-	2	3	3	1	-	3	2	2
CO4	3	2	3	2	-	2	-	3	3	-	1	2	3	2	2
CO5	3	1	1	1	-	-	-	2	3	-	2	-	3	2	2
CO6	3	2	3	3	1	2	2	3	3	-	2	2	3	2	2
AVG.	3.00	1.50	2.00	1.50	2.00	2.00	2.00	2.33	3.00	3.00	1.50	1.67	3.00	2.17	2.17

### UNIVERSITY SYLLABUS:

Unit	Content	Hrs/Unit
1	<b>Fundamentals of Computer:</b> History of Computer, Generation of Computer, Classification of Computers Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output Devices Binary & Allied number systems representation of signed and unsigned numbers. BCD, ASII. Binary Arithmetic & logic gates Assembly language, high level language, compiler and assembler (basic concepts) Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX, Algorithm & flow chart	15
2	<b>C Fundamentals:</b> The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements	3
3	<b>Operators &amp; Expressions:</b> Arithmetic operators, relational and logical operators, type, conversion, increment and decrement operators, bit wise operators, assignment operators and expressions, precedence and order of evaluation. Input and Output: Standard input and output,	5



	formatted output -- printf, formatted input scanf.	
4	<b>Flow of Control:</b> Statement and blocks, if - else, switch, loops - while, for do while, break and continue, go to and labels	2
5	<b>Fundamentals and Program Structures:</b> Basic of functions, function types, functions returning values, functions not returning values, auto, external, static and register variables, scope rules, recursion, function prototypes, C pre-processor, command line arguments.	6
6	<b>Arrays and Pointers:</b> One dimensional arrays, pointers and functions, multidimensional arrays.	6
7	<b>Structures Union and Files:</b> Basic of structures, structures and functions, arrays of structures, bit fields, formatted and unformatted files	5

**RESOURCES:**

1. E. Balagurusamy "Introduction To Computing" (TMH WBUT Series).
2. Rajaraman V. Fundamental of Computers
3. Balaguruswamy "Programming in C"
4. Kanetkar Y. "Let us C"
5. M.M.Oka "Computer Fundamentals,EPH"
6. Leon Introduction to Computers, Vikas.

<b>Course Title: Basic Electrical &amp; Electronic Engineering-II</b>	<b>Code: ES201</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 2<sup>nd</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISITIES:** Basic knowledge on Physics.

**COURSE OBJECTIVE:**

- The course aims at developing creative problem-solving skills, nurturing radical thinking and encouraging holistic solutions to the problems amongst students.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
ES201.CO1	<b>Understand</b> the basic fundamentals of DC circuit analysis and theorems and its application.	Understanding (Level II)
ES201.CO2	<b>Explain</b> the basic principles and laws of Electromagnetism and its application in engineering.	Evaluating (Level V)
ES201.CO3	<b>Define</b> the basic fundamentals of transient analysis for RLC circuits and phasor diagram representation for different electrical loads and also calculation of power, Q factor and resonance for series and parallel R-L-C circuits.	Remembering (Level I)
ES201.CO4	<b>Explain</b> the operation and structure of transistor.	Understanding (Level II)
ES201.CO5	<b>Describe</b> the basic structures and application of Diode and rectifier.	Remembering (Level I)
ES201.CO6	<b>Demonstrate</b> the conversion of different logic gates from universal gate and find the output of any digital logic circuits.	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	2	1	-	-	2	1	-	2	3	1	1
CO2	3	3	3	-	2	1	-	-	2	1	-	1	2	2	1
CO3	3	3	3	-	1	1	-	-	2	-	-	2	3	2	-
CO4	3	3	3	-	3	2	-	-	2	1	-	2	3	3	1
CO5	3	3	3	-	3	2	-	-	2	-	-	1	2	3	-
CO6	3	3	3	-	3	2	-	-	2	1	-	1	3	2	1
AVG	3.00	3.00	3.00	0	2.33	1.50	0	0	2.00	1.00	0	1.50	2.67	2.17	1.00



**UNIVERSITY SYLLABUS:**

**Basic Electrical Engineering - II**

Unit	Content	Hrs/Unit
1	<b>Electrostatics:</b> Coulomb's law, Electric Field Intensity, Electric field due to a group of charges, continuous charge distribution, Electric flux, Flux density, Electric potential, potential difference, Gauss's law, proof of gauss's law, its applications to electric field and potential calculation, Capacitor, capacitance of parallel plate capacitor, spherical capacitor, isolated spheres, concentric conductors, parallel conductors. Energy stored in a capacitor.	5
2	<b>DC Machines:</b> Construction, Basic concepts of winding (Lap and wave). DC generator: Principle of operation, EMF equation, characteristics (open circuit, load) DC motors: Principle of operation, Speed torque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armature voltage and field control)	6
3	<b>Single phase transformer:</b> Core and shell type construction, EMF equation, no load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation.	4
4	<b>3 phase induction motor:</b> Types, Construction, production of rotating field, principle of operation, equivalent circuit and phasor diagram, rating, torque-speed characteristics (qualitative only). Starter for squirrel cage and wound rotor induction motor. Brief introduction of speed control of 3 phase induction motor (voltage control, frequency control, resistance control)	5
5	<b>Three phase system:</b> Voltages of three balanced phase system, delta and star connection, relationship between line and phase quantities, phasor diagrams. Power measurement by two watt meters method.	3
6	<b>General structure of electrical power system:</b> Power generation to distribution through overhead lines and underground cables with single lone diagram.	1

**Basic Electronics Engineering - II:**

Unit	Content	Hrs/Unit
1	<b>Field Effect Transistors: [5L]</b> Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles.	5
2	<b>Feed Back Amplifier, Oscillators and Operational Amplifiers: [5L+5L = 10L]</b> Concept (Block diagram), properties, positive and negative feedback, loop gain, open loop gain, feedback factors; topologies of feedback amplifier; effect of feedback on gain, output impedance, input impedance, sensitivities (qualitative), bandwidth stability; effect of positive feedback: instability and oscillation, condition of oscillation, Barkhausen criteria. Introduction to integrated circuits, operational amplified and its terminal properties; Application of operational Amplifier; inverting and non-inverting mode of operation, Adders, Subtractors, Constant-gain multiplier, Voltage follower, Comparator, Integrator, Differentiator.	10
3	<b>Digital Electronics:[5L]</b> Introduction to binary number; Basic Boolean algebra; Logic gates and function realization with OPAMPs.	5





**RESOURCES:**

**Basic Electrical Engineering - II**

1. Basic Electrical engineering, D.P Kothari & I.J Nagrath, TMH, Second Edition
2. Fundamental of electrical Engineering, Rajendra Prasad, PHI, Edition 2005.
3. Basic Electrical Engineering, V.N Mittle & Arvind Mittal, TMH, Second Edition
4. Basic Electrical Engineering, J.P. Tewari, New age international publication

**Basic Electronics Engineering - II**

1. Sedra & Smith: Microelectronics Engineering.
2. Millman & Halkias: Integrated Electronics.

<b>Course Title: Mathematics-2</b>	<b>Code: M201</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 2<sup>nd</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** Basic Calculus.

**COURSE OBJECTIVE:**

- To teach different methods for solving ODE of first order first degree and first order higher degree and model many model many core engineering problems with applications of ODE and their solutions.
- Familiar with some basic properties of different types of graphs and applications in different models.
- Explain many core engineering topics with relevant mathematical theories using higher order and simultaneous linear differential equations and use of different algorithmic approach in graph theory.
- Familiar with the evaluation of some standard improper integrals and utility of Integral transforms (Laplace transform) for solutions of circuit problems, control theories, data processing etc.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
M-201.CO1	<b>Understand</b> the basics and different techniques to solve first order first/ higher degree and second order ordinary differential equations.	Understanding (Level II)
M-201.CO2	<b>Formation</b> of different models with suitable differential equations for Engineering sciences.	Creating (Level VI)
M-201.CO3	<b>Define</b> the basic properties of graph and characterize the nature of different standard/popular graphs.	Remembering (Level I)
M-201.CO4	<b>Explain</b> the application of graph theory in searching techniques, data management, networking and other different fields of engineering sciences.	Understanding (Level II)
M-201.CO5	<b>Apply</b> the ideas of improper integral to address different integral transforms and several techniques for solving higher order linear differential equations.	Applying (Level III)
M-201.CO6	<b>Demonstrate</b> the techniques of a special type of integral transform and solve differential equations, control engineering and other engineering problems.	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	2	-
<b>CO2</b>	2	2	3	1	-	-	-	-	-	-	-	-	2	2	-
<b>CO3</b>	3	3	2	1	-	-	-	-	-	-	-	-	2	2	-
<b>CO4</b>	3	2	3	1	-	-	-	-	-	-	-	-	2	2	-
<b>CO5</b>	3	3	3	1	-	-	-	-	-	-	-	-	2	2	-
<b>CO6</b>	3	2	3	1	-	-	-	-	-	-	-	-	2	2	-
<b>AVG.</b>	<b>2.83</b>	<b>2.50</b>	<b>2.67</b>	<b>0.83</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>2.00</b>	<b>2.00</b>	<b>0</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs/Unit
1	<b>Module I</b> <b>Ordinary differential equations (ODE)- First order and first degree:</b> Exact equations, Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli’s equation. General solution of ODE of first order and higher degree (different forms with special reference to Clairaut’s equation). [	5
2	<b>Module II</b> <b>ODE- Higher order and first degree:</b> General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods for finding P.I., Method of variation of parameters, Cauchy-Euler equations, Solution of simultaneous linear differential equations.	6
3	<b>Module III</b> <b>Basics of Graph Theory:</b> Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph,; Walks, Paths, Circuits, Euler Graph, Cut sets and cut vertices, Matrix representation of a graph, Adjacency and incidence matrices of a graph, Graph isomorphism, Bipartite graph.	10
4	<b>Module IV</b> <b>Tree:</b> Definition and properties, Binary tree, Spanning tree of a graph, Minimal spanning tree, properties of trees, Algorithms: Dijkstra’s Algorithm for shortest path problem, Determination of minimal spanning tree using DFS, BFS, Kruskal’s and Prim’s algorithms.	6
5	<b>Module V</b> <b>Improper Integral:</b> Basic ideas of improper integrals, working knowledge of Beta and Gamma functions (convergence to be assumed) and their interrelations. <b>Laplace Transform (LT):</b> Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property; LT of $f(t) t^n$ , LT of $f(t) e^{at}$ , LT of derivatives of $f(t)$ , L.T. of $\int f(u)du$ . Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT: Definition and its properties; Convolution Theorem (statement only) and its application to the evaluation of inverse LT, Solution of linear ODE with constant coefficients (initial value problem) using LT.	13

**RESOURCES**

1. Advanced Engineering Mathematics, Erwin Kreyszig, (Wiley Eastern)
2. Graph Theory: V. K. Balakrishnan, (Schaum’s Outline, TMH)
3. A first course at Graph Theory: J. Clark and D. A. Holton (Allied Publishers LTD)
4. Introduction to Graph Theory: D. B. West (Prentice-Hall of India)
5. Graph Theory: N. Deo (Prentice-Hall of India)
6. Engineering Mathematics: B.S. Grewal (S. Chand & Co.)



<b>Course Title: Engineering Thermodynamics &amp; Fluid Mechanics</b>	<b>Code: ME201</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 2<sup>nd</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** Basic knowledge on Mathematics, physics.

**COURSE OBJECTIVE:** After completion students able to

- Understand heat, work, energy, entropy and their relations.
- Analyze the different thermodynamics laws and its applications.
- Understand Different fluid properties and relationship between them.
- Familiar with different fluid flow devices.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
ME201.CO1	Analyze the work and heat interactions associated with a prescribed process path and to perform an analysis of a flow system	Analyzing (Level IV)
ME201.CO2	Define the fundamentals of the first and second laws of thermodynamics and explain their application	Remembering (Level I)
ME201.CO3	Determine the changes in thermodynamics properties of substance	Evaluating (Level V)
ME201.CO4	Examine the performance of energy conversion devices and their differences.	Analyzing (Level IV)
ME201.CO5	Identify the fluid properties and relationship between them	Applying (Level III)
ME201.CO6	Understand the principles of continuity, momentum, and energy and application in different measuring devices.	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	1	1	-	-	-	-	-	-	-	-	-
CO4	2	2	1	-	1	1	2	1	-	-	1	1	-	1	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	2	2	1	-	1	1	2	1	-	-	1	1	-	1	-
AVG.	2.00	2.00	1.00	0	1.00	1.00	2.00	1.00	0	0	1.00	1.00	0	1.00	0

UNIVERSITY SYLLABUS:

Unit	Content	Hrs/Unit
1	<p><b>Basic Concepts of Thermodynamics</b> Introduction: Microscopic and Macroscopic viewpoints. Definition of Thermodynamic systems: closed, open and isolated systems. Concept of Thermodynamics state; state postulate. Definition of properties: intensive, extensive &amp; specific properties. Thermodynamic equilibrium Thermodynamic processes; quasi-static, reversible &amp; irreversible processes; Thermodynamic cycles. Zeroth law of thermodynamics. Concept of empirical temperature.</p> <p><b>Heat and Work</b> Definition &amp; units of thermodynamic work. Examples of different forms of thermodynamic works; example of electricity flow as work. Work done during expansion of a compressible simple system Definition of Heat; unit of Heat Similarities &amp; Dissimilarities between Heat &amp; Work</p> <p><b>Ideal Equation of State, processes; Real Gas</b> Definition of Ideal Gas; Ideal Gas Equations of State. Thermodynamic Processes for Ideal Gas; P-V plots; work done, heat transferred for isothermal, isobaric, isochoric, isentropic &amp; polytropic processes. Equations of State of Real Gases: Vander Waal's equation; Virial equation of state.</p> <p><b>Properties of Pure Substances</b> p-v &amp; P-T diagrams of pure substance like H<sub>2</sub>O Introduction to steam table with respect to steam generation process; definition of saturation, wet &amp; superheated status. Definition of dryness fraction of steam, degree of superheat of steam.</p>	8L+3T
2	<p><b>1st Law of Thermodynamics</b> Definition of Stored Energy &amp; Internal Energy, 1st Law of Thermodynamics for cyclic processes, Non Flow Energy Equation ,Flow Energy &amp; Definition of Enthalpy, Conditions for Steady State Steady flow: Steady State Steady Flow Energy Equation</p>	4L+3T
3	<p><b>2nd Law of Thermodynamics</b> Definition of Sink, Source Reservoir of Heat. Heat Engine, heat Pump &amp; Refrigerator; Thermal efficiency of Heat Engines &amp; co-efficient of performance of Refrigerators, Kelvin – Planck &amp; Clausius statements of 2nd Law of Thermo dynamics, Absolute or Thermodynamic scale of temperature, Clausius Integral, Entropy, Entropy change calculation for ideal gas processes, Carnot Cycle &amp; Carnot efficiency, PMM-2; definition &amp; its impossibility</p>	6L+3T
4	<p>Otto cycle; plot on P-V, T-S planes; Thermal efficiency. Diesel cycle; plot on P-V, T-S planes; Thermal efficiency</p> <p><b>Rankine cycle of steam</b> h-s chart of steam (Mollier's Chart). Simple Rankine cycle plot on P-V, T-S, h-s planes. Rankine cycle efficiency with &amp; without pump work</p>	6L+3T
5	<p><b>Properties &amp; Classification of Fluids</b> Ideal &amp; Real fluids .Newton's law of viscosity; Newtonian and Non-Newtonian fluids. Compressible and Incompressible fluids</p> <p><b>Fluid Statics</b> Pressure at a point</p> <p><b>Measurement of Fluid Pressure</b> Manometers : simple &amp; differential U-tube Inclined tube</p> <p><b>Fluid Kinematics</b> Stream line, laminar &amp; turbulent flow, external &amp; internal flow, Continuity equation</p> <p><b>Dynamics of ideal fluids</b> Bernoulli's equation, Total head; Velocity head; Pressure head, Application of Bernoulli's equation</p> <p><b>Measurement of Flow rate: Basic principles</b> Venturimeter, Pilot tube, Orifice meter</p>	9L+3T

**RESOURCE****Engineering Thermodynamics:**

1. Engineering Thermodynamics - P K Nag, 4th edn, TMH.
2. "Fundamentals of Thermodynamics" 6e by Sonntag & Van Wylin published by Wiley India.
3. Engineering Thermodynamics – Russel & Adeliyi (Indian edition), OUP
4. Engineering Thermodynamics – Onkar Singh, New Age International Publishers Ltd.
5. Basic Engineering Thermodynamics – R Joel, 5th Ed., Pearson

**Fluid Mechanics:**

1. Fluid Mechanics and Hydraulic Machines - R K Bansal References :
2. Introduction to Fluid Mechanics and Fluid Machines - S.K.Som and G.Biswas. 2nd edn, TMH
3. Fluid Mechanics by A.K.Jain.

## SEMESTER – II PRACTICAL

<b>Course Title: Chemistry-I Lab</b>	<b>Code: CH291</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 2<sup>nd</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** Overall Knowledge about the basic concepts of chemistry as covered in class 11th & 12<sup>th</sup> Standard. Analytical & mathematical approach towards Chemistry.

**COURSE OBJECTIVE:**

- Be able to understand basic principles of chemical analysis
- Be able to apply the fundamental knowledge of science and engineering and skill to solve scientific problems

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CH291.CO1	<b>Determine</b> the strength of an acid using volumetric, method.	Evaluating (Level V)
CH291.CO2	<b>Define</b> the strength of an acid using conduct metric method.	Remembering (Level I)
CH291.CO3	<b>Measure</b> the strength of an acid using pH-metric methods	Evaluating (Level V)
CH291.CO4	<b>Explain</b> some physical property like partition coefficient of a compound and viscosity of a solution at room temperature	Evaluate (Level V)
CH201.CO5	<b>Estimate</b> the amount of an ion present in a given solution using permanganometric and argent metric methods	Creating (Level VI)
CH291.CO6	<b>Evaluate</b> alkalinity (in terms of CaCO <sub>3</sub> equivalent), hardness (in ppm) and amount of dissolved oxygen (in mg/l) present in a given water sample using volumetric method	Evaluating (Level V)



**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	2	1	1	-	-	-	-	-	-	-	-	1	-	-
<b>CO2</b>	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
<b>CO3</b>	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
<b>CO4</b>	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
<b>CO5</b>	3	1	1	1	-	-	-	-	-	-	-	-	1	-	-
<b>CO6</b>	3	1	1	1	-	-	-	-	-	-	-	-	1	-	-
<b>AVG.</b>	<b>3.00</b>	<b>1.67</b>	<b>1.00</b>	<b>1.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1.00</b>	<b>0</b>	<b>0</b>

**UNIVERSITY SYLLABUS:**

Unit	Content
1	Acid –base titration ( estimation of commercial caustic soda)
2	Redox titration (estimation of iron using permanganometry) acid.
3	Complex metric titration ( estimation of hardness of water using EDTA titration)
4	Preparation and analysis of a metal complex ( for example theorem / copper sulfate or nickelchloride / ammonia complexes)
5	Chemical Kinetics (determination of relative rates of reaction of iodide with H <sub>2</sub> O <sub>2</sub> at roomtemperature (clock reaction)
6	Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butane and water)
7	Photochemical oxidation-reduction (study of photochemical reduction of ferric salt)
8	Viscosity of solutions (determination of percentage composition of sugar solution from viscosity)
9	Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution
10	pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution.

**RESOURCES:**

1. Quantitative and qualitative analysis, by A.I. Vogel
2. Engineering Chemistry Practical by Sudha Rani



<b>Course Title: Basic Computation &amp; Principles of Computer Programming Lab</b>	<b>Code: CS291</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 2<sup>nd</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee (PAC)</b>

**PRE-REQUISTIES:** Basic knowledge on computer

**COURSE OBJECTIVE:**

- Use the fundamentals of C programming in trivial problem solving
- Enhance skill on problem solving by constructing algorithms.
- Identify solution to a problem and apply control structures and user defined functions for solving the problem
- Apply skill of identifying appropriate programming constructs for problem solving

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS291.CO1	Understand DOS and Unix commands	Understanding (Level II)
CS291.CO2	Knowledge of simple C programming	Remembering (Level I)
CS291.CO3	Understand the fundamentals of C programming.	Understanding (Level II)
CS291.CO4	Build program using function and recursion	Applying (Level III)
CS291.CO5	Implement different Operations on arrays, string, pointers,	Creating (Level VI)
CS291.CO6	Apply structures, unions and files to solve a problem	Applying (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	-	2	-	2	3	-	1	1	3	1	1
CO2	3	1	1	1	3	-	-	2	3	-	2	-	3	1	2
CO3	3	2	3	1	-	-	-	2	3	3	1	-	3	1	1
CO4	3	2	3	2	-	2	-	3	3	-	1	2	3	3	1
CO5	3	1	1	1	-	-	-	2	3	-	2	-	3	1	1
CO6	3	2	3	3	1	2	2	3	3	-	2	2	3	3	2
AVG.	3.00	1.50	2.00	1.50	2.00	2.00	2.00	2.33	3.00	3.00	1.50	1.67	3.00	1.67	1.33

**UNIVERSITY SYLLABUS:**

Unit	Content
1	DOS System commands and Editors (Preliminaries)
2	UNIX system commands and vi (Preliminaries)
3	Simple Programs: simple and compound interest. To check whether a given number is a palindrome or not, evaluate summation series, factorial of a number, generate Pascal's triangle, find roots of a quadratic equation
4	Programs to demonstrate control structure: text processing, use of break and continue, etc.
5	Programs involving functions and recursion.
6	Programs involving the use of arrays with subscripts and pointers
7	Programs using structures and files.

**RESOURCES:**

1. E. Balagurusamy “Introduction To Computing” (TMH WBUT Series).
2. Rajaraman V. Fundamental of Computers
3. Balaguruswamy “Programming in C”
4. Kanetkar Y. “Let us C”
5. M.M.Oka “Computer Fundamentals,EPH”
6. Leon Introduction to Computers, Vikas.

<b>Course Title: Basic Electrical &amp; Electronic Engineering- II</b>	<b>Code: ES291</b>
<b>Type of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 2<sup>nd</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITIES:** Basic knowledge on Physics.

**COURSE OBJECTIVE:**

- The course aims at developing creative problem-solving skills, nurturing radical thinking and encouraging holistic solutions to the problems amongst students.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom’s Taxonomy
ES291.CO1	<b>Conduct</b> different characteristics for field effect transistor.	Applying(Level III)
ES291.CO2	<b>Design</b> of different electronic circuit using operational amplifier	Creating(Level VI)
ES291.CO3	<b>Find</b> the IC specification of any electronic chip.	Remembering(Level I)
ES291.CO4	<b>Identify</b> the IC no. for any digital logic chip.	Applying(Level III)
ES291.CO5	<b>Demonstrate</b> different characteristics for bipolar junction transistor	Understanding(Level II)
ES291.CO6	<b>Illustrate</b> the basics of Boolean algebra and logic gates and their realization using discrete electronic components.	Understanding(Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	1	1	-	2	2	1	1
CO2	3	3	3	-	-	-	-	-	2	1	-	1	2	3	1
CO3	3	3	3	3	3	-	-	-	-	3	-	1	3	2	-
CO4	-	-	-	-	-	-	-	-	-	2	-	1	3	2	-
CO5	-	-	-	-	-	-	-	-	-	2	-	1	2	1	-
CO6	-	-	-	-	-	-	-	-	-	2	-	1	3	2	-
AVG.	3.00	3.00	3.00	3.00	3.00	0	0	0	1.50	1.83	0	1.17	2.50	1.83	1.00





## UNIVERSITY SYLLABUS:

### Basic Electrical Engineering- II

Unit	Content
1	Calibration of ammeter and voltmeter.
2	Open circuit and Short circuit test of a single phase Transformer.
3	No load characteristics of D.C shunt Generators
4	Starting and reversing of speed of a D.C. shunt
5	Speed control of DC shunt motor.
6	Measurement of power in a three phase circuit by two wattmeter method.

### Basic Electronics Engineering Laboratory-II

Unit	Content
1	Study of I-V characteristics of Field Effect Transistors.
2	Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
3	Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
4	Study of OPAMP circuits: Inverting and Non-inverting amplifiers, Adders, Integrators and Differentiators.
5	Study of Logic Gates and realization of Boolean functions using Logic Gates.
6	Study of Characteristic curves for CB, CE and CC mode transistors.



<b>Course Title: Basic Engineering Drawing &amp; Computer Graphics</b>	<b>Code: ME292</b>
<b>Type Of Course: Sessional</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 2<sup>nd</sup></b>	<b>Contact Hours: 1L+3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Basic knowledge on drawing.

**COURSE OBJECTIVE:**

- Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales.
- The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
ME292.CO1	<b>Perform</b> free hand sketching of basic geometrical constructions and multiple views of objects.	Applying(Level III)
ME292.CO2	<b>Design</b> isometric and perspective sections of simple solids.	Creating(Level VI)
ME292.CO3	<b>Demonstrate</b> computer aided drafting.	Understanding(Level II)
ME292.CO4	<b>Develop</b> graphic skills for communication of concepts, ideas and design of Engineering products.	Creating(Level VI)
ME292.CO5	<b>Understand</b> the internal features of an object and combination of different machine parts.	Understanding(Level II)
ME292.CO6	<b>Construct</b> modern engineering concepts to a large extent by using CAD.	Creating(Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	-	1	1	-	2	2	-	-	-	1	1	-
CO2	2	2	2	-	1	1	-	-	-	-	-	-	1	1	-
CO3	2	2	2	-	-	-	-	2	2	-	-	-	1	-	-
CO4	-	2	2	-	1	1	-	2	2	-	-	-	-	1	-
CO5	-	2	2	-	1	1	-	2	2	-	-	-	1	-	-
CO6	-	1	2	-	-	-	-	-	2	-	-	-	-	1	-
AVG.	2.00	2.00	2.00	0	1.00	1.00	0	2.00	2.00	0	0	0	1.00	1.00	0



**UNIVERSITY SYLLABUS:**

Unit	Content
1	<p><b>A. Theoretical Part</b></p> <ol style="list-style-type: none"> <li>1. Introduction to Lines, Lettering, Dimensioning, Scales. [1L]</li> <li>2. Geometrical Construction and Curves. [1L]</li> <li>3. Projection of Points, Lines and Surfaces [2L]</li> <li>4. Projection of Solids [2L]</li> <li>5. Isometric Views. [1L]</li> <li>6. Sectional Views. [1L]</li> <li>7. Development of Surfaces [1L]</li> <li>8. Introduction to Computer Aided Drafting [3L]</li> </ol>
2	<p><b>B. Practical Part</b></p> <ol style="list-style-type: none"> <li>1. LINES, LETTERING, DIMENSIONING, SCALES; Plain scale, Diagonal scale. [6hrs]</li> <li>2. GEOMETRICAL CONSTRUCTION AND CURVES; Construction of polygons, Parabola, Hyperbola, Ellipse. [6hrs]</li> <li>3. PROJECTION OF POINTS, LINES, SURFACES; Orthographic projection- 1st and 3rd angle projection, Projection of lines and surfaces– Hexagon. [3hrs]</li> <li>4. PROJECTION OF SOLIDS; Cube, Pyramid, Prism, Cylinder, Cone. [6hrs]</li> <li>5. DRAWING ISOMETRIC VIEW FROM ORTHOGONAL/ SECTIONAL VIEWS OF SIMPLE SOLIDOBJECTS. [3hrs]</li> <li>6. FULL AND HALF SECTIONAL VIEWS OF SOLIDS. [3hrs]</li> <li>7. DEVELOPMENT OF SURFACES; Prism, Cylinder, Cone. [3hrs]</li> <li>8. COMPUTER AIDED DRAFTING (Using AutoCAD and/or similar software); Introduction: Cartesian and Polar coordinate system, Absolute and Relative coordinates; Basic editing commands: Line, Point, Trace, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline; Editing methods; Basic object selection methods ,Window and crossing window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror; Display commands: Zoom, Pan, Redraw, Regenerate; Simple dimensioning and text, Simple exercises. [6hrs]</li> </ol>



**RCC INSTITUTE OF INFORMATION TECHNOLOGY**  
Canal South Road, Beliaghata, Kolkata- 700015  
College Code: 117  
(Affiliated to Maulana Abul Kalam Azad University of Technology, W.B)

# **COURSE BOOKLET FOR B.TECH (IT)**

## **SECOND YEAR**



### SEMESTER – III THEORY

<b>Course Title: Values &amp; Ethics in Profession</b>	<b>Code: HU301</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 3<sup>rd</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** N.A.

**COURSE OBJECTIVES:**

- Instill the moral values that ought to guide their profession.
- Resolve the moral issues in the profession.
- Infer moral judgment concerning the profession.
- Correlate the concepts in addressing the ethical dilemmas.
- Judge a global issue by presenting an optimum solution.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to:

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
HU301.CO1	<b>Interpret</b> the fundamental principles of values and ethics and their application to society, business and technology	Understanding (Level II)
HU301.CO2	<b>Analyze</b> the importance of preserving Natural resources by using renewable energy	Analyzing (Level IV)
HU301.CO3	<b>Assess</b> the importance of environment preservation through use of eco-friendly technologies	Evaluating (Level V)
HU301.CO4	<b>Consider</b> the need of maintaining professional ethics in the context of engineering, marketing and other areas of business	Evaluating (Level V)
HU301.CO5	<b>Develop</b> insights into the state of value crisis in present day society and industry and the means of preserving societal value	Applying (Level III)
HU301.CO6	<b>Examine</b> the importance of Indian Constitution in preserving societal values including secularism	Analyzing (Level IV)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	3	3	3	2	2	-	2	3	1	1
CO2	-	3	3	3	2	3	3	3	2	2	-	3	-	1	1
CO3	2	3	3	2	3	3	3	3	2	2	3	-	2	2	1
CO4	1	2	2	2	-	3	3	3	2	2	3	-	1	3	1
CO5	-	2	2	2	-	3	3	3	2	2	-	-	-	3	-
CO6	3	2	2	2	-	3	3	3	2	2	-	3	3	3	-
AVG.	2.25	2.33	2.17	2.00	2.50	3.00	3.00	3.00	2.00	2.00	3.00	2.67	2.25	2.17	1.00



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs/Unit
1	Science, Technology and Engineering as knowledge and as Social and Professional Activities	2
2	<b>Effects of Technological Growth:</b> <ul style="list-style-type: none"> <li>• Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: sustainable development</li> <li>• Energy Crisis: Renewable Energy Resources</li> <li>• Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations, Environmental Ethics</li> <li>• Appropriate Technology Movement of Schumacher; later developments</li> <li>• Technology and developing nations. Problems of Technology transfer, Technology assessment impact analysis.</li> <li>• Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.</li> </ul>	18
3	<b>Ethics of Profession:</b> <ul style="list-style-type: none"> <li>• Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond, Case studies.</li> </ul>	8
4	<b>Profession and Human Values Value Crisis in contemporary society</b> <ul style="list-style-type: none"> <li>• Nature of values: Value Spectrum of a 'good' life</li> <li>• Psychological values: Integrated personality; mental health</li> <li>• Societal values: The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution</li> <li>• Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity</li> <li>• Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility</li> </ul>	20

**RESOURCE:**

1. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley & Sons, New York 1994(2<sup>nd</sup> Ed)
2. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 1991.
3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996.
4. Blending the best of the East & West, Dr. Subir Chowdhury, EXCEL
5. Ethics & Mgmt. & Indian Ethos, Ghosh, VIKAS
6. Business Ethics, Pherwani, EPH
7. Ethics, Indian Ethos & Mgmt., Balachandran, Raja, Nair, Shroff Publishers



<b>Course Title: Physics-2</b>	<b>Code: PH 301</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 3<sup>rd</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITIES:** Basic Physics at 10+2 level, Physics at 1st semester

**COURSE OBJECTIVE:**

- Once the student has successfully completed this course, he/she must be able to answer the following questions or perform/demonstrate the following:
- Application of vector calculus.
- Application of problems related to classical mechanics
- Electrostatics Basics
- Derivation of wave equation for plane progressive electromagnetic wave and the properties of EM waves in different medium when the medium is perfect dielectric, perfect conductor or free space.
- Di electric and magnetic properties application
- Properties of different kinds of magnetic materials and their application, characteristic of para, ferro and dia magnetic substances
- Basic concept of Quantum mechanics
- Solving various kinds of quantum mechanical problems using Schrödinger Wave equation.
- Band gap theory application
- Classification of three types of statistical distribution

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

<b>Course Outcomes</b>	<b>CO Statement</b>	<b>Knowledge Level of revised Bloom's Taxonomy</b>
<b>PH 301.CO1</b>	<b>Apply</b> basic concepts of vector calculations	Applying(Level III)
<b>PH 301.CO2</b>	<b>Analyze</b> principles of classical mechanics	Analyzing(Level IV)
<b>PH 301.CO3</b>	<b>Categorize</b> di electric and magnetic properties of materials	Analyzing(Level IV)
<b>PH 301.CO4</b>	<b>Apply</b> Electromagnetic laws in Engineering	Applying(Level III)
<b>PH 301.CO5</b>	<b>Compare</b> between Classical Physics and Quantum Physics	Understanding(Level II)
<b>PH 301.CO6</b>	<b>Classify</b> statistical distribution to real life problems	Analyzing(Level IV)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	0	-	-	-	-	-	-	-	-	3	2	-
CO2	1	3	2	0	-	-	-	-	-	-	-	-	2	1	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO4	1	3	2	0	-	-	-	-	-	-	-	-	2	2	-
CO5	1	3	2	2	-	-	-	-	-	-	-	-	1	-	-
CO6	0	1	3	2	-	-	-	-	-	-	-	-	-	-	-
AVG.	1.50	2.33	1.83	0.83	0	0	0	0	0	0	0	0	2.00	1.50	0

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs/Unit
1	Vector Calculus: 1.1 Physical significances of grad, div, curl. Line integral, surface integral, volume integral- physical examples in the context of electricity and magnetism and statements of Stokes theorem and Gauss theorem [No Proof]. Expression of grad, div, curl and Laplacian in Spherical and Cylindrical co-ordinates.	2
2	Electricity 2.1 Coulombs law in vector form. Electrostatic field and its curl. Gauss’s law in integral form and conversion to differential form . Electrostatic potential and field, Poisson’s Eqn. Laplace’s eqn (Application to Cartesian, Spherically and Cylindrically symmetric systems – effective 1D problems) Electric current, drift velocity, current density, continuity equation, steady current. 2.2 Dielectrics-concept of polarization, the relation $D=\epsilon_0E+P$ , Polarizability. Electronic polarization and polarization in monoatomic and polyatomic gases.	8
3	Magnetostatics& Time Varying Field: 3. Lorentz force, force on a small current element placed in a magnetic field. Biot-Savart law and its applications, divergence of magnetic field, vector potential, Ampere’s law in integral form and conversion to differential form. Faraday’s law of electro-magnetic induction in integral form and conversion to differential form.	3
4	Electromagnetic Theory: 4.1 Concept of displacement current Maxwell’s field equations, Maxwell’s wave equation and its solution for free space. E.M. wave in a charge free conducting media, Skin depth, physical significance of Skin Depth, E.M. energy flow, &Poynting Vector.	6
5	Quantum Mechanics: 5.1 Generalised coordinates, Lagrange’s Equation of motion and Lagrangian, generalised force potential, momenta and energy. Hamilton’s Equation of motion and Hamiltonian. Properties of Hamilton and Hamilton’s equation of motion. 4L Course should be discussed along with physical problems of 1-D motion 5.2 Concept of probability and probability density, operators, commutator. Formulation of quantum mechanics and Basic postulates, Operator correspondence, Time dependent Schrödinger’s equation, formulation of time independent Schrödinger’s equation by method of separation of variables, Physical interpretation of wave function $\psi$ (normalization and probability interpretation), Expectation values, Application of Schrödinger equation – Particle in an infinite square well potential (1-D and 3-D potential well), Discussion on degenerate levels	13
6	Statistical Mechanics: 3.1 Concept of energy levels and energy states. Microstates, macrostates and thermodynamic probability, equilibrium macrostate. MB, FD, BE statistics (No deduction necessary), fermions, bosons (definitions in terms of spin, examples), physical significance and application, classical limits of quantum statistics Fermi distribution at zero & non-zero temperature, Calculation of Fermi level in metals, also total energy at absolute zero of temperature and total number of particles, Bose-Einstein statistics – Planck’s law of blackbody radiation.	7





**RESOURCE:**

1. Principles of Physics, 10ed, David Halliday, Robert Resnick Jearl Walker , Wiley
2. An Introduction to Mechanics (SIE), David Kleppner, Robert Kolenkow, McGraw Hill Education
3. Textbook of Physical Optics, B. Ghosh, Laxmi Publications
4. Introduction to Electrodynamics, David J. Griffiths, Pearson Education India Learning Private Limited
5. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, Robert Eisberg, Robert Resnick, Wiley

<b>Course Title: Basic Environmental Engineering &amp; Elementary Biology</b>	<b>Code: CH 301</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 3<sup>rd</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Basic knowledge of Environmental science

**COURSE OBJECTIVE:**

- Be able to understand the natural environment and its relationships with human activities.
- Be able to apply the fundamental knowledge of science and engineering to assess environmental and health risk.
- Be able to understand environmental laws and regulations to develop guidelines and procedures for health and safety issues.
- Be able to solve scientific problem-solving related to air, water, noise & land pollution.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CH301.CO1	<b>Solve</b> different open-ended problems related to air pollution acquiring the detailed knowledge about source, effect and mechanism of the pollution	Applying (Level III)
CH301.CO2	<b>Resolve</b> various societal problems related to land pollution after detailed understanding about source, effect and mechanism of the pollution.	Applying (Level III)
CH301.CO3	<b>Demonstrate</b> the basic of the need of natural resource management, environmental protection and population control. Extend the knowledge as well as the consciousness related to environmental issues to the society considering the related laws, acts and legislations	Understanding(Level II)
CH301.CO4	<b>Acquire</b> skills for scientific problem-solving related to water pollution	Applying (Level III)
CH301.CO5	<b>Determine</b> the issues related to noise pollution after studying the existing situation in detail.	Evaluating (Level VI)
CH301.CO6	<b>Develop</b> awareness about the geographical feature of the country considering biodiversity and the variety of ecological systems present in the nature	Applying (Level III)



**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	-	2	1	-	-	1	1	-	-	-	-	1	1	1	-
<b>CO2</b>	-	2	1	-	-	1	1	-	-	-	-	1	1	1	1
<b>CO3</b>	-	2	2	-	-	2	2	-	-	-	-	1	1	1	-
<b>CO4</b>	-	2	1	-	-	1	1	-	-	-	-	1	1	1	1
<b>CO5</b>	-	2	1	-	-	1	1	-	-	-	-	1	1	1	1
<b>CO6</b>	-	1	1	-	-	1	1	-	-	-	-	1	1	1	-
<b>AVG.</b>	<b>0</b>	<b>1.83</b>	<b>1.17</b>	<b>0</b>	<b>0</b>	<b>1.17</b>	<b>1.17</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs/Unit
1	<p><b>General</b>            Basic ideas of environment, basic concepts, man, society &amp; environment, their interrelationship.</p> <p>Mathematics of population growth and associated problems, Importance of population study in environmental engineering, definition of resource, types of resource, renewable, non-renewable, potentially renewable, effect of excessive use vis-à-vis population growth, Sustainable Development.</p> <p>Materials balance: Steady state conservation system, steady state system with non-conservative pollutants, step function.</p> <p>Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and control/management; Anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and Engineering.</p>	4
2	<p><b>Ecology</b>            Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function.</p> <p>Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban); Food chain [definition and one example of each food chain], Food web.</p> <p>Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur].</p> <p>Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity..</p>	6
3	<p><b>Air Pollution</b>            Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere, Tropopause and Mesopause.</p> <p>Energy balance: Conductive and Convective heat transfer, radiation heat transfer, simple global temperature model [Earth as a black body, earth as albedo], Problems.</p> <p>Green house effects: Definition, impact of greenhouse gases on the global climate and consequently on sea water level, agriculture and marine food. Global warming and its</p>	11



	<p>consequence, Control of Global warming. Earth's heat budget.</p> <p>Lapse rate: Ambient lapse rate Adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion).</p> <p>Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height, smokestack plumes and Gaussian plume model.</p> <p>Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant.</p> <p>Sources and effect of different air pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN. Smog, Photochemical smog and London smog.</p> <p>Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other green- house gases, effect of ozonemodification.</p> <p>Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP. cyclone separator, bag house, catalytic converter, scrubber (ventury), Statement with brief reference).</p>	
4	<p><b>Water Pollution</b></p> <p>Hydrosphere, Hydrological cycle and Natural water.</p> <p>Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds. River/Lake/ground water pollution:</p> <p>River: DO, 5 day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river[deoxygenation, reaeration], COD, Oil, Greases, pH.</p> <p>Lake: Eutrophication [Definition, source and effect].Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only)</p> <p>Standard and control: Waste water standard [BOD, COD, Oil, Grease], Water Treatment system [coagulation and flocculation, sedimentation and filtration, disinfection, hardness and alkalinity, softening] Waste water treatment system, primary and secondary treatments [Trickling filters, rotating biological contractor, Activated sludge, sludge treatment, oxidation ponds] tertiary treatment definition. Water pollution due to the toxic elements and their biochemical effects: Lead, Mercury, Cadmium, and Arsenic</p>	9
5	<p><b>Land Pollution [3L]</b></p> <p>Lithosphere; Internal structure of earth, rock and soil</p> <p>Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes; Recovery and disposal method- Open dumping, Land filling, incineration, composting, recycling.</p> <p>Solid waste management and control (hazardous and biomedical waste).</p>	3
6	<p><b>Noise Pollution [2L]</b></p> <p>Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise, neighborhood noise]</p> <p>Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level, <math>L_{10}</math> (18 hr Index), <math>Ld_n</math> . Noise pollution control.</p>	2



7	<b>Environmental Management [2L]</b> Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol.	2
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**RESOURCE:**

1. Masters, G. M., “Introduction to Environmental Engineering and Science”, Prentice-Hall of India Pvt. Ltd., 1991.
2. De, A. K., “Environmental Chemistry”, New Age International.

<b>Course Title: Analog &amp; Digital Electronics</b>	<b>Code: CS301</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 3<sup>rd</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITIES:** Class XII Mathematics, Physics, Basic knowledge of Computer, Basic Electronics, Basic Electrical.

**COURSE OBJECTIVE:**

- Explain the principles of analog and digital systems.
- Compare the performance of the digital system over the analog system.
- Prepare analog as well as digital logic circuits.
- Creating a hardware module with some specific application.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom’s Taxonomy
CS301.CO1	<b>Demonstrate</b> the concepts of digital circuits	Understanding (Level II)
CS301.CO2	<b>Discuss</b> between analog and digital system.	Creating (Level VI)
CS301.CO3	<b>Develop</b> the analog circuits to determine for a given outputs.	Creating (Level VI)
CS301.CO4	<b>Explain</b> the different model of analog and digital logic circuits.	Evaluating (Level V)
CS301.CO5	<b>Analyze</b> the outputs for given inputs for particular analog and digital circuits.	Analyzing (Level VI)
CS301.CO6	<b>Explain</b> the principle of different analog and digital electronics circuits.	Understanding (Level II)



**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	1	1	1	-	2	2	3	2	3	-	2	3	3	2
<b>CO2</b>	3	2	1	1	2	-	-	3	3	1	1	3	3	2	3
<b>CO3</b>	3	2	3	1	1	-	-	2	3	2	2	2	3	2	3
<b>CO4</b>	3	3	3	2	-	-	-	3	3	2	2	2	3	2	3
<b>CO5</b>	3	2	1	1	3	-	-	2	3	1	2	2	3	2	2
<b>CO6</b>	3	2	2	1	-	-	-	2	2	-	2	1	3	2	1
<b>AVG.</b>	<b>3.00</b>	<b>2.00</b>	<b>1.83</b>	<b>1.17</b>	<b>2.00</b>	<b>2.00</b>	<b>2.00</b>	<b>2.50</b>	<b>2.67</b>	<b>1.80</b>	<b>1.80</b>	<b>2.00</b>	<b>3.00</b>	<b>2.17</b>	<b>2.33</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Introduction</b> Different Classes of Amplifiers - (Class-A, B, AB and C - basic concepts, power, efficiency; Recapitulation of basic concepts of Feedback and Oscillation, Phase Shift, Wein Bridge oscillators Astable & Mon stable Multivibrators; Schmitt Trigger circuits, 555 Timer.	9
2	Binary Number System & Boolean Algebra (recapitulation); BCD, ASCII, EBDIC, Gray codes and their conversions; Signed binary number representation with 1's and 2's complement methods, Binary arithmetic, Venn diagram, Boolean algebra (recapitulation); Representation in SOP and POS forms; Minimization of logic expressions by algebraic method. Combinational circuits - Adder and Subtractor circuits (half & full adder & subtractor); Encoder, Decoder, Comparator, Multiplexer, DeMultiplexer and Parity Generator.	11
3	Sequential Circuits - Basic Flip-flop & Latch, Flip-flops -SR, JK, D, T and JK Master-slave Flip Flops, Registers (SISO, SIPO, PIPO, PISO) Ring counter, Johnson counter Basic concept of Synchronous and Asynchronous counters (detail design of circuits excluded), Design of Mod N Counter.	10
4	A/D and D/A conversion techniques – Basic concepts (D/A :R-2-R only A/D: successive approximation. Logic families- TTL, ECL, MOS and CMOS - basic concepts.	6

**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
Encoder, Decoder, Comparator, Multiplexer, De Multiplexer and Parity Generator.	Unit 2
Sequential Circuits	Unit 3
A/D and D/A conversion techniques – Basic concepts (D/A: R-2-R only A/D: successive approximation. Logic families- TTL, ECL, MOS and CMOS - basic concepts.	Unit 4



**RESOURCES:**

1. G.Nagrath, Analog Electronics, PHI
2. Analog Electronics, A.K. Maini, Khanna Publishing House
3. Microelectronics Engineering –Sedra & Smith-Oxford.
4. Principles of Electronic Devices & circuits—B L Thereja & Sedha—S Chand
5. Digital Electronics – Kharate – Oxford
6. Digital Electronics – Logic & Systems by J.Bigmeil & R.Donovan; Cambridge Learning.
7. Digital Logic and State Machine Design (3rd Edition) – D.J.Comer, OUP
8. Electronic Devices & Circuit Theory – Boyelstad & Nashelsky - PHI
9. Bell-Linear IC & OP AMP—Oxford

<b>Course Title: Data Structure &amp; Algorithm</b>	<b>Code: CS302</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 3<sup>rd</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator)</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS 201 (Basic Computation and Principles of C), M101 & M201 (Mathematics), basics of set theory

**COURSE OBJECTIVE:**

- To understand data structures and its utility
- To learn the implementation of data structure concepts in C programming
- To understand the importance of run time analysis
- To apply appropriate algorithm for proficiently solving a problem

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS302.CO1	<b>Memorize</b> relevant applicable methods for a given problem	Remember (Level I)
CS302.CO2	<b>Translate</b> a problem statement into pseudo code using specific data structure	Understand (Level II)
CS302.CO3	<b>Use</b> appropriate data structure model in problem solving process	Apply (Level III)
CS302.CO4	<b>Experiment</b> proposed algorithm and compare run time performance with suitable contemporary methods	Analyze (Level IV)
CS302.CO5	<b>Select</b> most suitable method for a particular problem solving	Evaluate (Level V)
CS302.CO6	<b>Develop</b> new methods by incorporating suitable data structure for problem solving	Understanding (Level II)



**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	-	-	-	-	-	-	-	-	2	-	-	-
CO2	3	3	2	-	-	-	2	-	3	2	-	1	2	-	3
CO3	3	2	2	-	3	-	1	-	-	1	-	-	-	2	-
CO4	3	2	2	3	1	1	-	-	3	-	-	-	-	2	-
CO5	3	2	2	2	2	2	2	1	3	1	-	-	2	3	1
CO6	3	3	3	2	2	2	-	1	3	-	2	-	3	-	1
AVG.	3.0	2.17	2.17	2.33	2.0	1.67	1.67	1.0	3.0	1.33	2.0	1.5	2.33	2.33	1.67

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<p><b>Linear Data Structure [8L]</b>  <b>Introduction(2L):</b>            Why we need data structure?            Concepts of data structures: a) Data and data structure b) Abstract Data Type and Data Type.            Algorithms and programs, basic idea of pseudo-code.            Algorithm efficiency and analysis, time and space analysis of algorithms – order notations.</p> <p><b>Array (2L):</b>            Different representations – row major, column major.            Sparse matrix - its implementation and usage. Array representation of polynomials.</p> <p><b>Linked List (4L):</b>            Singly linked list, circular linked list, doubly linked list, linked list representation of polynomial and applications.</p>	8
2	<p><b>Linear Data Structure [7L]</b>            Stack and its implementations (using array, using linked list), applications.            Queue, circular queue, dequeues. Implementation of queue- both linear and circular (using array, using linked list), applications.</p> <p><b>Recursion (2L):</b>            Principles of recursion – use of stack, differences between recursion and iteration, tail recursion. Applications - The Tower of Hanoi, Eight Queens Puzzle.</p>	7
3	<p><b>Nonlinear Data structures [15L]</b>  <b>Trees (9L):</b>            Basic terminologies, forest, tree representation (using array, using linked list).            Binary trees - binary tree traversal (pre-, in-, post- order), threaded binary tree (left, right, full) - non-recursive traversal algorithms using threaded binary tree, expression tree.            Binary search tree- operations (creation, insertion, deletion, searching).            Height balanced binary tree – AVL tree (insertion, deletion with examples only). B- Trees – operations (insertion, deletion with examples only).</p> <p><b>Graphs (6L):</b>            Graph definitions and concepts (directed/undirected graph, weighted/un-weighted edges, sub-graph, degree, cut- vertex/articulation point, pendant node, clique, complete graph, connected components – strongly connected component, weakly connected component, path, shortest path, isomorphism).</p>	15



	<p>Graph representations/storage implementations – adjacency matrix, adjacency list, adjacency multi-list.</p> <p>Graph traversal and connectivity – Depth-first search (DFS), Breadth-first search (BFS) – concepts of edges used in DFS and BFS (tree-edge, back-edge, cross-edge, forward-edge), applications.</p> <p>Minimal spanning tree – Prim’s algorithm (basic idea of greedy methods).</p>	
4	<p><b>Searching, Sorting [10L]</b></p> <p><b>Sorting Algorithms (5L):</b> Bubble sort and its optimizations, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort (concept of max heap, application – priority queue), radix sort.</p> <p><b>Searching (2L):</b> Sequential search, binary search, interpolation search.</p> <p><b>Hashing (3L):</b> Hashing functions, collision resolution techniques.</p>	19

**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
Programming in C. Recursion. Arrays,	Unit 1
Stacks, Queues	Unit 2
Trees, binary search trees, binary heaps, graphs	Unit 3

**RESOURCES:**

1. “Data Structures And Program Design In C”, 2/E by Robert L. Kruse, Bruce P. Leung.
2. “Fundamentals of Data Structures of C” by Ellis Horowitz, Sartaj Sahni, Susan Anderson-freed.
3. “Data Structures in C” by Aaron M. Tenenbaum.
4. “Data Structures” by S. Lipschutz.
5. “Data Structures Using C” by Reema Thareja.
6. “Data Structure Using C”, 2/e by A.K. Rath, A. K. Jagadev.
7. “Introduction to Algorithms” by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.





<b>Course Title: Computer Organization</b>	<b>Code: CS303</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 3<sup>rd</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS 201 Introductions to Computing, EC 101 Basic Electronics Engineering.

**COURSE OBJECTIVE:**

- Explain the organization of basic computer, its design.
- Demonstrate the working of central processing unit and RISC and CISC Architecture.
- Understand the principles of combinational and sequential logic circuits to design basic components
- Illustrate addressing modes, instruction formats, instruction sets, instruction cycle, and instruction pipeline with different hazards.
- Compare the performance of different levels components in memory hierarchy with respect to average memory access time.
- Illustrate I/O interface, different asynchronous I/O data transfer- strobe and handshaking, various modes of I/O-programmed I/O, interrupt driven I/O, and DMA.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS303.CO1	<b>Explain</b> the structural and functional organization of a computer system.	Understanding (Level II)
CS303.CO2	<b>Discuss</b> the integer and floating point number representations and the operations applied on it.	Analyzing (Level IV)
CS303.CO3	<b>Demonstrate</b> different circuit designs using basic gates and hardware architectures.	Applying (Level III)
CS303.CO4	<b>Define</b> the addressing modes, instruction formats, and instruction pipeline.	Remembering (Level I)
CS303.CO5	<b>Analyze</b> various components of memory hierarchy in terms of access time, cost.	Analyzing (Level IV)
CS303.CO6	<b>Explain</b> the concept of I/O interfacing and various taxonomy of I/O data transfer.	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	-	-	-	-	-	-	-	1	3	2	1
CO2	3	3	2	2	1	-	-	-	-	-	-	1	3	2	1
CO3	3	2	3	2	1	-	-	-	-	-	-	1	3	2	2
CO4	3	3	2	1	-	-	-	-	-	-	-	1	3	1	1
CO5	3	2	1	1	-	-	-	-	-	-	-	1	3	1	1
CO6	3	2	2	1	-	-	-	-	-	-	-	1	3	1	1
AVG.	3.00	2.17	1.83	1.33	1.00	0	0	0	0	0	0	1.00	3.00	1.50	1.17



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs/Unit
1	Basic organization of the stored program computer and operation sequence for execution of a program. Role of operating systems and compiler/assembler. Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format. Instruction sets and addressing modes. [7L] Commonly used number systems. Fixed and floating point representation of numbers. [1L]	8
2	Overflow and underflow. Design of adders - ripple carry and carry look ahead principles. [3L] Design of ALU. [1L] Fixed point multiplication -Booth's algorithm. [1L] Fixed point division - Restoring and non-restoring algorithms. [2L] Floating point - IEEE 754 standard. [1L]	8
3	Memory unit design with special emphasis on implementation of CPU-memory interfacing. [2L] Memory organization, static and dynamic memory, memory hierarchy, associative memory. [3L] Cache memory, Virtual memory. Data path design for read/write access. [5L]	10
4	Design of control unit - hardwired and micro-programmed control. [3L] Introduction to instruction pipelining. [2L] Introduction to RISC architectures. RISC vs CISC architectures. [2L] I/O operations - Concept of handshaking, Polled I/O, interrupt and DMA. [3L]	10

**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
Machine instructions and addressing modes	Unit 1
ALU	Unit 2
Memory hierarchy: cache, main memory and secondary storage;	Unit 3
Data-path and control unit. Instruction pipelining. I/O interface (interrupt and DMA mode)	Unit 4

**RESOURCES:**

1. Mano, M.M., “Computer System Architecture”, PHI.
2. Behrooz Parhami “ Computer Architecture”, Oxford University Press
3. Hayes J. P., “Computer Architecture & Organisation”, McGraw Hill,
4. Hamacher, “Computer Organisation”, McGraw Hill,
5. N. senthil Kumar, M. Saravanan, S. Jeevananthan, “Microprocessors and Microcontrollers” OUP
6. Chaudhuri P. Pal, “Computer Organisation & Design”, PHI,
7. P N Basu- “Computer Organization & Architecture” , Vikas Pub



### SEMESTER – III PRACTICAL

<b>Course Title: Physics-2</b>	<b>Code: PH391</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 3<sup>rd</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITIES:** Basic Physics at 10+2 level, Physics at 1st semester

**COURSE OBJECTIVE:**

- Once the student has successfully completed this course, he/she must be able to answer the following questions or perform/demonstrate the following:
- Application of vector calculus.
- Application of problems related to classical mechanics
- Electrostatics Basics
- Derivation of wave equation for plane progressive electromagnetic wave and the properties of EM waves in different medium when the medium is perfect dielectric, perfect conductor or free space.
- Di electric and magnetic properties application
- Properties of different kinds of magnetic materials and their application, characteristic of para, ferro and dia magnetic substances
- Basic concept of Quantum mechanics
- Solving various kinds of quantum mechanical problems using Schrödinger Wave equation.
- Band gap theory application
- Classification of three types of statistical distribution

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
PH391.CO1	<b>Find</b> Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant	Remembering (Level I)
PH391.CO2	<b>Determine</b> Band Gap of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors.	Evaluating (Level V)
PH391.CO3	<b>Identify</b> the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.	Applying (Level III)
PH391.CO4	<b>Demonstrate</b> Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors.	Understanding (Level II)
PH391.CO5	<b>Apply</b> concepts of quantum mechanics to verify Bohr's atomic orbital theory	Applying (Level IV)
PH391.CO6	<b>Define</b> Planck's constant and Stefan's constant applying modern Physics	Remembering (Level I)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	2	1	1	-	-	-	-	-	-	-	-	3	2	-
<b>CO2</b>	3	2	1	-	-	-	-	-	-	-	-	-	2	1	-
<b>CO3</b>	3	2	1	-	-	-	-	-	-	-	-	-	2	1	-
<b>CO4</b>	3	2	1	-	-	-	-	-	-	-	-	-	2	2	-
<b>CO5</b>	3	1	1	1	-	-	-	-	-	-	-	-	1	-	-
<b>CO6</b>	3	1	1	1	-	-	-	-	-	-	-	-	-	-	-
<b>AVG.</b>	<b>3.00</b>	<b>1.67</b>	<b>1.00</b>	<b>1.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2.00</b>	<b>1.50</b>	<b>0</b>

**UNIVERSITY SYLLABUS:**

Unit	Content
1	Experiments in Optics <ul style="list-style-type: none"> <li>• Determination of dispersive power of the material of a prism</li> <li>• Determination of wavelength of a monochromatic light by Newton’s ring</li> <li>• Determination of wavelength of a monochromatic light by Fresnel’s bi-prism</li> <li>• Determination of wavelength of the given laser source by diffraction method</li> </ul>
2	Experiments in Electricity & Magnetism <ul style="list-style-type: none"> <li>• Determination of thermo electric power of a given thermocouple.</li> <li>• Determination of specific charge (e/m) of electron by J.J. Thompson’s method.</li> <li>• Determination of dielectric constant of a given dielectric material.</li> <li>• Determination of Hall coefficient of a semiconductor by four probe method.</li> <li>• To study current voltage characteristics, load response, areal characteristic and spectral response of a photovoltaic solar cell.</li> <li>• Determination of resistance of ballistic galvanometer by half deflection method and study of variation of logarithmic decrement with series resistance.</li> <li>• Determination of unknown resistance using Carey Foster’s bridge</li> <li>• Study of Transient Response in LR, RC and LCR circuits using expeyes</li> <li>• Generating sound from electrical energy using expeyes</li> </ul>
3	Experiments in Quantum Physics <ul style="list-style-type: none"> <li>• Determination of Stefan-Boltzmann constant.</li> <li>• Determination of Planck constant using photocell.</li> <li>• Determination of Lande-g factor using Electron spin resonance spectrometer.</li> <li>• Determination of Rydberg constant by studying Hydrogen spectrum.</li> <li>• Determination of Band gap of semiconductor.</li> <li>• To study current voltage characteristics, load response, areal characteristic and spectral response of a photovoltaic solar cell.</li> </ul>
4	Miscellaneous experiments <ul style="list-style-type: none"> <li>• Determination of Young’s modulus of elasticity of the material of a bar by the method of flexure</li> <li>• Determination of bending moment and shear force of a rectangular beam of uniform cross- section</li> <li>• Determination of modulus of rigidity of the material of a rod by static method</li> <li>• Determination of rigidity modulus of the material of a wire by dynamic method</li> <li>• To determine the moment of inertia of a body about an axis passing through its centre of gravity and to determine the modulus of rigidity of the material of the suspended wire</li> <li>• Determination of coefficient of viscosity by Poiseulle’s capillary flow method</li> </ul>

**RESOURCES:**

1. Practical Physics, Prof. B. Ghosh



<b>Course Title: Analog and Digital Electronics lab</b>	<b>Code: CS391</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 3rd</b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment committee (PAC)</b>

**PRE-REQUISTIES:** Class XII Mathematics, Physics, Basic knowledge of Computer, Basic Electronics, Basic Electrical.

**COURSE OBJECTIVE:**

- Explain the principles of analog and digital systems.
- Compare the performance of the digital system over the analog system.
- Prepare analog as well as digital circuits.
- Creating a hardware module with some specific application.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS391.CO1	<b>Demonstrate</b> the concepts of circuits	Understanding (Level II)
CS391.CO2	<b>Discuss</b> between analog and digital system.	Creating (Level VI)
CS391.CO3	<b>Develop</b> the analog circuits to determine for a given outputs.	Creating (Level VI)
CS391.CO4	<b>Explain</b> the different model of analog and digital circuits.	Evaluating (Level V)
CS391.CO5	<b>Analyze</b> the outputs for given inputs for particular analog and digital circuits.	Analyzing (Level VI)
CS391.CO6	<b>Explain</b> the principle of different analog and digital circuits.	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	-	-	-	-	-	-	1	3	3	2
CO2	3	3	3	2	3	-	-	2	-	-	-	2	3	1	3
CO3	3	3	3	2	3	-	-	2	1	-	-	2	3	2	3
CO4	3	3	3	2	3	-	-	2	-	-	1	2	3	3	3
CO5	3	3	3	2	3	-	-	1	1	-	1	2	3	3	2
CO6	3	3	2	1	1	-	-	-	1	-	-	1	3	3	1
AVG.	3.00	3.00	2.83	1.67	2.33	0	0	1.75	1.00	0	1.00	1.67	3.00	2.50	2.33



### UNIVERSITY SYLLABUS:

Unit	Content	Hrs/Unit
<b>ANALOG: At least any two of the following</b>		
1	Design a Class A amplifier.-Analog	3
2	Design a Phase-Shift Oscillator.-Analog	3
3	Design of a Schmitt Trigger using 555 timer. -Analog	3
<b>DIGITAL : At least any five of the following</b>		
4	Design a Full Adder using basic gates and verify its output / Design a Full Subtractor circuit using basic gates and verify its output. - Digital	3
5	Construction of simple Decoder & Multiplexer circuits using logic gates. - Digital	3
6	Realization of RS / JK / D flip flops using logic gates. - Digital	3
7	Design of Shift Register using J-K / D Flip Flop. - Digital	3
8	Realization of Synchronous Up/Down counter. - Digital	3
9	Design of MOD- N Counter. - Digital	3
10	Study of DAC - Digital	3

### RESOURCES:

1. G.Nagrath, Analog Electronics, PHI
2. Analog Electronics, A.K. Maini, Khanna Publishing House
3. Microelectronics Engineering –Sedra & Smith-Oxford.
4. Principles of Electronic Devices & circuits—B L Thereja & Sedha—S Chand
5. Digital Electronics – Kharate – Oxford
6. Digital Electronics – Logic & Systems by J.Bigmeil & R.Donovan; Cambridge Learning.
7. Digital Logic and State Machine Design (3rd Edition) – D.J.Comer, OUP
8. Electronic Devices & Circuit Theory – Boyelstad & Nashelsky - PHI
9. Bell-Linear IC & OP AMP—Oxford
10. P. Raja- Digital Electronics- Scitech Publications.
11. Morris Mano- Digital Logic Design- PHI.
12. R. P. Jain- Modern Digital Electronics, 2/e ,McGraw Hill.
13. H. Taub & D. Shilling, Digital Integrated Electronics- McGraw Hill.
14. D.Ray Chaudhuri- Digital Circuits-Vol-I & II, 2/e- Platinum Publishers.
15. Tocci, Widmer, Moss- Digital Systems,9/e- Pearson.



<b>Course Title: Data Structure &amp; Algorithm</b>	<b>Code: CS392</b>
<b>Type of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 3<sup>rd</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS 201 (Basic Computation and Principles of C)

**COURSE OBJECTIVE:**

- To understand data structures and its utility
- To understand roles of linear and nonlinear data patterns
- To implement data structure concepts in C programming
- To apply appropriate data structure in in different problem solving

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS392.CO1	<b>Define</b> appropriate data structure to represent data items of various problems	Remember (Level I)
CS392.CO2	<b>Explain</b> time and place complexity of different algorithm	Understand (Level II)
CS392.CO3	<b>Use</b> appropriate data structure model in problem solving process	Apply (Level III)
CS392.CO4	<b>Test</b> proposed algorithm by writing code and referring a set of inputs	Analyze (Level IV)
CS392.CO5	<b>Select</b> most suitable method for a particular problem solving	Evaluate (Level V)
CS392.CO6	<b>Develop</b> new methods by incorporating suitable data structure for problem solving	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	3	2	2	-	-	-	-	-	-	-	2	-	-	-
<b>CO2</b>	3	3	2	2	-	-	2	-	3	2	-	1	2	-	3
<b>CO3</b>	3	-	2	-	3	-	1	-	-	1	-	-	-	2	-
<b>CO4</b>	3	-	2	3	3	1	-	-	3	-	-	-	-	2	-
<b>CO5</b>	3	2	2	3	-	2	2	1	3	1	-	-	2	3	3
<b>CO6</b>	3	3	3	-	3	2	-	1	3	-	2	-	3	-	3
<b>AVG.</b>	<b>3.0</b>	<b>2.75</b>	<b>2.17</b>	<b>2.50</b>	<b>3.0</b>	<b>1.67</b>	<b>1.67</b>	<b>1.0</b>	<b>3.0</b>	<b>1.33</b>	<b>2.00</b>	<b>1.50</b>	<b>2.33</b>	<b>2.33</b>	<b>3.0</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Linear Data Structure [10 x 3 P = 30 P]</b> a) Implementation of Array operations b) Implementation of Binary search technique c) Sorting Techniques i. Implementation of Bubble Sort ii. Implementation of Merge Sort iii. Implementation of Quick Sort d) Implementation of Stack with PUSH, POP, Delete e) Implementation of Infix to Postfix conversion and Postfix evaluation f) Implementation of Queue with Insert, Delete and Display g) Implementation of Priority Queue h) Implementation of Linked list, Insert, Removal and Traversal i) Implementation of Double Linked List j) Implementation of Reversing a Linked List	30
2	<b>Non-Linear Data Structure [3 x 3 P = 9 P]</b> a) Implementation of Binary Tree, Insertion and Traversal (Preorder, Postorder and Inorder) b) Implementation of Binary Search Tree c) Implementation of Hashing and collision resolution	9

**RESOURCES:**

1. "Data Structures And Program Design In C", 2/E by Robert L. Kruse, Bruce P. Leung.
2. "Fundamentals of Data Structures of C" by Ellis Horowitz, Sartaj Sahni, Susan Anderson-freed.
3. "Data Structures in C" by Aaron M. Tenenbaum.
4. "Data Structures" by S. Lipschutz.
5. "Data Structures Using C" by Reema Thareja.
6. "Data Structure Using C", 2/e by A.K. Rath, A. K. Jagadev.
7. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.





<b>Course Title: Computer Organization</b>	<b>Code: CS393</b>
<b>Type of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 3<sup>rd</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITES:** EC 191 Basic Electronics Engineering

**COURSE OBJECTIVE:**

- Analyze the behavior of various logic gates.
- Design the combinational circuits for basic components of computer system and applications.
- Analyze the operational behavior and applications of various flip-flops.
- Design Arithmetic logic units and different types of memory blocks.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS393.CO1	<b>Demonstrate</b> the behavior of various integrated chips (IC): multiplexer, decoder, encoder, comparator and verify corresponding truth tables.	Understanding (Level II)
CS393.CO2	<b>Design</b> of an adder/subtractor composite unit.	Creating (Level VI)
CS393.CO3	<b>Develop</b> the design of a BCD adder.	Applying (Level III)
CS393.CO4	<b>Construct</b> the design of a carry-look ahead-adder.	Applying (Level III)
CS393.CO5	<b>Experiment with</b> an arithmetic and logic units using multiplexer unit for single bit and multi bit arithmetic operations.	Applying (Level III)
CS393.CO6	<b>Examine</b> read write operation using RAM IC and cascade two RAM ICs for vertical and horizontal expansion.	Analyzing (Level IV)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	2	-	-	1	3	1	-
CO2	3	3	2	1	1	-	-	1	2	-	-	2	3	1	-
CO3	3	3	2	1	1	-	-	1	2	-	-	2	3	1	-
CO4	3	3	2	1	1	-	-	1	2	-	1	2	3	1	-
CO5	3	3	2	2	1	-	-	1	2	-	1	2	3	2	-
CO6	3	3	2	2	1	-	-	1	2	-	-	1	3	2	-
AVG.	3.00	2.83	1.83	1.33	1.00	0	0	1.00	2.00	0	1.00	1.67	3.00	1.33	0



### UNIVERSITY SYLLABUS:

Unit	Content
1.	Familiarity with IC-chips, e.g. a) Multiplexer , b) Decoder, c) Encoder b) Comparator Truth Table verification and clarification from Data-book.
2.	Design an Adder/Subtractor composite unit.
3.	Design a BCD adder.
4.	Design of a 'Carry-Look-Ahead' Adder circuit.
5.	Use a multiplexer unit to design a composite ALU.
6.	Use ALU chip for multibit arithmetic operation.
7.	Implement read write operation using RAM IC
8.	(a) & (b) Cascade two RAM ICs for vertical and horizontal expansion.

### RESOURCES:

1. Mano, M.M., "Computer System Architecture", PHI.
2. Chaudhuri P. Pal, "Computer Organisation & Design", PHI,
3. P N Basu- "Computer Organization & Architecture" , Vikas Pub

## SEMESTER – IV

### THEORY

<b>Course Title: Numerical Methods</b>	<b>Code: M(CS)401</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 4<sup>th</sup></b>	<b>Contact Hours: 2L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** C-Language, Data structure.

### COURSE OBJECTIVE:

- Explain the principles and modules of numerical methods.
- Compare performance of different algorithms in numerical methods.
- Produce algorithmic solutions to different mathematical problems.
- Illustrate numerical methods concepts such as interpolation, integration, and root evaluation, solving of differential equation and solving a set of linear equations.



**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
M(CS)401.CO1	<b>Demonstrate</b> common numerical methods and how they are used to obtain approximate solutions to complex mathematical problems.	Understanding (Level II)
M(CS)401.CO2	<b>Apply</b> different numerical methods to solve real life mathematical problem.	Applying (Level III)
M(CS)401.CO3	<b>Analyze</b> different numerical algorithms to solve a particular problem.	Analyzing (Level IV)
M(CS)401.CO4	<b>Define</b> a mathematical problem with its assumption to solve it using numerical algorithm.	Remembering (Level I)
M(CS)401.CO5	<b>Interpret</b> a mathematical problem to use accurate numerical algorithm to solve it.	Understanding (Level II)
M(CS)401.CO6	<b>Evaluate</b> interpolation, integration, root evaluation, solving of differential equation and solving a set of linear equations.	Evaluating (Level V)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	1	2	2	-	2	1	1	2	3	1	2	3	3	1
<b>CO2</b>	3	2	1	2	2	-	-	-	2	1	-	2	3	2	1
<b>CO3</b>	3	2	3	1	-	-	-	1	2	2	-	2	3	2	1
<b>CO4</b>	3	2	2	2	-	-	-	-	2	2	-	2	3	2	1
<b>CO5</b>	3	2	1	2	3	-	-	-	2	1	-	2	3	2	1
<b>CO6</b>	3	2	3	2	-	-	-	-	2	-	-	1	3	2	1
<b>AVG.</b>	<b>3.00</b>	<b>1.83</b>	<b>2.00</b>	<b>1.83</b>	<b>2.50</b>	<b>2.00</b>	<b>1.00</b>	<b>1.00</b>	<b>2.00</b>	<b>1.80</b>	<b>1.00</b>	<b>1.83</b>	<b>3.00</b>	<b>2.17</b>	<b>1</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Interpolation</b> forward/backward interpolation, Lagrange's and Newton's divided difference Interpolation	5
2	<b>Numerical integration</b> Trapezoidal rule, Simpson's 1/3 rule, Expression for corresponding error terms.	3
3	<b>Numerical solution of a system of linear equations</b> Gauss elimination method, Matrix inversion, LU Factorization method, Gauss-Seidel iterative method.	6
4	<b>Numerical solution of Algebraic equation</b> Bisection method, Regula-Falsi method, Newton-Raphson method.	4
5	<b>Numerical solution of ordinary differential equation</b> Euler's method, Runge-Kutta methods, Predictor-Corrector methods and Finite Difference method.	6

**RESOURCES:**

1. C. Xavier: C Language and Numerical Methods.
2. Dutta & Jana: Introductory Numerical Analysis.
3. J. B. Scarborough: Numerical Mathematical Analysis.



<b>Course Title: Mathematics-3</b>	<b>Code: M401</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 4<sup>th</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** M201 Mathematics-2.

**COURSE OBJECTIVE:**

- To know basic Concept of probability and distribution.
- To know the sampling distribution and maximum likelihood estimation of statistical parameters.
- To know testing of hypothesis for small samples.
- To know basic Concept of graph theory, graph coloring.
- To understand the basic algebraic structures and their elementary properties.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
M401.CO1	<b>Demonstrate</b> the concepts of probability	Understanding (Level II)
M401.CO2	<b>Explain</b> the concept of Tchebychev inequalities	Evaluating (Level V)
M401.CO3	<b>Solve</b> problems involving sampling theory and parameter estimating	Applying (Level III)
M401.CO4	<b>Test</b> small samples for goodness of fit.	Creating (Level VI)
M401.CO5	<b>Utilize</b> graph algorithms to solve problems.	Applying (Level III)
M401.CO6	<b>Develop</b> the concept of group, ring and field.	Applying (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	2	2	-	-	-	-	-	-	-	-	-	2	-	1
<b>CO2</b>	3	3	3	-	-	-	-	-	-	-	2	-	3	-	1
<b>CO3</b>	3	3	3	-	-	-	-	-	-	-	1	-	2	-	1
<b>CO4</b>	3	3	3	-	-	-	-	-	-	-	2	-	3	-	-
<b>CO5</b>	3	3	2	-	-	-	-	-	-	-	1	-	2	-	1
<b>CO6</b>	3	2	2	-	-	-	-	-	-	-	-	-	3	-	1
<b>AVG.</b>	<b>3.00</b>	<b>2.67</b>	<b>2.50</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1.50</b>	<b>0</b>	<b>2.50</b>	<b>0</b>	<b>1.00</b>



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs/Unit
1	<b>Theory of Probability:</b> Axiomatic definition of probability. Conditional probability. Independent events and related problems. Bayes theorem (Statement only) & its application. One dimensional random variable. Probability distributions- discrete and continuous. Expectation. Binomial, Poisson, Uniform, Exponential, Normal distributions and related problems. $t$ , $\chi^2$ and F-distribution (Definition only). Transformation of random variables. Central Limit Theorem, Law of large numbers (statement only) and their applications. Tchebychev inequalities (statement only) and its application.	14
2	<b>Sampling theorem</b> Random sampling. Parameter, Statistic and its Sampling distribution. Standard error of statistic. Sampling distribution of sample mean and variance in random sampling from a normal distribution (statement only) and related problems. <b>Estimation of parameters:</b> Unbiased and consistent estimators. Point estimation. Interval estimation. Maximum likelihood estimation of parameters (Binomial, Poisson and Normal). Confidence intervals and related problems.	7
3	<b>Testing of Hypothesis:</b> Simple and Composite hypothesis. Critical region. Level of significance. Type I and Type II errors. One sample and two sample tests for means and proportions. $\chi^2$ - test for goodness of fit.	5
4	<b>Advanced Graph Theory:</b> Planar and Dual Graphs. Kuratowski's graphs. Homeomorphic graphs. Eulers formula ( $n - e + r = 2$ ) for connected planar graph and its generalisation for graphs with connected components. Detection of planarity. Graph colouring. Chromatic numbers of $C_n$ , $K_n$ , $K_{m,n}$ and other simple graphs. Simple applications of chromatic numbers. Upper bounds of chromatic numbers (Statements only). Chromatic polynomial. Statement of four and five colour theorems.	10
5	<b>Algebraic Structures:</b> Group, Subgroup, Cyclic group, Permutation group, Symmetric group ( $S_3$ ), Coset, Normal subgroup, Quotient group, Homomorphism & Isomorphism (Elementary properties only). Definition of Ring, Field, Integral Domain and simple related problems.	12

**RESOURCES:**

Text Books:

1. Banerjee A., De S.K. and Sen S.: Mathematical Probability, U.N. Dhur & Sons.
2. Gupta S. C and Kapoor V K: Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
3. Mapa S.K. :Higher Algebra (Abstract & Linear), Sarat Book Distributors.
4. Sen M.K., Ghosh S. and Mukhopadhyay P.: Topics in Abstract Algebra, University Press.
5. West D.B.: Introduction to Graph Theory, Prentice Hall.

References:

1. Babu Ram: Discrete Mathematics, Pearson Education.
2. Balakrishnan: Graph Theory (Schaum's Outline Series), TMH.
3. Chakraborty S.K and Sarkar B.K.: Discrete Mathematics, OUP.
4. Das N.G.: Statistical Methods, TMH.
5. Deo N: Graph Theory with Applications to Engineering and Computer Science, Prentice Hall.
6. Khanna V.K and Bhambri S.K. : A Course in Abstract Algebra, Vikas Publishing House.
7. Spiegel M.R., Schiller J.J. and Srinivasan R.A. : Probability and Statistics (Schaum's Outline Series), TMH.
8. Wilson: Introduction to graph theory, Pearson Education.



<b>Course Title: Communication Engg. &amp; Coding Theory</b>	<b>Code: CS401</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 4<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Class XII Mathematics, Physics, Basic Electronics, Basic Electrical.

**COURSE OBJECTIVE:**

- Explain the principles of analog and digital systems.
- Compare the performance of the digital system over the analog system.
- Prepare analog as well as digital logic circuits.
- Creating a hardware module with some specific application.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS401.CO1	<b>Demonstrate</b> the concepts of Electronics Communication.	Understanding (Level II)
CS401.CO2	<b>Discuss</b> between analog and digital communication system.	Creating (Level VI)
CS401.CO3	<b>Develop</b> the communication circuits to determine for a given outputs.	Creating (Level VI)
CS401.CO4	<b>Explain</b> the different model of analog and digital communication circuits.	Evaluating (Level V)
CS401.CO5	<b>Analyze</b> the outputs for given inputs for particular analog and digital communication circuits.	Analyzing (Level VI)
CS401.CO6	<b>Explain</b> the principle of different analog and digital communication circuits.	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	-	2	2	3	2	3	-	2	3	3	2
CO2	3	2	1	1	2	-	-	3	3	1	1	3	3	2	3
CO3	3	2	3	1	1	-	-	2	3	2	2	2	3	2	3
CO4	3	3	3	2	-	-	-	3	3	2	2	2	3	2	3
CO5	3	2	1	1	3	-	-	2	3	1	2	2	3	2	2
CO6	3	2	2	1	-	-	-	2	2	-	2	1	3	2	1
AVG.	3.00	2.00	1.83	1.17	2.00	2.00	2.00	2.50	2.67	1.80	1.80	2.00	3.00	2.17	2.33



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Elements of Communication system, Analog Modulation &amp; Demodulation, Noise, SNR Analog-to-Digital Conversion. (Basic ideas in brief)</b> [Details: Introduction to Base Band transmission & Modulation (basic concept) (1L); Elements of Communication systems (mention of transmitter, receiver and channel); origin of noise and its effect, Importance of SNR in system design (1L); Basic principles of Linear Modulation (Amplitude Modulation) (1L); Basic principles of Non-linear modulation (Angle Modulation - FM, PM) (1L); Sampling theorem, Sampling rate, Impulse sampling, Reconstruction from samples, Aliasing (1L); Analog Pulse Modulation - PAM (Natural & flat topped sampling), PWM, PPM (1L); Basic concept of Pulse Code Modulation, Block diagram of PCM (1L); Multiplexing - TDM, FDM (1L);	8
2	<b>Digital Transmission: [Details]:</b> Concept of Quantisation & Quantisation error, Uniform Quantiser (1L); Non-uniform Quantiser, A-law & law companding (mention only) (1L); Encoding, Coding efficiency (1L); Line coding & properties, NRZ & RZ, AMI, Manchester coding PCM, DPCM (1L); Baseband Pulse Transmission, Matched filter (mention of its importance and basic concept only), Error rate due to noise (2L); ISI, Raised cosine function, Nyquist criterion for distortion-less base-band binary transmission, Eye pattern, Signal power in binary digital signals (2L);	8
3	<b>Digital Carrier Modulation &amp; Demodulation Techniques: [Details]:</b> Bit rate, Baud rate (1L); Information capacity, Shanon's limit (1L); M-ary encoding, Introduction to the different digital modulation techniques - ASK, FSK, PSK, BPSK, QPSK, mention of 8 BPSK, 16 BPSK (2L); Introduction to QAM, mention of 8QAM, 16 QAM without elaboration (1L); Delta modulation, Adaptive delta modulation (basic concept and importance only, no details (1L); introduction to the concept of DPCM, Delta Modulation, Adaptive Delta modulation and their relevance (1L); Spread Spectrum Modulation - concept only. (1L).	8
4	<b>Information Theory &amp; Coding: [Details]:</b> Introduction, News value & Information content (1L);, Entropy (1L);, Mutual information (1L);, Information rate (1L);, Shanon-Fano algorithm for encoding (1L);, Shannon's Theorem - Source Coding Theorem (1L);, Channel Coding Theorem, Information Capacity Theorem (basic understanding only) (1L);, Error Control & Coding - basic principle only. (1L);	8

**RESOURCES:**

1. An Introduction to Analog and Digital Communications by Simon Haykin; Published by Wiley India.
2. Data Communication and Networking by Behrouz A. Forouzan, Published by Tata McGraw-Hill
3. Communication Systems 4th Edition by Simon Haykin; Published by Wiley India (Student Edition)
4. Principles and Analog and Digital Communication by Jerry D Gibson, Published by MacMillan.
5. Communication Systems by A. B. Carlson, Published by McGraw-Hill.
6. Understanding Signals and Systems by Jack Golten, Published by McGraw Hill.



<b>Course Title: Formal Language &amp; Automata Theory</b>	<b>Code: CS402</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 4<sup>th</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Elementary discrete mathematics

**COURSE OBJECTIVE:**

- Understand basic properties of formal languages and formal grammars.
- Understand basic properties of deterministic and nondeterministic finite automata
- Understand the minimization of deterministic and nondeterministic finite automata.
- Understand the Context free languages and grammars, and also Normalizing CFG.
- Understand the concept of Pushdown automata and its application.
- Understand basic properties of Turing machines and computing with Turing machines.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS402.CO1	<b>Explain</b> the concept of abstract machines and their power to recognize the languages	Understanding(Level II)
CS402.CO2	<b>Design</b> Finite state machines and the equivalent regular grammars	Creating(Level VI)
CS402.CO3	<b>Create</b> context free grammars for formal languages	Creating(Level VI)
CS402.CO4	<b>Apply</b> minimization techniques on Finite state machines and grammars of Context Free Languages	Applying(Level III)
CS402.CO5	<b>Elaborate</b> Pushdown automata for any Context-Free Language	Creating(Level VI)
CS402.CO6	<b>Illustrate</b> the power of the Turing Machine for abstract automation	Understanding(Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	1	2	1	-	-	-	-	-	-	-	-	1	1	2	1
<b>CO2</b>	2	2	2	-	-	-	-	-	-	-	-	1	1	1	2
<b>CO3</b>	2	2	2	-	-	-	-	-	-	-	-	1	1	1	2
<b>CO4</b>	2	2	2	-	-	-	-	-	-	-	-	2	1	2	1
<b>CO5</b>	2	2	2	-	-	-	-	-	-	-	-	1	1	1	2
<b>CO6</b>	2	2	1	-	-	-	-	-	-	-	-	1	1	1	1
<b>AVG.</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>1.00</b>	<b>1.33</b>	<b>1.50</b>





**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<p><b>Finite Automata [13L]</b>            Fundamentals: Basic definition of sequential circuit, block diagram, mathematical representation, concept of transition table and transition diagram (Relating of Automata concept to sequential circuit concept) Design of sequence detector, Introduction to finite state model [2L]            Finite state machine: Definitions, capability &amp; state equivalent, kth-equivalent concept [ 1L]            Merger graph, Merger table, Compatibility graph [1L]            Finite memory definiteness, testing table &amp; testing graph. [1L]            Deterministic finite automaton and non-deterministic finite automaton. [1L]            Transition diagrams and Language recognizers. [1L]            Finite Automata: NFA with <math>\hat{1}</math> transitions - Significance, acceptance of languages. [1L]            Conversions and Equivalence: Equivalence between NFA with and without <math>\hat{1}</math> transitions. NFA to DFA conversion. [2L]            Minimization of FSM, Equivalence between two FSM's , Limitations of FSM [1L]            Application of finite automata, Finite Automata with output- Moore &amp; Melay machine. [2L]</p>	13
2	<p><b>Regular Languages and Grammar [8L]</b>            Regular Languages: Regular sets. [1L]            Regular expressions, identity rules. Arden's theorem state and prove [1L]            Constructing finite Automata for a given regular expressions, Regular string accepted by NFA/DFA [1L]            Pumping lemma of regular sets. Closure properties of regular sets (proofs not required). [1L]            Grammar Formalism: Regular grammars-right linear and left linear grammars. [1L] Equivalence between regular linear grammar and FA. [1L]            Inter conversion, Context free grammar. [1L]            Derivation trees, sentential forms. Right most and leftmost derivation of strings. (Concept only)</p>	8
3	<p><b>PDA and Context Free Grammar [9L]</b>            Context Free Grammars, Ambiguity in context free grammars. [1L]            Minimization of Context Free Grammars. [1L]            Chomsky normal form and Greibach normal form. [1L]            Pumping Lemma for Context Free Languages. [1L]            Enumeration of properties of CFL (proofs omitted). Closure property of CFL, Ogden's lemma &amp; its applications [1L]            Push Down Automata: Push down automata, definition. [1L]            Acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. [1L]            Equivalence of CFL and PDA, interconversion. (Proofs not required).[1L]            Introduction to DCFL and DPDA. [1L]</p>	9
4	<p><b>Turing Machine [6L]</b>            Turing Machine : Turing Machine, definition, model [1L]            Design of TM, Computable functions [1L]            Church's hypothesis, counter machine [1L]            Types of Turing machines (proofs not required) [1 L]            Universal Turing Machine, Halting problem [2L]</p>	6



**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
Finite automata	Unit 1
Regular expression, Regular grammar and, pumping lemma.	Unit 2
Context-free languages, Context-free grammars and push-down automata.	Unit 3
Turing machines and undesirability.	Unit 4

**RESOURCES:**

1. “Introduction to Automata Theory Language and Computation”, Hopcroft H.E. and Ullman J. D., Pearson education.
2. “Theory of Computer Science “, Automata Languages and computation”, Mishra and Chandrashekar, 2<sup>nd</sup> edition, PHI.
3. “Formal Languages and Automata Theory”, C.K.Nagpal, Oxford
4. “Switching & Finite Automata”, ZVI Kohavi, 2nd Edn., Tata McGraw Hill
5. “Introduction to Computer Theory”, Daniel I.A. Cohen, John Wiley
6. “Introduction to languages and the Theory of Computation”, John C Martin, TMH
7. “Elements of Theory of Computation”, Lewis H.P. & Papadimitrou C.H. Pearson, PHI.

<b>Course Title: Object Oriented Programming&amp; UML</b>	<b>Code: IT401</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 4<sup>th</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-201 Basic Computation & Principles of Computer Programming, CS-302 Data Structure& Algorithm.

**COURSE OBJECTIVE:**

- Specify simple abstract data types and design implementations, using abstraction functions to document them.
- Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
- Name and apply some common object-oriented design patterns and give examples of their use.
- Design applications with an event-driven graphical user interface



### COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT401.CO1	<b>Discuss</b> simple abstract data types and implementations using the concepts of class, object, message passing, constructor, inheritance, encapsulation, and polymorphism.	Creating (Level VI)
IT401.CO2	<b>Explain</b> the knowledge of object-oriented programming language using Java	Understanding (Level II)
IT401.CO3	<b>Analyze</b> the basic concept of Java programming, various Stream classes, I/O operations	Analyzing (Level IV)
IT401.CO4	<b>Create</b> reusable programs using the concepts of multiple inheritance, extending interfaces and packages.	Creating (Level VI)
IT401.CO5	<b>Identify</b> the concepts of Multithreading and Exception handling.	Applying (Level III)
IT401.CO6	<b>Demonstrate</b> graphical User Interface using AWT and swing.	Understanding (Level II)

### Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1	-	-	-	-	-	1	1	3	-	1
CO2	1	1	1	1	1	-	-	-	-	-	-	1	3	-	1
CO3	2	1	1	1	1	-	-	-	-	-	-	1	3	-	1
CO4	1	2	1	1	1	-	-	-	-	-	-	1	3	-	1
CO5	1	2	1	1	1	-	-	-	-	-	-	1	3	-	1
CO6	1	1	3	1	3	-	-	-	2	2	2	1	3	1	1
AVG.	1.33	1.33	1.33	1.00	1.33	0	0	0	2.00	2.00	1.50	1.00	3.00	1.00	1.00

### UNIVERSITY SYLLABUS:

Unit	Content	Hrs./Unit
1	<b>Object oriented design [10 L]</b> Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes- association, aggregation, using, instantiation, meta-class, grouping constructs.	10
2	<b>Object oriented concepts [4 L]</b> Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism	4
3	<b>Basic concepts of object oriented programming using Java [22 L]</b> Implementation of Object oriented concepts using Java.	22
4	<b>Class &amp; Object proprieties [6L]</b> Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading ,this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables &	6



	methods, garbage collection, nested & inner classes, basic string handling concepts-String (discuss charAt() , compareTo(),equals(), equalsIgnoreCase(), indexOf(), length() , substring(), toCharArray() , toLowerCase(), toString(), toUpperCase() , trim() , valueOf() methods) & StringBuffer classes (discuss append(), capacity(), charAt(), delete(), deleteCharAt(),ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(), setLength(), substring(), toString() methods),concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input usingBufferedReader & Scanner classes.	
5	<b>Reusability properties[6L]</b> Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes &methods, interfaces. Creation of packages, importing packages, member access for packages.	6
6	<b>Exception handling &amp; Multithreading [6L]</b> Exception handling basics, different types of exception classes, use of try &catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, inter-thread communication, deadlocks for threads, suspending & resuming threads.	6
7	<b>Applet Programming (using swing) [4L]</b> Basics of applet programming, applet life cycle, difference between application& applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use ofrepaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton classonly) & text fields.	4



## SEMESTER IV PRACTICAL

<b>Course Title: Technical Report Writing &amp; Language Lab Practice</b>	<b>Code: HU481</b>
<b>Type of Course: Sessional</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 4<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITES:** Nil

**COURSE OBJECTIVE:**

- To inculcate a sense of confidence in the students.
- To help them become good communicators both socially and professionally.
- To assist them to enhance their power of Technical Communication.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
HU481.CO1	<b>Demonstrate</b> technical report writing skill	Understanding (Level II)
HU481.CO2	<b>Analyze</b> technical communication in business and general situation	Remembering (Level I)
HU481.CO3	<b>Apply</b> communication skill fairly well in business world and in engineering society	Understanding (Level II)
HU481.CO4	<b>Develop</b> presentation, GD and interview as professional skills	Creating (Level VI)
HU481.CO5	<b>Formulate</b> strategies for success in competitive examinations	Developing (Level III)
HU481.CO6	<b>Build</b> soft-skill and overall personality for enhanced employability	Analyzing(Level IV)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	3	-	-	2	3	3	-	3	3	3	1
CO2	-	2	3	2	-	-	2	2	3	3	2	3	-	3	2
CO3	2	1	-	2	3	2	2	2	3	3	2	3	2	3	1
CO4	1	3	3	3	3	3	2	3	3	3	2	3	1	3	-
CO5	-	2	2	3	2	2	2	3	3	3	-	3	-	3	1
CO6	3	2	2	3	2	3	2	2	3	3	2	3	3	3	-
AVG.	2.25	1.83	2.50	2.60	2.60	2.50	2.00	2.33	3.00	3.00	2.00	3.00	2.25	3	1.25



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
A.	Technical Report Writing : 1. Report Types (Organizational / Commercial / Business / Project ) 2. Report Format & Organization of Writing Materials 3. Report Writing (Practice Sessions & Workshops)	2L+6P
B.1	Language Laboratory Practice I. Introductory Lecture to help the students get a clear idea of Technical Communication & the need of Language Laboratory Practice Sessions	4L+4P
B.2	Conversation Practice Sessions: (To be done as real life interactions) a) Training the students by using Language Lab Device/Recommended Texts/cassettes /cd's to get their Listening Skill & Speaking Skill honed b) Introducing Role Play & honing over all Communicative Competence	
B.3	Group Discussion Sessions: a) Teaching Strategies of Group Discussion b) Introducing Different Models & Topics of Group Discussion c) Exploring Live /Recorded GD Sessions for mending students' attitude/approach & for taking remedial measure	2L+6P
B.4	Interview Sessions: a) Training students to face Job Interviews confidently and successfully b) Arranging Mock Interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in a formal situation for effective communication	2L+6P
B.5	Presentation: a) Teaching Presentation as a skill b) Strategies and Standard Practices of Individual /Group Presentation c) Media & Means of Presentation: OHP/POWER POINT/ Other Audio-Visual Aids	2L+6P
B.6	Competitive Examination: a) Making the students aware of Provincial /National/International Competitive Examinations b) Strategies/Tactics for success in Competitive Examinations c) SWOT Analysis and its Application in fixing Target	2L+2P

**RESOURCES:**

1. Nira Konar: English Language Laboratory: A Comprehensive Manual PHI Learning, 2011
2. D. Sudharani: Advanced Manual for Communication Laboratories & Technical Report Writing
3. Pearson Education (W.B. edition), 2011
4. Adrian Duff et. al. (ed.): Cambridge Skills for Fluency
  - A) Speaking (Levels 1-4 Audio Cassettes/Handbooks)
  - B) Listening (Levels 1-4 Audio Cassettes/Handbooks) Cambridge University Press 1998
5. Mark Hancock: English Pronunciation in Use
  - i. 4 Audio Cassettes/CD'S OUP 2004



<b>Course Title: Numerical Methods Lab</b>	<b>Code: M(CS)491</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 4<sup>th</sup></b>	<b>Contact Hours: 2P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITIES:** CS-291 Basic Computation & Principles of Computer Programming Lab, CS-392 Data structure Lab.

**COURSE OBJECTIVE:**

- Specify simple abstract data types and design implementations using MATLAB.
- Recognize features of MATLAB to implement different algorithms in numerical methods.
- Implement different algorithms of numerical methods using MATLAB.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
M(CS)491.CO1	<b>Design</b> simple abstract data types and implementations using the functions of MATLAB.	Creating (Level VI)
M(CS)491.CO2	<b>Knowledge</b> of array to implement interpolation, numerical integration, solution of linear equations.	Applying (Level III)
M(CS)491.CO3	<b>Create</b> functions to implement different algorithms in numerical methods.	Creating (Level VI)
M(CS)491.CO4	<b>Explain</b> the concept of vector operations.	Understanding (Level II)
M(CS)491.CO5	<b>Apply</b> numerical methods for modern scientific calculation.	Applying (Level III)
M(CS)491.CO6	<b>Develop</b> algorithm for solving complex numerical problem.	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	2	1	2	1	1	-	-	-	-	1	1	1	3	-	1
<b>CO2</b>	1	1	1	1	1	-	-	-	-	1	-	1	3	-	1
<b>CO3</b>	2	1	1	1	1	-	-	-	-	1	-	1	3	-	1
<b>CO4</b>	1	1	1	1	1	-	-	-	-	1	-	1	3	-	1
<b>CO5</b>	1	1	1	1	1	-	-	-	-	1	-	1	3	-	1
<b>CO6</b>	1	1	3	1	3	-	-	-	2	2	2	1	3	1	1
<b>AVG.</b>	<b>1.33</b>	<b>1.00</b>	<b>1.50</b>	<b>1.00</b>	<b>1.33</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2.00</b>	<b>1.17</b>	<b>1.50</b>	<b>1.00</b>	<b>3.00</b>	<b>1.00</b>	<b>1</b>



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	Introduction to Software Packages: Matlab / Scilab / Labview / Mathematical	12
2	Assignments on Newton forward /backward, Lagrange’s interpolation	3
3	Assignments on numerical integration using Trapezoidal rule, Simpson’s 1/3 rule	6
4	Assignments on numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations.	6
5	Assignments on numerical solution of Algebraic Equation by Regular-falsi and Newton Raphson methods.	6

**RESOURCES:**

1. C.Xavier: C Language and Numerical Methods.
2. Dutta & Jana: Introductory Numerical Analysis.

<b>Course Title: Communication Engg. &amp; Coding Theory</b>	<b>Code: CS491</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 4<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITIES:** Class XII Mathematics, Physics, Basic Electronics, Basic Electrical.

**COURSE OBJECTIVE:**

- Explain the principles of analog and digital communication systems.
- Compare the performance of the digital communication system over the analog communication system.
- Prepare analog as well as digital communication circuits.
- Creating a hardware module with some specific application.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom’s Taxonomy
CS491.CO1	<b>Demonstrate</b> the concepts of communication circuits	Understanding (Level II)
CS491.CO2	<b>Discuss</b> between analog communication and digital communication system.	Creating (Level VI)
CS491.CO3	<b>Develop</b> the analog communication circuits to determine for a given outputs.	Developing (Level III)
CS491.CO4	<b>Explain</b> the different model of analog communication and digital communication circuits.	Evaluating (Level V)
CS491.CO5	<b>Analyze</b> the outputs for given inputs for particular analog communication and digital communication circuits.	Analyzing (Level VI)
CS491.CO6	<b>Explain</b> the principle of different analog communication and digital communication circuits.	Understanding (Level II)





**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	-	-	-	-	-	-	1	3	3	2
CO2	3	3	3	2	3	-	-	2	-	-	-	2	3	1	3
CO3	3	3	3	2	3	-	-	2	1	-	-	2	3	2	3
CO4	3	3	3	2	3	-	-	2	-	-	1	2	3	3	3
CO5	3	3	3	2	3	-	-	1	1	-	1	2	3	3	2
CO6	3	3	2	1	1	-	-	-	1	-	-	1	3	3	1
AVG.	3.00	3.00	2.83	1.67	2.33	0	0	1.75	1.00	0	1.00	1.67	3.00	2.50	2.33

**UNIVERSITY SYLLABUS:**

Unit	Content
1	Generation of Amplitude Modulation (Design using transistor or Balanced Modulator Chip (to view the wave shapes)
2	Generation of FM using VCO chip (to view the wave shapes)
3	Generation of PAM
4	Generation of PWM & PPM (using IC 555 Timer)

**RESOURCES:**

1. An Introduction to Analog and Digital Communications by Simon Haykin; Published by Wiley India.
2. Data Communication and Networking by Behrouz A. Forouzan, Published by Tata McGraw-Hill.

<b>Course Title: Software Tools</b>	<b>Code: CS 492</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 4<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-291 Computing Lab, CS-392 Data Structures Lab.

**COURSE OBJECTIVE:**

- Introduce software project basic concepts.
- Illustrate various Visual Basic tools for GUI building.
- Design chosen software as case study.
- Develop the chosen software with working front end and back end.



**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
CS492.CO1	Define the concepts of Software Project Development Life Cycle and Visual Basic interface.	Remembering (Level I)
CS492.CO2	Explain VB data tool set and their functions.	Understanding (Level II)
CS492.CO3	Apply decision logic, timer in VB.	Applying (Level III)
CS492.CO4	Design real-life scenario through diagrams.	Evaluating (Level V)
CS492.CO5	Create database connectivity with front-end, with and without help of wizard.	Creating (Level VI)
CS492.CO6	Develop basic version of a software project in full workable mode.	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	1	-	-	2	-	2	2	3	3	1
CO2	3	-	-	1	2	1	-	-	2	-	1	2	3	2	1
CO3	3	-	-	1	2	1	-	-	2	-	1	2	3	2	1
CO4	3	3	3	2	2	1	1	1	2	2	1	2	-	3	2
CO5	3	3	2	1	2	1	2	2	2	1	1	2	3	3	2
CO6	3	3	3	2	2	1	2	2	2	3	3	2	3	3	2
AVG.	3.00	3.00	2.67	1.40	2.00	1.00	1.67	1.67	2.00	2.00	1.50	2.00	3.00	2.67	1.50

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Introduction to Software Project and VB [6L]</b> Introduction to Visual Basic & difference with BASIC. Concept about form Project, Application, Tools, Toolbox.	6
2	<b>Control Structure and Data Types [6L]</b> Controls & Properties. Idea about Labels, Buttons, Text Boxes. Data basics, Different type variables & their use in VB. List boxes & Data lists, List Box control, Combo Boxes, data Arrays. Frames, buttons, check boxes, timer control.	6
3	<b>Loop, Data Access and Timer Management [3L]</b> Sub-functions & Procedure details, Input box () & MsgBox (). Making decisions, looping.	3
4	<b>Design Diagrams [6L]</b> Design Diagrams – DFD, ERD, Decision Table, Decision Tree.	6
5	<b>Connect Database [3L]</b> Programming with data, ODBC data base connectivity. Data form Wizard, query, and menus in VB Applications, Graphics.	3
6	<b>Case Study Development [24L]</b> Case studies using any of the following items including relevant form design with the help of visual programming aids. a) Payroll accounting system. b) Library circulation management system.	24



	c) Inventory control system. d) University examination & grading system. e) Patient information system. f) Tourist information system. g) Judiciary information system. h) Flight reservation system. i) Bookshop automation software. j) Time management software.	
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**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
ODBC connections	Unit 4

**RESOURCES:**

1. Byron S. Gottfried, “Schaum’s Outline of Programming with Visual Basic”, McGraw Hill.
2. Noel Jerke, “The Complete Reference Visual Basic 6”, Tata-McGraw Hill.
3. Soma Dasgupta, “Visual Basic Projects”, BPB Publications.
4. Arunesh Goyal, “Systems Analysis and Design”, PHI
5. Awad Elias M., “Systems Analysis and Design”, Galgotias.

<b>Course Title: Object Oriented Programming &amp; UML(IT) Lab</b>	<b>Code: IT491</b>
<b>Type of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 4<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-291 Basic Computation & Principles of Computer Programming Lab, CS-392 Data structure Lab.

**COURSE OBJECTIVE:**

- Specify simple abstract data types and design implementations, using abstraction functions to document them.
- Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
- Name and apply some common object-oriented design patterns and give examples of their use.
- Design applications with an event-driven graphical user interface



### COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT491.CO1	<b>Discuss</b> simple abstract data types and implementations using the concepts of constructor, overloading, inheritance and overriding.	Creating (Level VI)
IT491.CO2	<b>Apply</b> the knowledge of object-oriented paradigm and array in the Java programming language	Applying (Level III)
IT491.CO3	<b>Create</b> reusable programs using the concepts of multiple inheritance and extending interfaces	Creating (Level VI)
IT491.CO4	<b>Explain</b> the concept of Packages.	Understanding (Level II)
IT491.CO5	<b>Experiment with</b> the concepts of Multithreading and Exception handling.	Applying (Level III)
IT491.CO6	<b>Design</b> graphical User Interface using AWT and Swing.	Creating (Level VI)

### Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	1	1	-	-	-	-	1	1	1	3	-	1
CO2	1	1	1	1	1	-	-	-	-	1	-	1	3	-	1
CO3	2	1	1	1	1	-	-	-	-	1	-	1	3	-	1
CO4	1	1	1	1	1	-	-	-	-	1	-	1	3	-	1
CO5	1	1	1	1	1	-	-	-	-	1	-	1	3	-	1
CO6	1	1	3	1	3	-	-	-	2	2	2	1	3	1	1
AVG.	1.33	1.00	1.50	1.00	1.33	0	0	0	2.00	1.17	1.50	1.00	3.00	1.00	1.00

### UNIVERSITY SYLLABUS:

Unit	Content	Hrs./Unit
1	Assignments on class, constructor, overloading, inheritance, overriding.	12
2	Assignments on wrapper class, arrays.	3
3	Assignments on developing interfaces- multiple inheritances, extending interfaces.	6
4	Assignments on creating and accessing packages.	6
5	Assignments on multithreaded programming.	6
6	Assignments on applet programming.	3

### RESOURCES:

1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India
2. Ali Bahrami – "Object Oriented System Development" – Mc Graw Hill
3. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" – TMH
4. R.K Das – "Core Java For Beginners" – VIKAS PUBLISHING
5. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson
6. Ivor Horton's Beginning Java 2 SDK – Wrox
7. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – TMH



**RCC INSTITUTE OF INFORMATION TECHNOLOGY**  
Canal South Road, Beliaghata, Kolkata- 700015  
College Code: 117  
(Affiliated to Maulana Abul Kalam Azad University of Technology, W.B)

## **COURSE BOOKLET FOR B. TECH (IT)**

### **THIRD YEAR**



## SEMESTER V THEORY

<b>Course Title: Economics for Engineers</b>	<b>Code: HU501</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 5<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITES: N.A.**

**COURSE OBJECTIVES:**

- Understanding the Decision making process.
- Knowing about Inflation and Price Change.
- Calculating Present Worth Analysis, Return Analysis.
- Understanding Accounting.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
HU501.CO1	<b>Recall</b> the concepts of Accounting and Recognize different systems used in industrial applications.	Remembering (Level I)
HU501.CO2	<b>Discuss</b> on the design of appropriate accounting tool required for real life problems.	Creating (Level VI)
HU501.CO3	<b>Demonstrate</b> the use of Economical concepts.	Understanding (Level II)
HU501.CO4	<b>Analyze</b> and Simulate a sequential accounting tool for a system or process appropriate for required accuracy.	Analyzing (Level IV)
HU501.CO5	<b>Design</b> a sequential economic policy that can work according to the required specifications.	Creating (Level VI)
HU501.CO6	<b>Justify</b> a specific accounting technique for a specific purpose.	Evaluating (Level V)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	1	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG.	3.00	3.00	3.00	0.00	3.00	0	1.00	0.00	1.00	0.00	0.00	0.00	0	0	0



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<ul style="list-style-type: none"> <li>• Economic Decisions Making – Overview, Problems, Role, Decision making process.</li> <li>• Engineering Costs &amp; Estimation – Fixed, Variable, Marginal &amp; Average Costs, Sunk Costs, Opportunity Costs, Recurring And Nonrecurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models - Per-Unit Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement &amp; Learning Curve, Benefits</li> </ul>	2
2	<ul style="list-style-type: none"> <li>• Cash Flow, Interest and Equivalence: Cash Flow – Diagrams, Categories &amp; Computation, Time Value of Money, Debt payment, Nominal &amp; Effective Interest.</li> <li>• Cash Flow &amp; Rate Of Return Analysis – Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate Of Return, Calculating Rate of Return, Incremental Analysis; Best Alternative Choosing An Analysis Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity And Breakeven Analysis. Economic Analysis In The Public Sector - Quantifying And Valuing Benefits &amp; drawbacks.</li> </ul>	18
3	<ul style="list-style-type: none"> <li>• Inflation And Price Change – Definition, Effects, Causes, Price Change with Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates.</li> <li>• Present Worth Analysis: End-Of-Year Convention, Viewpoint Of Economic Analysis Studies, Borrowed Money Viewpoint, Effect Of Inflation &amp; Deflation, Taxes, Economic Criteria, Applying Present Worth Techniques, Multiple Alternatives.</li> <li>• Uncertainty In Future Events - Estimates and Their Use in Economic Analysis, Range Of Estimates, Probability, Joint Probability Distributions, Expected Value, Economic Decision Trees, Risk, Risk vs Return, Simulation, Real Options</li> </ul>	8
4	<ul style="list-style-type: none"> <li>• Depreciation - Basic Aspects, Deterioration &amp; Obsolescence, Depreciation And Expenses, Types Of Property, Depreciation Calculation Fundamentals, Depreciation And Capital Allowance Methods, Straight-Line Depreciation Declining Balance Depreciation, Common Elements Of Tax Regulations For Depreciation And Capital Allowances.</li> <li>• Replacement Analysis - Replacement Analysis Decision Map, Minimum Cost Life of a New Asset, Marginal Cost, Minimum Cost Life Problems.</li> <li>• Accounting – Function, Balance Sheet, Income Statement, Financial Ratios Capital Transactions, Cost Accounting, Direct and Indirect Costs, Indirect Cost Allocation.</li> </ul>	20

**RESOURCES:**

1. James L.Riggs,David D. Bedworth, Sabah U. Randhawa : Economics for Engineers 4e , Tata McGraw-Hill
2. Donald Newnan, Ted Eschembach, Jerome Lavelle : Engineering Economics Analysis, OUP
3. John A. White, Kenneth E.Case,David B.Pratt : Principle of Engineering Economic Analysis, John Wiley
4. Sullivan and Wicks: Engineering Economy, Pearson
5. R.Paneer Seelvan: Engineering Economics, PHI
6. Michael R Lindeburg : Engineering Economics Analysis, Professional Pub.



<b>Course Title: Design &amp; Analysis of Algorithm</b>	<b>Code: IT501</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 5<sup>th</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-302 Data structure.

**COURSE OBJECTIVE:**

- To introduce various designing techniques and methods for algorithms.
- Performance analysis of Algorithms using asymptotic and empirical approaches
- Demonstrate a familiarity with major algorithms and data structures.
- To give clear idea on algorithmic design paradigms like Divide-and-Conquer, Dynamic Programming, Greedy, Branch and Bound etc

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT501.CO1	<b>Demonstrate</b> the concepts of Operating System Services, System calls, structure and types.	Understanding (Level II)
IT501.CO2	<b>Discuss</b> processes and threads for multiprogramming and multi-threading.	Creating (Level VI)
IT501.CO3	<b>Develop</b> the greedy algorithms.	Developing (Level III)
IT501.CO4	<b>Explain</b> when an algorithmic design situation calls for it.	Evaluating (Level V)
IT501.CO5	<b>Analyze</b> and justify the correctness of algorithms.	Analyzing (Level IV)
IT501.CO6	<b>Explain</b> when an algorithmic design situation calls for it. For a given problems of dynamic-programming	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	1	-	2	2	3	2	3	-	2	3	3	-
CO2	3	2	1	1	2	-	-	3	3	1	1	3	3	1	-
CO3	3	2	3	2	1	-	-	2	3	2	2	2	3	2	-
CO4	3	3	2	1	-	-	-	3	3	2	2	2	3	1	-
CO5	3	1	1	1	3	-	-	2	3	1	2	2	3	1	-
CO6	3	2	1	1	-	-	-	2	2	-	2	1	3	2	-
AVG.	3.00	1.83	1.67	1.17	2.00	2.00	2.00	2.50	2.67	1.80	1.80	2.00	3.00	1.67	0





**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	Complexity Analysis:[2L] Time and Space Complexity, Different Asymptotic notations – their mathematical significance	2
<b>Algorithm Design Techniques:</b>		
2	Divide and Conquer: [3L] Basic method, use, Examples – Binary Search, Merge Sort, Quick Sort and their complexity. Heap Sort and its complexity [1L]	4
3	Dynamic Programming: [3L] Basic method, use, Examples – Matrix Chain Manipulation, All pair shortest paths, single source shortest path. Backtracking: [2L] Basic method, use, Examples – 8 queens problem, Graph coloring problem.	5
4	Greedy Method: [3L] Basic method, use, Examples – Knapsack problem, Job sequencing with deadlines, Minimum cost spanning tree by Prim's and Kruskal's algorithm	3
5	Lower Bound Theory: [1L] $O(n \lg n)$ bound for comparison sort	1
6	Disjoint set manipulation: [2L] Set manipulation algorithm like UNION-FIND, union by rank.	2
7	Graph traversal algorithm: Recapitulation [1L] Breadth First Search(BFS) and Depth First Search(DFS) – Classification of edges - tree, forward, back and cross edges – complexity and comparison	1
8	String matching problem: [3L] Different techniques – Naive algorithm, string matching using finite automata, and Knuth, Morris, Pratt (KMP) algorithm with their complexities	3
9	Amortized Analysis: [3L] Aggregate, Accounting, and Potential Method	3
10	Network Flow: [3L] Ford Fulkerson algorithm, Max-Flow Min-Cut theorem (Statement and Illustration)	3
11	Matrix Manipulation Algorithm: [3L] Strassen's matrix manipulation algorithm; application of matrix multiplication to solution of simultaneous linear equations using LUP decomposition, Inversion of matrix and Boolean matrix multiplication	3
12	Notion of NP-completeness: [3L] P class, NP class, NP hard class, NP complete class – their interrelationship, Satisfiability problem, Cook's theorem (Statement only), Clique decision problem	3
13	Approximation Algorithms: [3L] Necessity of approximation scheme, performance guarantee, polynomial time approximation schemes, vertex cover problem, travelling salesman problem.	3

**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
Greedy Method	Unit 2
Complexity Analysis	Unit 3
Matrix Manipulation Algorithm	Unit 4



**RESOURCES:**

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, “Introduction to Algorithms”
2. Aho, J.Hopcroft and J.Ullman “The Design and Analysis of Algorithms”
3. D.E.Knuth “The Art of Computer Programming”, Vol. 3
4. Jon Kleiberg and Eva Tardos, "Algorithm design" Reference:
5. K.Mehlhorn , “Data Structures and Algorithms” - Vol. I & Vol. 2.
6. S.Baase “Computer Algorithms”
7. E.Horowitz and Shani “Fundamentals of Computer Algorithms”
8. E.M.Reingold, J.Nievergelt and N.Deo- “Combinational Algorithms- Theory and Practice”, Prentice Hall, 1997

<b>Course Title: Computer Architecture</b>	<b>Code: IT502</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 5<sup>th</sup></b>	<b>Contact Hours: 3L+1T/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Basic Electronics in First year, Introduction to Computing in second semester, Analog & Digital Electronics and Computer Organization.

**COURSE OBJECTIVE:**

- Explain the principles and modules of computer architecture.
- Compare performance of machines in computer architecture.
- Produce solutions to different problems in computer architecture.
- Illustrate different concepts such as pipelining, memory management, and different architectures in computer architecture.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom’s Taxonomy
IT502.CO1	<b>Demonstrate</b> different concepts of computer architecture to improve the performance of a computer.	Understanding (Level II)
IT502.CO2	<b>Apply</b> different methods for proper organization of memory in computer architecture.	Applying (Level III)
IT502.CO3	<b>Analyze</b> different architectures to improve the performance of a computer.	Analyzing (Level IV)
IT502.CO4	<b>Define</b> a number of architectures of a computer and compare it.	Remembering (Level I)
IT502.CO5	<b>Interpret</b> an architectural problem to use accurate method to solve it.	Understanding (Level II)
IT502.CO6	<b>Evaluate</b> interpolation performance of a pipeline, data hazard, and memory performance.	Evaluating (Level V)



**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	1	2	2	-	2	1	1	2	3	1	2	3	3	1
<b>CO2</b>	3	2	1	2	2	-	-	-	2	1	-	2	3	2	1
<b>CO3</b>	3	2	3	1	-	-	-	1	2	2	-	2	3	2	1
<b>CO4</b>	3	2	2	2	-	-	-	-	2	2	-	2	3	2	1
<b>CO5</b>	3	2	1	2	3	-	-	-	2	1	-	2	3	2	1
<b>CO6</b>	3	2	3	2	-	-	-	-	2	-	-	1	3	2	1
<b>AVG.</b>	<b>3</b>	<b>1.83</b>	<b>2</b>	<b>1.83</b>	<b>2.5</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1.5</b>	<b>1.8</b>	<b>1</b>	<b>1.83</b>	<b>3.00</b>	<b>2.17</b>	<b>1</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Introduction [3L]</b> Review of basic computer architecture (Revisited), Quantitative techniques in computer design, measuring and reporting performance.  <b>Pipelining:</b> Basic concepts, instruction and arithmetic pipeline, data hazards, control hazards and structural hazards, techniques for handling hazards. Exception handling. Pipeline optimization techniques; Compiler techniques for improving performance. (9L)	12
2	<b>Hierarchical memory technology:</b> Inclusion, Coherence and locality properties; Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, mapping and management techniques, memory replacement policies. (8L)	8
3	<b>Instruction-level parallelism:</b> basic concepts, techniques for increasing ILP, superscalar, super pipelined and VLIW processor architectures. Array and vector processors. (6L)	6
4	<b>Multiprocessor architecture [8L]</b> Taxonomy of parallel architectures; Centralized shared- memory architecture: synchronization, memory consistency, interconnection networks. Distributed shared-memory architecture. Cluster computers.  <b>Non von Neumann architectures [4L]</b> Data flow computers, reduction computer architectures, systolic architectures	12

**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
Machine instructions and addressing modes. ALU, data-path and control unit.	Unit 1
Instruction pipelining, pipeline hazards.	Unit 1
Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode)	Unit 2

**RESOURCES:**

1. Computer Architecture and Organization. John. P.Hayes Magraw- Hill.
2. Computer system Architecture. M.Moris Mano. Pearson



<b>Course Title: Operating System</b>	<b>Code: IT503</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 5<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-302 Data structure, CS-303 Computer Organization.

**COURSE OBJECTIVE:**

- Explain the different types and structure of Operating Systems.
- Compare and contrast the performance of different CPU scheduling algorithms.
- Generate algorithmic solutions to process synchronization problems.
- Illustrate operating system concepts such as process management, deadlock handling, memory management, networked processes and file systems

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT503.CO1	List the different types of operating system.	Remembering (Level I)
IT503.CO2	Explain the operating system program, structures and operations with system calls.	Understanding (Level II)
IT503.CO3	Finding the issues related to process management and CPU scheduling in designing of Operating system.	Analyzing (Level IV)
IT503.CO4	Solve real world problems associated with storage management by understanding the elementary concepts.	Applying (Level III)
IT603.CO5	Execute different algorithm to handle the issues related to the deadlock prevention, detection and recovery.	Applying (Level III)
IT503.CO6	Explain the mass storage structure and file system Interface.	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	1	1	-	-	-	-	2	2	2	1
CO2	3	2	1	1	2	-	-	-	-	1	-	2	2	2	1
CO3	3	2	3	1	1	-	-	-	-	1	-	2	3	2	1
CO4	3	3	3	3	2	1	1	-	-	2	-	2	3	3	2
CO5	3	2	1	1	3	1	-	-	-	1	-	2	3	3	2
CO6	3	2	2	1	-	-	-	-	-	1	-	2	2	2	1
AVG.	3.00	2.00	1.83	1.40	2.00	1.00	1.00	0	0	1.20	0	2.00	2.50	2.33	1.33



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Introduction</b> Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, timesharing, real-time, distributed, parallel.	4
2	<b>System Structure</b> Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.	3
3	<b>Process Management</b> Processes [3L]: Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process communication. Threads [2L]: overview, benefits of threads, user and kernel threads. CPU scheduling [3L]: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling Process Synchronization [5L]: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores. Deadlocks [4L]: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.	17
4	<b>Storage Management</b> Memory Management [5L]: background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging. Virtual Memory [3L]: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing. File Systems [4L]: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance. I/O Management [4L]: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance. Disk Management [3L]: disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN) , disk reliability, disk formatting, boot block, bad blocks.	19
5	<b>Protection &amp; Security</b> Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.	4

**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
System calls	Unit 2
Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling.	Unit 3
Memory management and virtual memory. File systems.	Unit 4



**RESOURCES:**

1. Milenkovic M., “Operating System : Concept & Design”, McGraw Hill.
2. Tanenbaum A.S., “Operating System Design & Implementation”, Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., “Operating System Concepts”, Wiley.
4. Dhamdhare: Operating System TMH
5. Stalling, William, “Operating Systems”, Maxwell McMillan International Editions, 1992.
6. Dietel H. N., “An Introduction to Operating Systems”, Addison Wesley.

<b>Course Title: Programming Practices using C++</b>	<b>Code: IT504F</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 5<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS291 Introduction to computing Laboratory, CS-392 Data structure Laboratory.

**COURSE OBJECTIVE:**

- To understand the concepts of object-oriented programming with C++
- To familiarize with static, friend functions, function overloading, operator overloading and type conversion
- To expertise in OOP concepts such as inheritance, run time polymorphism and exception handling
- To explore function and class templates
- To realize file handling

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom’s Taxonomy
IT504F.CO1	<b>Develop</b> programming skills among the student and applications using C++ by using the key programming construct, classes and objects	Creating (Level VI)
IT504F.CO2	<b>Understand</b> generic programs by applying templates to functions and classes	Understanding(Level II)
IT504F.CO3	<b>Apply</b> exception handling mechanism for handling exceptions, reuse in application development using inheritance, run time polymorphism	Applying (Level III)
IT504F.CO4	<b>Implement</b> Files for handling IOs in an application	Applying (Level III)
IT504F.CO5	<b>Design</b> real world problems with modern tool usage.	Creating (Level VI)
IT504F.CO6	<b>Solve</b> the professional ethics and lifelong learning in technical aspects.	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	-	-	-	-	-	2	2	3	2	3
CO2	3	3	3	2	2	-	-	-	1	-	2	1	3	2	3
CO3	3	3	3	2	2	-	-	-	-	-	2	1	3	2	3
CO4	3	3	3	2	2	-	-	-	-	-	2	1	3	2	3
CO5	3	3	3	3	3	2	2	-	2	-	2	2	3	2	3
CO6	1	1	2	-	2	3	2	3	3	2	2	2	3	3	3
AVG.	2.67	2.67	2.83	2.20	2.17	2.50	2.00	3.00	2.00	2.00	2.00	1.50	3.00	2.17	3.00



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	Introduction of UNIX/Linux Operating System which includes preliminary commands, start-up & shutdown methodology, file handling as well as introduction to editors like Vi editor, introduction to GNU C & C++ compiler, as well as introduction to GNU & GDB script.	4
2	Introduction to C++, basic loop control, executing programs, writing functions, selection statements, review of functions and parameters, command line arguments, recursion, I/O streams, arrays and string manipulation, pointers, structures & unions	6
3	Object-Oriented Programming in C++, fundamentals of classes, constructors-destructors. Dealing with member functions, operator overloading and polymorphism (both static & dynamic).	6
4	Dealing with inheritance, derived class handling, abstract class, virtual class, overriding, template class, name-space & exception handling.	4
5	Dynamic memory allocation, implementation of Linked Lists, using C++.	4

**RESOURCES:**

1. Schildt, H., The Complete Reference C++, McGraw – Hill.
2. C++ object oriented programming paradigm, Debasish Jana, PHI
3. Pooley, R and P. Stevens, Using UML , Addison-Wesley.
4. Programming In C++, Y.I. Shah and M.H. Thaker, ISTE/EXCEL BOOKS
5. Rumbaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India
6. Rajaram: Object Oriented Programming and C++, New Age International



## SEMESTER V PRACTICAL

<b>Course Title: Design &amp; Analysis of Algorithm</b>	<b>Code: IT591</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 5<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator)</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITES:** CS-392 Data structure.

**COURSE OBJECTIVE:**

- To introduce various designing techniques and methods for algorithms.
- Performance analysis of Algorithms using asymptotic and empirical approaches
- Demonstrate a familiarity with major algorithms and data structures.
- To give clear idea on algorithmic design paradigms like Divide-and-Conquer, Dynamic Programming, Greedy, Branch and Bound etc.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT591.CO1	Define the concept of Divide and Conquer approach and learn where it has to be used	Remembering (Level I)
IT591.CO2	Understand the concept of Dynamic Programming and can be able to apply that in problem solving	Understanding (Level II)
IT591.CO3	Apply the knowledge of branch and bound in different puzzle related problems.	Applying (Level III)
IT591.CO4	Examine the concept of Backtracking in problem solving and learn how to implement it	Analyzing (Level IV)
IT591.CO5	Explain the programming knowledge using Greedy method and learn the process of solving different problems	Evaluating (Level V)
IT591.CO6	Construct programming concept on Graph Traversal Algorithm	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	-	-	-	-	-	-	1	3	3	-
CO2	3	3	3	2	3	-	-	2	-	-	-	2	3	1	-
CO3	3	3	3	2	3	-	-	2	1	-	-	2	3	2	-
CO4	3	3	3	2	3	-	-	2	-	-	1	2	3	3	-
CO5	3	3	3	2	3	-	-	1	1	-	1	2	3	3	-
CO6	3	3	2	1	1	-	-	-	1	-	-	1	3	3	-
AVG.	3.00	3.00	2.83	1.67	2.33	0	0	1.75	1.00	0	1.00	1.67	3.00	2.50	0





**UNIVERSITY SYLLABUS:**

Unit	Content
1	<b>Divide and Conquer :</b> <ul style="list-style-type: none"><li>• Implement Binary Search using Divide and Conquer approach</li><li>• Implement Merge Sort using Divide and Conquer approach</li><li>• Implement Quick Sort using Divide and Conquer approach</li><li>• Find Maximum and Minimum element from an array of integer using Divide and Conquer approach</li></ul>
2	<b>Dynamic Programming :</b> <ul style="list-style-type: none"><li>• Find the minimum number of scalar multiplication needed for chain of matrix</li><li>• Implement all pair of Shortest path for a graph ( Floyd- Warshall Algorithm )</li><li>• Implement Traveling Salesman Problem</li><li>• Implement Single Source shortest Path for a graph ( Dijkstra, Bellman Ford Algorithm )</li></ul>
3	<b>Brunch and Bound :</b> <ul style="list-style-type: none"><li>• Implement 15 Puzzle Problem</li></ul>
4	<b>Backtracking :</b> <ul style="list-style-type: none"><li>• Implement 8 Queen problem</li><li>• Graph Coloring Problem</li><li>• Hamiltonian Problem</li></ul>
5	<b>Greedy method</b> (implement any one of the following problem) : Knapsack Problem <ul style="list-style-type: none"><li>• Job sequencing with deadlines</li><li>• Minimum Cost Spanning Tree by Prim's Algorithm</li><li>• Minimum Cost Spanning Tree by Kruskal's Algorithm</li></ul>
6	<b>Graph Traversal Algorithm :</b> <ul style="list-style-type: none"><li>• Implement Breadth First Search (BFS)</li><li>• Implement Depth First Search (DFS)</li></ul>

<b>Course Title: Computer Architecture</b>	<b>Code: IT592</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 5<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-291 Basic Computation & Principles of Computer Programming Lab, CS-392 Data structure Lab and Computer Organization Lab

**COURSE OBJECTIVE:**

- Specify simple abstract data types and design implementations, using VHDL
- Recognize features of HDL to design different components of a computer.
- Generate the timing signal for different components.



**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	Details	Knowledge Level of revised Bloom's Taxonomy
IT592.CO1	Design complex circuits to achieve complex logical results.	Creating (Level VI)
IT592.CO2	Knowledge of new circuits that may be effective for complex computation.	Applying (Level III)
IT592.CO3	Create basic components of a machine using VHDL	Creating (Level VI)
IT592.CO4	Explain the interconnection between different hardware components.	Understanding (Level II)
IT592.CO5	Apply software tools to generate hardware components.	Applying (Level III)
IT592.CO6	Develop programs to compare the performance of different hardware components.	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	1	1	-	-	-	-	1	1	1	3	-	1
CO2	1	1	1	1	1	-	-	-	-	1	-	1	3	-	1
CO3	2	1	1	1	1	-	-	-	-	1	-	1	3	-	1
CO4	1	1	1	1	1	-	-	-	-	1	-	1	3	-	1
CO5	1	1	1	1	1	-	-	-	-	1	-	1	3	-	1
CO6	1	1	3	1	3	-	-	-	2	2	2	1	3	1	1
AVG.	1.33	1	1.5	1	1.33	0	0	0	2	1.17	1.5	1	3.00	1.00	1

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	VHDL introduction	12
2	Assignments on basic digital logic base programming with HDL	3
3	Assignments on Addition, Multiplication, Division.	6
4	Assignments on Register design	6
5	Assignments on Memory design	6

**RESOURCES:**

1. Computer Architecture and Organization. John. P.Hayes Magraw- Hill.
2. Computer system Architecture. M.Moris Mano. Pearson



<b>Course Title: Operating System Lab</b>	<b>Code: IT593</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 5<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-201 Introduction to Computing, CS-302 Data Structure.

**COURSE OBJECTIVE:**

- Explain the details structure of UNIX Operating Systems.
- Familiar with shell scripts
- Implement different operations of process and threads.
- Implementing the concept of semaphore, Process synchronization and Inter-process-communication (IPC).

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT593.CO1	<b>Describe</b> the history, file system and components of a UNIX operating system.	Remember (Level I)
IT593.CO2	<b>Explain</b> the different construct for writing shell scripts.	Understand (Level II)
IT593.CO3	<b>Execute</b> shell scripts to solve basic programming problems.	Apply (Level III)
IT593.CO4	<b>Implement</b> different operations of process and threads.	Apply (Level III)
IT593.CO5	<b>Design</b> Inter- process communication mechanism for process communication.	Create (Level VI)
IT593.CO6	<b>Finding</b> the programming solution for classical synchronization problem using semaphore.	Analyze (Level IV)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	1	1	-	-	1	-	-	-	-	2	2	1	1	1
<b>CO2</b>	3	1	1	-	-	-	-	-	-	-	2	2	3	1	1
<b>CO3</b>	3	3	1	1	-	-	-	-	-	-	2	2	3	2	1
<b>CO4</b>	3	3	2	1	-	-	-	-	-	-	2	2	3	2	2
<b>CO5</b>	3	3	2	1	-	-	-	-	-	-	2	2	3	2	2
<b>CO6</b>	3	2	3	1	-	2	-	-	-	-	2	2	3	3	2
<b>AVG.</b>	<b>3.00</b>	<b>2.17</b>	<b>1.67</b>	<b>1.00</b>	<b>0</b>	<b>1.50</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2.00</b>	<b>2.00</b>	<b>2.67</b>	<b>1.83</b>	<b>1.50</b>



## UNIVERSITY SYLLABUS:

Unit	Content	Hrs./Unit
1	<b>Managing Unix/Linux Operating System</b> Creating a bash shell script, making a script executable, shell syntax (variables, conditions, control structures, functions, commands). Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Backup schedules and methods Kernel loading, init and the inittab file, Run-levels, Run level scripts. Password file management, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user-management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users & user groups.	8
2	<b>Process</b> Starting new process, replacing a process image, duplicating a process image, waiting for a process, zombie process.	4
3	<b>Signal</b> Signal handling, sending signals, signal interface, signal sets.	4
4	<b>Semaphore</b> Programming with semaphores (use functions semctl, semget, semop, set_semvalue, del_semvalue, semaphore_p, semaphore_v).	6
5	<b>POSIX Threads</b> Programming with pthread functions (viz. pthread_create, pthread_join, pthread_exit, pthread_attr_init, pthread_cancel).	6
6	<b>Inter-process communication</b> Pipes (use functions pipe, popen, pclose), named pipes (FIFOs, accessing FIFO), message passing & shared memory (IPC version V).	6

## RESOURCES:

1. Das, Sumitava “YOUR UNIX :THE ULTIMATE GUIDE ”, McGraw Hill.
2. Silberschatz A. and Peterson J. L., “Operating System Concepts”, Wiley.



<b>Course Title: Programming Practices using C++</b>	<b>Code: IT594F</b>
<b>Type of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 5<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS291 Introduction to computing Laboratory, CS-392 Data structure Laboratory.

**COURSE OBJECTIVE:**

- To understand the concepts of object-oriented programming with C++
- To familiarize with static, friend functions, function overloading, operator overloading and type conversion
- To expertise in OOP concepts such as inheritance, run time polymorphism and exception handling
- To explore function and class templates
- To realize file handling

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
<b>IT594F.CO1</b>	<b>Develop</b> programming skills among the student and applications using C++ by using the key programming construct, classes and objects	Creating (Level VI)
<b>IT594F.CO2</b>	<b>Understand</b> generic programs by applying templates to functions and classes	Understanding(Level II)
<b>IT594F.CO3</b>	<b>Apply</b> exception handling mechanism for handling exceptions, reuse in application development using inheritance, run time polymorphism	Applying (Level III)
<b>IT594F.CO4</b>	<b>Implement</b> Files for handling IOs in an application	Applying (Level III)
<b>IT594F.CO5</b>	<b>Design</b> real world problems with modern tool usage.	Creating (Level VI)
<b>IT594F.CO6</b>	<b>Practice</b> the professional ethics and lifelong learning in technical aspects.	Applying (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	3	3	2	2	-	-	-	-	-	2	2	3	2	3
<b>CO2</b>	3	3	3	2	2	-	-	-	1	-	2	1	3	2	3
<b>CO3</b>	3	3	3	2	2	-	-	-	-	-	2	1	3	2	3
<b>CO4</b>	3	3	3	2	2	-	-	-	-	-	2	1	3	2	3
<b>CO5</b>	3	3	3	3	3	2	2	-	2	-	2	2	3	2	3
<b>CO6</b>	1	1	2	-	2	3	2	3	3	2	2	2	3	3	3
<b>AVG.</b>	<b>2.67</b>	<b>2.67</b>	<b>2.83</b>	<b>2.20</b>	<b>2.17</b>	<b>2.50</b>	<b>2.00</b>	<b>3.00</b>	<b>2.00</b>	<b>2.00</b>	<b>2.00</b>	<b>1.50</b>	<b>3.00</b>	<b>2.17</b>	<b>3.00</b>



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	Introduction of UNIX/Linux Operating System which includes preliminary commands, start-up & shutdown methodology, file handling as well as introduction to editors like Vi editor, introduction to GNU C & C++ compiler, as well as introduction to GNU & GDB script.	4
2	Introduction to C++, basic loop control, executing programs, writing functions, selection statements, review of functions and parameters, command line arguments, recursion, I/O streams, arrays and string manipulation, pointers, structures & unions.	6
3	Object-Oriented Programming in C++, fundamentals of classes, constructors-destructors. Dealing with member functions, operator overloading and polymorphism (both static & dynamic).	6
4	Dealing with inheritance, derived class handling, abstract class, virtual class, overriding, template class, name-space & exception handling.	4
5	Dynamic memory allocation, implementation of Linked Lists, using C++.	4



## SEMESTER VI THEORY

<b>Course Title: Principles of Management</b>	<b>Code: HU601</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 2L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES: N.A.**

### COURSE OBJECTIVES:

- Instill the moral values that ought to guide their profession.
- Resolve the moral issues in the profession.
- Infer moral judgment concerning the profession.

### COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
HU601.CO1	<b>Recall</b> the concepts of Management and learn different theories used in industrial applications.	Understanding (Level II)
HU601.CO2	<b>Discuss</b> the appropriate theory required for solving real life problems.	Creating (Level VI)
HU601.CO3	<b>Apply</b> the use of Management concepts.	Applying (Level III)
HU601.CO4	<b>Analyze</b> the Marketing Mix and functions of production.	Analyzing (Level IV)
HU601.CO5	<b>Design</b> the materials as per different materials management analysis.	Creating (Level VI)
HU601.CO6	<b>Understand</b> MBO and learn its application in organizations.	Understanding (Level II)

### Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	3	-	-	2	-	-
CO2	-	-	-	-	-	-	3	-	-	1	-	-	-	-	-
CO3	-	-	1	-	1	3	-	-	-	2	-	-	1	1	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-
CO5	-	-	-	-	-	-	-	-	1	1	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-
AVG.	3.00	0	1.00	0	1.00	3.00	3.00	0	1.00	1.50	3.00	0	1.50	1.00	0



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<ul style="list-style-type: none"> <li>Basic concepts of management: Definition – Essence, Functions, Roles, Level.</li> <li>Functions of Management: Planning – Concept, Nature, Types, Analysis, Management by objectives; Organisation Structure – Concept, Structure, Principles, Centralization, Decentralization, Span of Management; Organisational Effectiveness.</li> </ul>	2
2	<ul style="list-style-type: none"> <li>Management and Society – Concept, External Environment, CSR, Corporate Governance, Ethical Standards.</li> <li>People Management – Overview, Job design, Recruitment &amp; Selection, Training &amp; Development, Stress Management.</li> <li>Managerial Competencies – Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, Entrepreneurship</li> </ul>	18
3	<ul style="list-style-type: none"> <li>Leadership: Concept, Nature, Styles.</li> <li>Decision making: Concept, Nature, Process, Tools &amp; techniques.</li> <li>Economic, Financial &amp; Quantitative Analysis – Production, Markets, National Income Accounting, Financial Function &amp; Goals, Financial Statement &amp; Ratio Analysis, Quantitative Methods – Statistical Interference, Forecasting, Regression Analysis, Statistical Quality Control.</li> </ul>	8
4	<ul style="list-style-type: none"> <li>Customer Management – Market Planning &amp; Research, Marketing Mix, Advertising &amp; Brand Management.</li> <li>Operations &amp; Technology Management – Production &amp; Operations Management, Logistics &amp; Supply Chain Management, TQM, Kaizen &amp; Six Sigma, MIS.</li> </ul>	20

<b>Course Title: Data Base Management System</b>	<b>Code: IT601</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** IT-503 Operating System, CS-302 Data structure.

**COURSE OBJECTIVE:**

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
- To understand the different issues involved in the design and implementation of a database system.





**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT601.CO1	<b>Explain</b> the principles of database management systems	Understanding (Level II)
IT601.CO2	<b>Design</b> and develop Entity Relationship Diagram.	Creating (Level VI)
IT601.CO3	<b>Understand</b> the features of relational database design and implement them in real life examples.	Understanding (Level II)
IT601.CO4	<b>Explain</b> and evaluate the use of SQL in relational database design.	Evaluating (Level V)
IT601.CO5	<b>Knowledge</b> on file organization and index structure.	Applying (Level III)
IT601.CO6	<b>Distinguish</b> between different data modeling approaches.	Analyzing (Level IV)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	1	1	-	-	-	-	1	3	-	-
CO2	3	3	2	2	2	-	1	-	-	-	-	2	3	1	-
CO3	3	2	3	2	1	-	-	-	-	1	1	2	3	1	-
CO4	3	2	3	2	2	-	-	-	-	1	1	2	3	1	-
CO5	3	2	-	-	-	1	-	-	-	-	-	1	3	-	1
CO6	3	2	-	-	-	1	-	-	-	-	1	1	3	-	1
AVG.	3.00	2.17	2.67	2.00	1.67	1.00	1.00	0	0	1.00	1.00	1.50	3.00	1.00	1.00

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Introduction [4L]</b> Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS.	4
2	<b>Entity-Relationship Model [6L]</b> Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.	6
3	<b>Relational Model [5L]</b> Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications Of the Database.	5
4	<b>SQL and Integrity Constraints [8L]</b> Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Sub queries, Database security application development using SQL, Stored procedures and triggers.	8
5	<b>Relational Database Design [9L]</b> Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF	9
6	<b>Internals of RDBMS [7L]</b> Physical data structures, Query optimization: join algorithm, statistics and cost based optimization. Transaction processing, Concurrency control and Recovery Management: transaction model properties, state serializability, lock based protocols, two phase locking.	7



7	<b>File Organization &amp; Index Structures [6L]</b> File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree .	6
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**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
Three Schema architecture of DBMS	Unit 1
Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.	Unit 2
Relational Algebra, Relational Calculus	Unit 3
Use of SQL	Unit 4
Transaction processing, Concurrency control and Recovery Management, state serializability, lock base protocols, two phase locking.	Unit 6
Primary Indexes, Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree	Unit 7

**RESOURCES:**

1. Henry F. Korth and Silberschatz Abraham, "Database System Concepts", Mc.Graw Hill.
2. Elmasri Ramez and Novathe Shamkant, "Fundamentals of Database Systems", Benjamin CummingsPublishing. Company.
3. Ramakrishnan: Database Management System , McGraw-Hill
4. Gray Jim and Reuter Address, "Transaction Processing : Concepts and Techniques", Moragan KauffmanPublishers.
5. Jain: Advanced Database Management System CyberTech
6. Date C. J., "Introduction to Database Management", Vol. I, II, III, Addison Wesley.
7. Ullman JD., "Principles of Database Systems", Galgottia Publication.
8. James Martin, "Principles of Database Management Systems", 1985, Prentice Hall of India, New Delhi
9. "Fundamentals of Database Systems", Ramez Elmasri, Shamkant B.Navathe, Addison Wesley Publishing Edition
10. "Database Management Systems", Arun K.Majumdar, Pritimay Bhattacharya, Tata McGraw Hill



<b>Course Title: Computer Networks</b>	<b>Code: IT602</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** IT-503 Operating System, CS-303 Computer Organization.

**COURSE OBJECTIVE:**

- To obtain a theoretical understanding of data communication and computer networks.
- To develop an understanding of modern network architectures from a design and performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs) and local area networks (LANs).
- Illustrate various networking protocols such as HDLC, Ethernet, IP, etc.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT602.CO1	Outline the basic concept of networking, types, networking topologies and layered architecture.	Understanding (Level II)
IT602.CO2	Explain data link layer and MAC sub-layer.	Evaluating (Level V)
IT602.CO3	Demonstrate the network Layer functioning.	Understanding (Level II)
IT602.CO4	Identify the different types of network devices and their functions within a network.	Applying (Level III)
IT602.CO5	Examine the transport layer and application layer operation.	Analyzing (Level IV)
IT602.CO6	Design and maintenance of individual networks.	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	-	2	2	1	-	3	-	2	1	3	3
CO2	3	2	1	1	2	-	-	-	-	1	1	3	3	2	1
CO3	3	2	3	1	1	-	-	-	-	2	2	2	3	2	2
CO4	3	3	3	2	-	-	-	2	-	2	2	2	1	2	1
CO5	3	2	1	1	3	-	-	2	-	1	2	2	3	2	2
CO6	3	2	2	1	-	-	2	2	3	-	2	3	1	2	1
AVG.	3.00	2.00	1.83	1.17	2.00	2.00	2.00	1.75	3.00	1.80	1.80	2.33	2.00	2.17	1.67



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<p><b>Overview of Data Communication and Networking: [4L]</b>            Introduction; Data communications: components, data representation (ASCII, ISO etc.), direction of data flow (simplex, half duplex, full duplex); network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN,WAN);            Internet: brief history, Protocols and standards;            Reference models: OSI reference model, TCP/IP reference model, their comparative study.</p> <p><b>Physical Level: [6L]</b></p> <p>Overview of data (analog &amp; digital), signal(analog &amp; digital), transmission (analog &amp; digital) &amp; transmission media (guided&amp; unguided);            Circuit switching: time division &amp; space division switch, TDM bus; Telephone Network.</p>	10
2	<p><b>Data link Layer: [5L]</b>            Types of errors, framing (character and bit stuffing), error detection &amp; correction methods;            Flow control; Protocols: Stop &amp; wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC.</p> <p><b>Medium Access sub layer: [5L]</b></p> <p>Point to Point Protocol, LCP, NCP, Token Ring;            Reservation, Polling, Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA Traditional Ethernet, fast Ethernet (in brief).</p>	10
3	<p><b>Network layer: [8L]</b></p> <p>Internetworking &amp; devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway;            Addressing: IP addressing, sub-netting;            Routing: techniques, static vs. dynamic routing,            Unicast Routing Protocols: RIP, OSPF, BGP;            Other Protocols: ARP, IP, ICMP, IPV6;.</p> <p><b>Transport layer: [4L]</b></p> <p>Process to Process delivery; UDP; TCP; Congestion Control: Open Loop, Closed Loop choke packets; Quality of service: techniques to improve QoS: Leaky bucket algorithm, Token bucket algorithm,</p>	12
4	<p><b>Application Layer [5L]</b></p> <p>Introduction to DNS, SMTP, SNMP, FTP, HTTP &amp; WWW;            Security: Cryptography (Public, Private Key based), DigitalSignature, Firewalls</p> <p><b>Modern topics: [5L]</b></p> <p>ISDN services &amp; ATM, DSL technology,            Cable Modem: Architecture &amp; Operation in brief            Wireless LAN: IEEE 802.11, Introduction to blue-tooth.</p>	10



**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
Error detection & correction methods; Flow control protocols, Multiple access protocols.	Module 2
Addressing, Routing, Congestion Control	Module 3
Cryptography	Module 4

**RESOURCES:**

1. B A Forouzan: Data Communications and Networking, TMH, 2003.
2. A S Tanenbaum: Computer Networks, PHI, 2004.
3. W Stallings: Data and Computer Communications, PHI/Pearson.

<b>Course Title: Software Engg.</b>	<b>Code: IT603</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Basic knowledge on software and Information system.

**COURSE OBJECTIVE:**

- Understand common lifecycle processes including waterfall (linear), incremental approaches (such as Unified process), and agile approaches.
- Design a solution to a given problem using one or more design patterns and implement the design in a programming language
- Apply software testing and quality assurance techniques at the module level, and understand these techniques at the system and organization level.
- Discover the role of project management including planning, staffing, scheduling, monitoring etc.
- Model the structure and behavior a software system using the UML diagrams

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT603.CO1	<b>Understand</b> software lifecycle processes including traditional and modern approaches.	Understanding (Level II)
IT603.CO2	<b>Design</b> software using requirement model	Creating (Level VI)
IT603.CO3	<b>Apply</b> software testing and quality assurance techniques at the modular, system and organizational level.	Applying (Level III)
IT603.CO4	<b>Explain</b> role of SDLC in Software project development.	Evaluating (Level V)
IT603.CO5	<b>Develop</b> project schedule and network diagram for different projects.	Creating (Level VI)
IT603.CO6	<b>Analyze</b> the structure and behavior of a software system using the UML diagrams	Analyzing (Level IV)



**Mapping of COs with Pos and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	2	1	1	-	-	2	-	-	-	2	-	2	2	1	-
<b>CO2</b>	2	-	3	1	2	-	-	-	2	1	1	1	1	2	-
<b>CO3</b>	2	2	1	-	3	-	-	-	1	1	1	-	1	2	-
<b>CO4</b>	2	-	-	-	2	-	-	1	2	1	2	-	1	2	-
<b>CO5</b>	2	-	3	1	3	-	1	-	2	1	2	1	1	1	1
<b>CO6</b>	2	3	1	-	3	-	-	-	1	1	1	-	1	1	1
<b>AVG.</b>	<b>2.00</b>	<b>2.00</b>	<b>1.80</b>	<b>1.00</b>	<b>2.60</b>	<b>2.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.60</b>	<b>1.17</b>	<b>1.40</b>	<b>1.33</b>	<b>1.17</b>	<b>1.50</b>	<b>1.00</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	Overview of System Analysis & Design , Business System Concept, System Development Life Cycle, Waterfall Model , Spiral Model, Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis, COCOMO model. [10L]	10
2	System Design – Context diagram and DFD, Problem Partitioning, Top-Down And Bottom-Up design; Decision tree, decision table and structured English; Functional vs. Object- Oriented approach. [5L]	5
3	Coding & Documentation – Structured Programming, OO Programming, Information Hiding, Reuse, System Documentation. [4L]  Testing – Levels of Testing, Integration Testing, Test case Specification, Reliability Assessment, Validation & Verification Metrics, Monitoring & Control. [8L]	12
4	Software Project Management – Project Scheduling, Staffing, Software Configuration Management, Quality Assurance, Project Monitoring. [7L]	7
5	Fundamentals of Object Oriented design in UML Static and dynamic models, why modeling, UML diagrams: Class diagram, interaction diagram: collaboration diagram, sequence diagram, state chart diagram, activity diagram, implementation diagram. [10 L]	10

**RESOURCES:**

1. Software Engineering, Rogers G. Pressman, MH
2. Fundamentals of Software Engineering, 2nd Ed. ,Ghezzi, PHI
3. Software Engineering, Pankaj Jalote, PHI.



<b>Course Title: ERP</b>	<b>Code: IT604D</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-492 S/w Tools Lab.

**COURSE OBJECTIVE:**

- Introduce ERP and its evolution.
- Explain ERP systems in the light of ICT tools.
- Illustrate implementations of ERP systems.
- Produce examples on emerging trends and future ERP.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT604D.CO1	<b>Define</b> the concepts of ERP.	Remembering (Level I)
IT604D.CO2	<b>Develop</b> ideas on application of IT in ERP systems.	Creating (Level VI)
IT604D.CO3	<b>Discuss</b> on ERP and related technologies.	Creating (Level VI)
IT604D.CO4	<b>Demonstrate</b> implementation of ERP systems.	Understanding (Level II)
IT604D.CO5	<b>Demonstrate</b> ideas on post ERP implementations.	Understanding (Level II)
IT604D.CO6	<b>Analyze</b> various future aspects of ERP.	Analyzing (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	2	2	-	-	1	-	1	1	2	2	2	-	-	-
<b>CO2</b>	3	3	3	-	-	1	1	1	1	3	2	2	-	2	-
<b>CO3</b>	3	2	2	-	-	1	1	1	1	2	2	2	-	2	-
<b>CO4</b>	3	2	2	3	2	1	1	1	1	3	2	2	2	2	-
<b>CO5</b>	3	2	2	3	2	1	1	1	1	2	2	2	2	2	-
<b>CO6</b>	3	3	3	3	2	1	1	1	1	3	2	2	-	2	3
<b>AVG.</b>	<b>3.00</b>	<b>2.33</b>	<b>2.33</b>	<b>3.00</b>	<b>2.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>2.50</b>	<b>2.00</b>	<b>2.00</b>	<b>2.00</b>	<b>2.00</b>	<b>3.00</b>



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<p><b>Overview of ERP [9L]</b>            The evolution of ERP systems: A historical perspective            Evolution through Payroll system, Inventory Control system, Materials Requirement Planning (MRP I) system, Manufacturing Resource Planning (MRP II) system, Their advantages and disadvantages. Definition and Concept of ERP, Business reasons for rise and popularity of ERP system - Benefits of an ERP system</p> <p>Business processes supported by ERP systems            Various business functions in an Organization – Purchasing, Materials Management, Manufacturing, Sales &amp; Distribution, Plant Maintenance, Quality Management, Finance &amp; Accounting including Costing, Human Resources etc.</p> <p>ERP market place – SAP, Oracle, PeopleSoft, JD Edwards, Baan, Microsoft’s suit of products etc.            Business modules in these ERP packages – a brief comparative description of business function modules and sub-modules.            Overview of key end-to-end business processes supported in two major ERP systems (preferably SAP and Oracle) – Order to Cash, Procure to Pay, Plan to Produce and Dispatch.</p>	9
2	<p><b>Information Technology and ERP systems [6L]</b>            The evolution of Information Technology (IT): A historical perspective            Evolution of computer generations (hardware and software) – Operating systems, File systems to Database Management systems, Communication Networks. Enabling of ERP systems by IT evolution.</p> <p>The evolution of ERP systems architecture            Client-Server based architecture, Multi-Tier architecture – Presentation layer, Application layer, and Database layer (On-line Transaction Processing – OLTP). Brief discussion on Extended ERP systems - Web-enabled ERP architecture, Service-Oriented Architecture and Cloud Computing. Open Source ERP.</p>	6
3	<p><b>Related technology concepts [3L]</b>            ERP and Supply Chain Management (SCM), and Customer Relationship Management (CRM), ERP and Business Intelligence (some of the popular tools like Cognos, Business Objects should be mentioned), ERP and Data warehousing (Data Mart, Data Mining and On-line Analytical Processing - OLAP), ERP and E-business.</p>	3
4	<p><b>Implementation of ERP systems [7L]</b>            ERP implementation approach            Single vendor versus Best-of Breed ERP implementation, Big Bang versus Phased (by module/ site) implementation, Using ERP of Application Service Provider (ASP).</p> <p>ERP implementation life cycle            Planning different aspects (Economic viability, Senior Management commitment, Resource requirements, Change management etc.), Understanding requirements and Process preparation – Gap analysis and Business Process Engineering, User Acceptance criteria, Design, Configuration, Customization (difference between Configuration and Customization, advantages and disadvantages), Extensions, Data migration, End-user training, User Acceptance, Going live, Roll-out. Differences between ERP implementation life cycle and Custom Software development phases. Drawbacks of ERP system.</p> <p>Organizing implementation            Interaction with Vendors, Consultants, and Users. Contracts with Vendors, Consultants, and Employees. Project Management and Monitoring. ERP Project Organization – Formation of Steering Committee and different User Groups. Top Management</p>	7





	Commitment and Steering Committee meetings. Change Management, Risks and Challenges in ERP implementation.	
5	<p><b>Post-implementation of ERP systems [4L]</b>            Post-implementation Support, Review, Maintenance and Security of ERP systems            A typical Support Cycle (Planning, Stabilization, Ongoing and Upgrade phases). Post-implementation Review of ERP systems – measures of review (Efficiency, Effectiveness, and Competitive Advantage), and approaches for review (User attitude survey, Cost/benefit analysis, Compliance audit, Budget performance review, Service level monitoring, Technical review, Product review, Integration review etc.). System maintenance and ERP system maintenance. Software upgrade (patch, release, version). Security and Access control of ERP systems.</p>	4
6	<p><b>Emerging trends and future of ERP systems [7L]</b>            Emerging Technologies and ERP</p> <p>Service-oriented Architecture (SOA): Enterprise SOA layers – Business processes, Business services, Components and Integration services, Advantages and Drawbacks of SOA, When to use SOA, Difference between multi-layered Client-server architecture and SOA, basic awareness of NetWeaver from SAP, Websphere from Oracle and .Net from Microsoft.</p> <p>Enterprise Application Integration (EAI): Basic understanding of the concept, Types of EAI (levels) – UserInterface, Method (logic), Application Interface, Data.            EAI architecture – Typical framework (Business Processes, Components &amp; Services, Messaging service, and Transport service. Mention of some of the leading EAI vendors – IBM, Microsoft, Oracle, SAP, TIBCO. Radio Frequency Identification (RFID) and ERP: awareness of RFID technology, Benefits of RFID integrated with ERPs.</p> <p>M-Commerce: basic concept and applications, difference with E-Commerce, benefits of integration with ERPs.</p> <p>Future of ERP            Technology transformation to SOA, more E-Commerce features, Growing mobile applications, Economical and Easy models of ERP deployment etc.</p>	7

**RESOURCES:**

1. D P Goyal, “Enterprise Resource Planning – A Managerial Perspective”, Tata McGraw Hill Education, 2011
2. Ashim Raj Singla, “Enterprise Resource Planning”, Cengage Learning, 2008
3. Alexis Leon, “Enterprise Resource Planning”, 2<sup>nd</sup> Edition, Tata McGraw Hill Education, 2008



<b>Course Title: Compiler Design(CSE)</b>	<b>Code: IT605C</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-303 Computer Organisation, CS-302 Data structure, CS402 Formal Language and Automata Theory.

**COURSE OBJECTIVE:**

- To realize basics of compiler design and apply for real time applications.
- To understand the basic principles of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler
- To understand relations between computer architecture and how its understanding is useful in design of a compiler.
- To know about compiler generation tools and techniques

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT605C.CO1	<b>Explain</b> the concepts and different phases of compilation with compile time error handling.	Understanding (Level II)
IT605C.CO2	<b>Analyze</b> language tokens using regular expressions, context free grammar and finite automata and design lexical analyzer for a language.	Analyzing (Level IV)
IT605C.CO3	<b>Compare</b> top down with bottom up parsers, and develop appropriate parser to produce parse tree representation of the input	Understanding (Level II)
IT605C.CO4	<b>Generate</b> intermediate code for statements in high level language	Evaluating (Level V)
IT605C.CO5	<b>Develop</b> syntax directed translation schemes for a given context free grammar	Creating(Level VI)
IT605C.CO6	<b>Apply</b> optimization techniques to intermediate code and generate machine code for high level language program.	Applying (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO2
CO1	3	2	-	1	-	-	-	-	-	-	-	-	3	2	3
CO2	3	3	2	2	1	-	-	-	-	-	-	-	3	2	3
CO3	2	2	-	-	1	-	-	-	-	-	-	-	3	2	3
CO4	3	2	-	2	-	-	-	-	-	-	-	-	3	2	3
CO5	2	1	-	1	1	-	-	-	-	-	-	-	3	2	3
CO6	3	1	1	2	1	-	-	-	-	-	-	-	3	2	3
AVG.	2.67	1.83	1.50	1.60	1.00	0	0	0	0	0	0	0	3.00	2.00	3.00



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Introduction to Compiling</b> [3L] Compilers, Analysis of the source program, The phases of the compiler, Cousins of the compiler	3
2	<b>Lexical Analysis</b> [6L]  The role of the lexical analyzer, Tokens, Patterns, Lexemes, Input buffering, Specifications of a token, Recognition of a tokens, Finite automata, From a regular expression to an NFA, From a regular expression to NFA, From a regular expression to DFA, Design of a lexical analyzer generator (Lex)..	6
3	<b>Syntax Analysis</b> [9L]  The role of a parser, Context free grammars, Writing a grammar, Top down Parsing, Non-recursive Predictive parsing(LL), Bottom up parsing, Handles, Viable prefixes, Operator precedence parsing, LR parsers (SLR, LALR), Parser generators (YACC). Error Recovery strategies for different parsing techniques	9
4	<b>Syntax directed translation</b> [5L]  Syntax director definitions, Construction of syntax trees, Bottom-up evaluation of S attributed definitions, L attributed definitions, Bottom-up evaluation of inherited attributes.	5
5	<b>Type checking</b> [4L] Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions.	4
6	<b>Run time environments</b> [5L]  Source language issues (Activation trees, Control stack, scope of declaration, Binding of names), Storage organization(Subdivision of run-time memory, Activation records), Storage allocation strategies, Parameter passing (call by value, call by reference, copy restore, call by name), Symbol tables, dynamic storage allocation techniques	5
7	<b>Intermediate code generation</b> [4L]  Intermediate languages, Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples).	4
8	<b>Code optimization</b> [5L]  Introduction, Basic blocks & flow graphs, Transformation of basic blocks, Dag representation of basic blocks, The principle sources of optimization, Loops in flow graph, Peephole optimization.	5
9	<b>Code generations</b> [4L]  Issues in the design of code generator, a simple code generator, Register allocation & assignment.	4

**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
Lexical analysis	Unit 2
Parsing	Unit 3
Syntax-directed translation	Unit 4
Runtime environments	Unit 6
Intermediate code generation	Unit 7



**RESOURCES:**

1. Aho, Sethi, Ullman - “Compiler Principles, Techniques and Tools” - Pearson Education.
2. Holub - “Compiler Design in C” - PHI..

<b>Course Title: Artificial Intelligence(CSE)</b>	<b>Code: IT605D</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-302 Data Structure, IT-501 Design & Analysis Algorithm.

**COURSE OBJECTIVE:**

- Explain the different types intelligent agent.
- Familiar with different Heuristic search techniques.
- Learn different types of knowledge representation techniques.
- Grasp some idea on programming languages like Prolog & Lisp.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT605D.CO1	<b>Explain</b> the history of artificial intelligence (AI) and its foundations.	Understand (Level II)
IT605D.CO2	<b>Describe</b> real world problems in terms of Initial and Goal conditions.	Understand (Level II)
IT605D.CO3	<b>Implement</b> real life AI based problem using Prolog & Lisp.	Apply (Level III)
IT605D.CO4	<b>Design</b> production rule for real life AI based problems.	Create (Level VI)
IT605D.CO5	<b>Compare</b> AI with human intelligence and traditional information processing and discuss its strengths and limitations as well as its application to complex and human-centered problems.	Analyze (Level IV)
IT605D.CO6	<b>Use</b> solution driver to logically derive solution based on probability theory and possibility theory (fuzzy logic)	Apply (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	-	-	-	-	-	-	2	-	-	2
CO2	3	3	2	1	1	-	-	-	-	-	-	2	1	1	2
CO3	3	3	2	2	3	-	-	-	-	-	-	2	3	1	3
CO4	3	1	3	3	2	-	-	-	-	-	-	2	2	1	2
CO5	3	1	1	1	-	-	-	-	-	-	-	2	1	1	2
CO6	3	3	2	2	2	-	-	-	-	-	-	2	1	2	3
AVG.	3.00	2.00	1.83	1.80	2.00	0	0	0	0	0	0	2.00	1.60	1.20	2.33



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Introduction to AI and Intelligent Agents [4L]</b> Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem. Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.	4
2	<b>Problem Solving [2L]</b> Problems, Problem Space & search: Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs.	2
3	<b>Search techniques [5L ]</b> Solving problems by searching: problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies.	5
4	<b>Heuristic search strategies [5L]</b> Greedy best-first search, A* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated annealing search, local beam search, genetic algorithms; constraint satisfaction problems, local search for constraint satisfaction problems.	5
5	<b>Adversarial search [3L]</b> Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterative deepening.	3
6	<b>Knowledge &amp; reasoning [8L]</b> Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation. Using predicate logic: Representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction. Representing knowledge using rules: Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge.	8
7	<b>Probabilistic reasoning [4L]</b> Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets & fuzzy logics.	4
8	<b>Planning [2L]</b> Overview, components of a planning system, Goal stack planning, Hierarchical planning, other planning techniques.	2
9	<b>Natural Language processing [2L]</b> Introduction, Syntactic processing, semantic analysis, discourse & pragmatic processing.	2
10	<b>Learning [2L]</b> Forms of learning, inductive learning, learning decision trees, explanation based learning, learning using relevance information, neural net learning & genetic learning.	2
11	<b>Expert Systems [2L]</b> Representing and using domain knowledge, expert system shells, and knowledge acquisition.	2
12	<b>Basic knowledge of programming language like Prolog &amp; Lisp [6L]</b>	6

**RESOURCES:**

1. Artificial Intelligence, Ritch & Knight, TMH
2. Artificial Intelligence A Modern Approach, Stuart Russel Peter Norvig Pearson
3. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
4. Poole, Computational Intelligence, OUP
5. Logic & Prolog Programming, Saroj Kaushik, New Age International
6. Expert Systems, Giarranto, VIKAS
7. Artificial Intelligence, Russel, Pearson



## SEMESTER VI PRACTICAL

<b>Course Title: Data Base Management System Lab</b>	<b>Code: IT691</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**Pre-requisites:** CS-392 Data structure & Algorithm Lab.

### COURSE OBJECTIVE:

- To understand the practical applicability of database management system concepts.
- Working on existing database systems, designing of database, creating relational database, analysis of table design.
- provide practical knowledge to understand database applications using procedures, cursors and triggers

### COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT691.CO1	<b>Illustrate</b> the basic principles of database management systems	Understanding (Level II)
IT691.CO2	<b>Apply</b> SQL for designing and creating relational database.	Applying (Level III)
IT691.CO3	<b>Analyze</b> the use of SQL for table and record handling	Analyzing (Level IV)
IT691.CO4	<b>Explain</b> and evaluate the use of SQL for retrieving data using different clauses.	Evaluating (Level V)
IT691.CO5	<b>Elaborate</b> the concepts of view, grant, revoke etc.	Creating (Level VI)
IT691.CO6	<b>Develop</b> stored procedures, triggers and cursor using PL/SQL	Applying (Level III)

### Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	1	-	-	-	-	-	2	2	-	-
CO2	3	2	2	2	2	-	-	-	-	-	-	2	3	-	-
CO3	3	2	2	3	1	-	-	-	-	1	1	1	2	2	-
CO4	3	3	3	2	1	-	-	-	-	1	1	2	3	1	1
CO5	3	2	-	-	-	1	-	-	-	-	-	2	2	-	1
CO6	3	2	-	-	-	1	-	-	-	-	1	1	3	-	1
AVG.	3.00	2.33	2.33	2.33	1.33	1.00	0	0	0	1.00	1.00	1.67	2.50	1.50	1.00



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	To learn about database creation, table creation and value insertion, fetch data from table with specific condition.	3
2	To learn about key constraints, Aggregate functions, Numeric functions, Arithmetic Operator and Relational Operator.	6
3	To learn about Order by, Group by and Having clause.	3
4	To learn about Correlated queries.	3
5	To learn about Joining.	6
6	To learn about View, Index.	6
7	To learn about PL/SQL.	6
8	To learn about Triggers.	3

**RESOURCES:**

1. SQL,PL/SQL The programming language of ORACLE, I.Bayross, BPB Publication.
2. Oracle PL/SQL Programming, Steven Feuerstein, Bill Pribyl, O'Reilly.

<b>Course Title: Computer Networking Lab</b>	<b>Code: IT692</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-291 C Programming, IT-401 Java Programming, IT-593 Operating System Lab.

**COURSE OBJECTIVE:**

- To obtain a theoretical understanding of data communication and computer networks.
- To develop an understanding of modern network architectures from a design and performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs) and local area networks (LANs).
- Illustrate various networking protocols such as HDLC, Ethernet, IP, etc.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT692.CO1	<b>Explain</b> OSI Reference Model and in particular have a good knowledge of Layers 1-3.	Understanding (Level II)
IT692.CO2	<b>Apply</b> knowledge of datagram and internet socket programming.	Applying (Level III)
IT692.CO3	<b>Design</b> and test simple programs to implement networking concepts using Java.	Creating (Level VI)
IT692.CO4	<b>Develop</b> simple data transmission using networking concepts and implement.	Applying (Level III)
IT692.CO5	<b>Compare</b> and analyze different existing protocols.	Analyzing (Level IV) and Evaluating (Level V)
IT692.CO6	<b>Analyze</b> the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.	Analyzing (Level IV)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	1	1	-	3	-	2	1	3	3
CO2	3	2	2	1	3	-	-	1	1	1	1	3	3	2	3
CO3	3	3	3	1	1	-	-	-	2	2	2	2	3	2	2
CO4	3	2	2	2	1	2	1	2	2	2	2	2	3	2	3
CO5	3	2	-	-	2	-	-	2	-	1	-	2	1	2	1
CO6	3	3	2	3	2	2	2	2	3	2	2	3	3	2	3
AVG.	3	2.17	2.25	1.75	1.8	2	1.33	1.6	2	1.83	1.75	2.33	2.33	2.17	2.5

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	NIC Installation & Configuration (Windows/Linux) Understanding IP address, subnet mask. <b>Different LAN Topologies:</b> Mesh, Bus, Star and Tree etc. and their advantages and disadvantages. <b>Different networking commands:</b> ipconfig, ping, tracert, nslookup and netstat.	3
2	<b>Familiarization with :</b> 1. Networking cables (CAT5, UTP) 2. Connectors (RJ45, T-connector). 3. Hubs, Switches. <b>Hands on:</b> Straight cable and cross cable connection using clamping tools. Connect two pc's using cross cable and connect more than two pc's using straight cable and switch.	3
3	<b>Data Link Layer Error Detection Mechanism</b> (Cyclic Redundancy Check) using C program.	3
4	<b>Data Link Layer Error Correction Mechanism</b> (Hamming Code) using C program.	3
5	<b>TCP/UDP Socket Programming Using Java</b> Multicast & Broadcast Sockets	3
6	<b>Java Socket Programming:</b> ECHO CLIENT, ECHO SERVER for single client.	3
7	<b>Java Socket Programming:</b> ECHO CLIENT, ECHO SERVER for multiple client support using java Thread class.	3
8	<b>Data Link Layer Flow Control Mechanism</b> (Stop & Wait, Sliding Window) using c program.	3
9	<b>Server Setup/Configuration:</b> FTP, TELNET, NFS, DNS, Firewall.	3

**RESOURCES:**

1. B A Forouzan : Data Communications and Networking, TMH, 2003.
2. W Richard Stevens; UNIX Network Programming (Vol-1), AWP, 2004.
3. H Schildt; Java: The Complete Reference, TMH, 2008.





<b>Course Title: Software Engineering. Lab</b>	<b>Code: IT693</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Design a project proposal which will be used throughout the lab for performing different experiments using CASE Tools.

**COURSE OBJECTIVE:**

- Introduce software project basic concepts.
- Illustrate various tools for Project.
- Design chosen software as case study.
- Develop the chosen software as a project.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT693.CO1	<b>Define</b> the concepts of Software Development Life Cycle .	Remembering (Level I)
IT693.CO2	<b>Explain</b> requirements for proposed project.	Understanding (Level II)
IT693.CO3	<b>Apply</b> tools for project schedule preparation.	Applying (Level III)
IT693.CO4	<b>Justify</b> real-life scenario using UML diagrams.	Evaluating (Level V)
IT693.CO5	<b>Design</b> test plan for project.	Creating (Level VI)
IT693.CO6	<b>Develop</b> the software project in full workable mode.	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	1	1	-	-	2	-	2	2	1	2	1
CO2	2	3	-	1	2	1	-	-	2	-	1	2	2	2	1
CO3	2	1	-	2	3	1	-	-	2	-	1	2	1	2	1
CO4	2	2	3	2	2	1	1	1	2	2	1	2	-	2	2
CO5	2	2	3	1	2	1	2	2	2	1	1	2	2	2	2
CO6	2	2	3	2	2	1	2	2	2	3	3	2	2	2	2
AVG.	2.00	2.00	3.00	1.60	2.00	1.00	1.67	1.67	2.00	2.00	1.50	2.00	1.60	2.00	1.50



**UNIVERSITY SYLLABUS:**

Unit	Content
1	Preparation of requirement document for proposed project in standard format.
2	Project Schedule preparation using tools like MS Project. Generation of Gantt and PERT chart from schedule. Prepare Project Management Plan in standard format.
3	Draw Use Case diagram, Class diagram, Sequence diagram and prepare Software Design Document using tools like Rational Rose.
4	Estimate project size using Function Point (FP)/Use Case Point. Use Excel/Open Office template for calculation.
5	Design Test Script/Test Plan (both Black box and White Box approach) for a small component of the proposed project.(Develop that component using programming languages like c/Java/VB etc.)
6	Generate Test Result and perform defect root cause analysis using Pareto or Fishbone diagram.
7	Compute Process and Product Metrics (e. g Defect Density, Defect Age, Productivity, Cost etc.)
8	Familiarization with any Version Control System like CVS/VSS/Pvcs etc. (Following projects can be used as dummy projects: Library Management System Railway Reservation System Employee Payroll Online Banking System Online Shopping Cart Online Examination)

<b>Course Title: Seminar</b>	<b>Code: IT681</b>
<b>Type Of Course: Sessional</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 6<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITES: Communication Skill**

**COURSE OBJECTIVE:**

- Develop awareness of how to use values in improving your own professionalism.
- Learning about personal and communication styles for team building.
- Demonstrate the ability to describe, interpret and analyze technical issues and develop competence in presenting.
- Prepare a well-organized report employing elements of technical writing and critical thinking.



**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT681.CO1	<b>Identify</b> promising new directions of various cutting edge technologies through literature survey.	Remembering (Level I)
IT681.CO2	<b>Establish</b> motivation for any topic of interest and develop a thought process for technical presentation.	Creating (Level VI)
IT681.CO3	<b>Use</b> proper attitude and communication skill to enhance the technical presentation capability.	Applying (Level III)
IT681.CO4	<b>Understand</b> the privileges and responsibilities associated with career as a professional.	Understanding (Level II)
IT681.CO5	<b>Adapt</b> knowledge through research work to explain the dynamic changes of technological advancement for solving real word problems.	Creating (Level VI)
IT681.CO6	<b>Impart</b> skills in preparing detailed report describing the project and results.	Applying (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	2	1	2	2	3	2	1	2	3	3	3
CO2	3	3	3	3	2	1	1	1	3	2	1	3	3	2	3
CO3	1	-	-	-	1	-	-	-	3	3	-	1	1	1	2
CO4	2	1	-	1	1	2	-	2	3	2	2	2	3	3	2
CO5	3	3	3	3	3	3	3	2	3	1	2	3	3	3	3
CO6	3	1	1	-	-	-	-	2	2	3	2	1	1	2	3
AVG.	2.50	2.20	2.00	2.25	1.80	1.75	2.00	1.80	2.83	2.17	1.60	2.00	2.33	2.33	2.67

**RESOURCES:**

1. <https://www.youtube.com/watch?v=kZURUshBTG4>
2. <https://www.youtube.com/watch?v=ADJAcYTq1us>



**RCC INSTITUTE OF INFORMATION TECHNOLOGY**  
Canal South Road, Beliaghata, Kolkata- 700015  
College Code: 117  
(Affiliated to Maulana Abul Kalam Azad University of Technology, W.B)

# **COURSE BOOKLET FOR B. TECH (IT)**

## **FOURTH YEAR**



## SEMESTER VII THEORY

<b>Course Title: Internet Technology</b>	<b>Code: IT701</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 7<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Basic Programming and Computer Networks.

**COURSE OBJECTIVE:**

- Define the terms related to Internet.
- Understand how computers are connected to the Internet.
- Demonstrate the ability to used World Wide Web.
- Understand how webpages are designed and created.
- Understand and used common types of protocol, files found on the internet.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT701.CO1	<b>Demonstrate</b> the concept of computer networks and various protocols related to this.	Understanding (Level I)
IT701.CO2	<b>Creating</b> a web page and identify its elements and attributes.	Creating (Level VI)
IT701.CO3	<b>Develop</b> the concepts of Internet Telephony, Multimedia Applications and Search Engines.	Developing (Level III)
IT701.CO4	<b>Explain</b> the protocols related to networking such as TCP/IP , FTP, HTTP etc.	Evaluating (Level V)
IT701.CO5	<b>Apply</b> the concepts of Client-Server programming for a given problem and develop a solution using the technologies taught like PERL and Java.	Analyzing (Level VI)
IT701.CO6	<b>Understand</b> the security issues while using different technologies for web programming.	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	2	1	1	1	3	2	1	3	3	3	-	2	2	2	1
<b>CO2</b>	2	3	1	2	2	1	-	1	2	1	1	3	2	2	1
<b>CO3</b>	2	2	3	1	1	-	1	2	3	2	2	1	2	3	1
<b>CO4</b>	2	2	3	2	1	3	3	3	3	2	2	2	3	2	1
<b>CO5</b>	2	3	1	3	3	1	2	1	3	1	2	2	3	2	1
<b>CO6</b>	3	1	2	1	1	-	1	2	2	1	2	2	3	2	1
<b>AVG.</b>	<b>2.17</b>	<b>2.00</b>	<b>1.83</b>	<b>1.67</b>	<b>1.83</b>	<b>1.75</b>	<b>1.60</b>	<b>2.00</b>	<b>2.67</b>	<b>1.67</b>	<b>1.80</b>	<b>2.00</b>	<b>2.50</b>	<b>2.17</b>	<b>1.00</b>



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<p><b>Introduction (1L):</b>            Overview, Network of Networks, Intranet, Extranet and Internet.            World Wide Web (1L):            Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP.            Review of TCP/IP (1L):            Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6.            IP Subnetting and addressing (1L):            Classful and Classless Addressing, Subnetting. NAT, IP masquerading, IP tables.            Internet Routing Protocol (1L):            Routing -Intra and Inter Domain Routing, Unicast and Multicast Routing, Broadcast.            Electronic Mail (1L):            POP3, SMTP.</p>	6
2	<p><b>HTML (3L):</b>            Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue.            Image Maps (1L): map, area, attributes of image area.            Extensible Markup Language (XML) (4L):            Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief.            CGI Scripts (1L):            Introduction, Environment Variable, GET and POST Methods.</p>	9
3	<p><b>PERL (3L):</b>            Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling.            JavaScript (4L): Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation.            Cookies (1L): Definition of cookies, Create and Store a cookie with example.            Java Applets (2L): Container Class, Components, Applet Life Cycle, Update method; Parameter passing applet, Applications.</p>	10
4	<p><b>Client-Server programming In Java (2L):</b>            Java Socket, Java RMI.            Threats (1L): Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks.            Network security techniques (2L): Password and Authentication; VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH).            Firewall (1L): Introduction, Packet filtering, Stateful, Application layer, Proxy.</p>	4
5	<p><b>Internet Telephony (1L):</b> Introduction, VoIP.             Multimedia Applications (2L): Multimedia over IP: RSVP, RTP, RTCP and RTSP. Streaming media, Codec and Plugins, IPTV.             Search Engine and Web Crawler (2L): Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO..</p>	5

**RESOURCES:**

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013. (Chapters 1-5,7,8,9).
2. Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011. (Chapters 5,6,12)



<b>Course Title: Multimedia Technology</b>	<b>Code: IT702</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 7<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS302 Data Structure & Algorithm, IT601 Database Management System, IT602 Computer Networking.

**COURSE OBJECTIVE:**

- To learn the basics and Fundamentals of Multimedia.
- To introduce Multimedia components and Tools.
- To understand how Multimedia can be incorporated.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT702.CO1	<b>Find</b> technical aspect of Multimedia Systems	Remembering (Level I)
IT702.CO2	<b>Explain</b> the standards available for different audio, video, Image and text applications	Evaluating (Level V)
IT702.CO3	<b>Design</b> various available storage model for multimedia and synchronization	Creating (Level VI)
IT702.CO4	<b>Construct</b> various types of image and video databases.	Creating (Level VI)
IT702.CO5	<b>Compare</b> between different available multimedia document architecture	Evaluating (Level V)
IT702.CO6	<b>Apply</b> multimedia application for various web design.	Applying (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO2	1	-	-	-	1	-	-	-	-	-	1	1	1	-	1
CO3	1	-	-	-	1	-	-	-	-	-	-	1	1	-	1
CO4	1	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO5	1	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO6	1	-	3	-	2	-	-	-	1	-	2	1	1	-	1
<b>AVG.</b>	<b>1.00</b>	<b>0</b>	<b>3.00</b>	<b>0</b>	<b>1.33</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1.00</b>	<b>0</b>	<b>1.50</b>	<b>1.00</b>	<b>1.00</b>	<b>0</b>	<b>1.00</b>



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Introduction [2L]</b> Multimedia today, Impact of Multimedia, Multimedia Systems, Components and Its Applications	2
2	<b>Text and Audio [6L]</b> Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption; Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Sound (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI	6
3	<b>Image and Video (8L)</b> Image: Formats, Image Color Scheme, Image Enhancement; Video: Analogue and Digital Video, Recording Formats and Standards (JPEG, MPEG, H.261) Transmission of Video Signals, Video Capture, and Computer based Animation.	8
4	<b>Synchronization [4L]</b> Temporal relationships, synchronization accuracy specification factors, quality of service	4
5	<b>Protection &amp; Security [4L]</b> Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.	4
6	<b>Storage models and Access Techniques [(4L)]</b> Magnetic media, optical media, file systems (traditional, multimedia) Multimedia devices - Output devices, CD-ROM, DVD, Scanner, CCD	4
7	<b>Image and Video Database [8L]</b> Image representation, segmentation, similarity based retrieval, image retrieval by color, shape and texture; indexing- k-d trees, R-trees, quad trees; Case studies- QBIC, Virage. Video Content, querying, video segmentation, indexing	8
8	<b>Document Architecture and Content Management [9L]</b> Content Design and Development, General Design Principles Hypertext: Concept, Open Document Architecture (ODA), Multimedia and Hypermedia Coding Expert Group (MHEG), Standard Generalized Markup Language (SGML), Document Type Definition (DTD), Hypertext Markup Language (HTML) in Web Publishing. Case study of Applications	9
9	<b>Multimedia Applications [4L]</b> Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.	4





**RESOURCES:**

1. Ralf Steinmetz and Klara Nahrstedt , Multimedia: Computing, Communications & Applications , Pearson Ed.
2. Nalin K. Sharda , Multimedia Information System , PHI.
3. Fred Halsall , Multimedia Communications , Pearson Ed.
4. Buford , Multimedia Systems , Pearson Ed.
5. Fred Hoffstetter , Multimedia Literacy , McGraw Hill.
6. Ralf Steinmetz and Klara Nahrstedt , Multimedia Fundamentals: Vol. 1- Media Coding and Content Processing , PHI.
7. J. Jeffcoate , Multimedia in Practice: Technology and Application , PHI..

<b>Course Title: E- Commerce</b>	<b>Code: IT703A</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 7<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-492 S/w Tools Lab, IT-401 OOP & UML, IT-602 Computer Network.

**COURSE OBJECTIVE:**

- Introduce e-commerce and its various categories.
- Explain EDI and its technical details.
- Illustrate legal and security aspects of e-commerce.
- Produce case studies related to e-business.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

<b>Course Outcomes</b>	<b>CO Statement</b>	<b>Knowledge Level of revised Bloom's Taxonomy</b>
<b>IT703A.CO1</b>	<b>Define</b> the concepts of e-commerce focusing on basic software and hardware requirements.	Remembering (Level I)
<b>IT703A.CO2</b>	<b>Develop</b> ideas on B2B websites and EDI.	Creating (Level VI)
<b>IT703A.CO3</b>	<b>Demonstrate</b> the legal issues related to e-commerce.	Understanding (Level II)
<b>IT703A.CO4</b>	<b>Analyze</b> the security aspects of e-commerce.	Analyzing (Level VI)
<b>IT703A.CO5</b>	<b>Develop</b> ideas on B2C websites.	Creating (Level VI)
<b>IT703A.CO6</b>	<b>Discuss</b> on various case studies focusing on payment interfaces.	Creating (Level VI)



**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	2	2	-	2	1	-	1	1	2	2	2	2	2	2
<b>CO2</b>	3	3	3	3	3	1	1	1	1	3	2	2	2	2	2
<b>CO3</b>	3	2	2	-	2	1	-	1	1	2	2	2	-	2	2
<b>CO4</b>	3	2	2	3	2	1	1	1	1	2	2	2	2	2	2
<b>CO5</b>	3	3	3	3	3	1	1	1	1	3	2	2	3	2	2
<b>CO6</b>	3	3	3	3	3	1	1	1	1	2	2	2	3	2	2
<b>AVG.</b>	<b>3.00</b>	<b>2.50</b>	<b>2.50</b>	<b>3.00</b>	<b>2.50</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>2.33</b>	<b>2.00</b>	<b>2.00</b>	<b>2.40</b>	<b>2.00</b>	<b>2.00</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Introduction to E-Commerce [6L]</b> Definition, Scope of E-Commerce, Hardware requirements, E-Commerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce.	6
2	<b>Business to Business E-Commerce [7L]</b> Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT), Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational E-commerce.	7
3	<b>Legal issues [5L]</b> Risks: Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable online contract.	5
4	<b>Security Issues [6L]</b> Security Solutions: Symmetric and Asymmetric Cryptosystems, RSA, DES, and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol, Electronic cash over internet, Internet Security.	6
5	<b>Business to Consumer E-Commerce [8L]</b> Consumer trade transaction, Internet, Page on the Web, Elements of E-Commerce with VB, ASP, SQL.	8
6	<b>E-business [7L]</b> Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E-Diversity, Case studies through internet.	7

**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
RSA, DES, Digital Signature, SET protocol	Unit 4

**RESOURCES:**

- David Whitley, "E-Commerce-Strategy, Technologies & Applications", TMH
- Kamlesh K. Bajaj, "E-Commerce - The cutting edge of business", TMH
- W Clarke, "E-Commerce through ASP", BPB
- Mathew Reynolds, "Beginning E-Commerce with VB, ASP, SQL Server 7.0 & MTS", Wrox Publishers
- J. Christopher Westland and Theodore H. K Clark, "Global Electronic Commerce - Theory and Case Studies", University Press



<b>Course Title: Cloud Computing</b>	<b>Code: IT704B</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 7<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Basic concept on Operating system and database.

**COURSE OBJECTIVE:**

- To learn how to use Cloud Services and applications.
- Apply Virtualization concepts on different cloud services
- Cloud infrastructure, services and application management

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT704B.CO1	<b>Explain</b> the main concepts, key technologies, strengths and limitations of cloud computing	Understanding (Level II)
IT704B.CO2	<b>Discuss</b> the architecture, infrastructure and delivery models of cloud computing	Creating (Level VI)
IT704B.CO3	<b>Apply</b> suitable virtualization concept	Applying (Level III)
IT704B.CO4	<b>Analyze</b> the components of Google web, AWS and Microsoft cloud services	Analyzing (Level IV)
IT704B.CO5	<b>Discover</b> the core issues of cloud computing such as security, privacy and interoperability	Analyzing (Level IV)
IT704B.CO6	<b>Ability</b> to choose the appropriate services and technologies for the related issues.	Evaluating (Level V)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	2	-	-	1	1	-	1	1	2	1
CO2	3	2	2	1	2	1	-	2	2	1	1	1	1	1	1
CO3	3	2	2	2	2	2	1	1	2	1	1	2	-	1	2
CO4	3	2	1	2	2	2	1	1	2	1	1	2	-	1	2
CO5	3	2	2	-	1	1	2	1	1	2	1	2	1	2	1
CO6	3	2	2	3	2	2	2	1	1	1	2	2	2	-	3
AVG.	3.00	2.00	1.67	1.80	1.67	1.67	1.50	1.20	1.50	1.17	1.20	1.67	1.25	1.40	1.67



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<p><b>Module 1: Definition of Cloud Computing and its Basics (Lectures : 9)</b></p> <p><b>Definition of Cloud Computing:</b> Defining a Cloud, Cloud Types – NIST model, Cloud Cube model, Deployment models (Public , Private, Hybrid and Community Clouds), Service models – Infrastructure as a Service, Platform as a Service, Software as a Service with examples of services/ service providers, Cloud Reference model Characteristics of Cloud Computing – a shift in paradigm Benefits and advantages of Cloud Computing</p> <p><b>Cloud Architecture:</b> A brief introduction on Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Connecting to the Cloud by Clients</p> <p><b>Services and Applications by Type</b> IaaS – Basic concept, Workload, partitioning of virtual private server instances, Pods, aggregations, silos PaaS – Basic concept, tools and development environment with examples SaaS - Basic concept and characteristics, Open SaaS and SOA, examples of SaaS platform Identity as a Service (IDaaS) Compliance as a Service (CaaS)</p>	9
2	<p><b>Module 2 : Use of Platforms in Cloud Computing (Lectures : 12)</b></p> <p><b>Concepts of Abstraction and Virtualization</b> Virtualization technologies : Types of virtualization (access, application, CPU, storage), Mobility patterns (P2V, V2V, V2P, P2P, D2C, C2C, C2D, D2D) Load Balancing and Virtualization: Basic Concepts, Network resources for load balancing, Advanced load balancing (including Application Delivery Controller and Application Delivery Network), Mention of The GoogleCloud as an example of use of load balancing Hypervisors: Virtual machine technology and types, VMware vSphere Machine Imaging (including mention of Open Virtualization Format – OVF) Porting of applications in the Cloud: The simple Cloud API and AppZero Virtual Application appliance</p> <p><b>Concepts of Platform as a Service</b> Definition of services, Distinction between SaaS and PaaS (knowledge of Salesforce.com and Force.com), Application development Use of PaaS Application frameworks</p> <p><b>Use of Google Web Services</b> Discussion of Google Applications Portfolio – Indexed search, Dark Web, Aggregation and disintermediation, Productivity applications and service, Adwords, Google Analytics, Google Translate, a brief discussion on Google Toolkit (including introduction of Google APIs in brief), major features of Google App Engine service.</p>	12



	<p><b>Use of AWS</b></p> <p>Amazon Web Service components and services: Amazon Elastic Cloud, Amazon Simple Storage system, AmazonElastic Block Store, Amazon SimpleDB and Relational Database Service</p> <p><b>Use of Microsoft Cloud Services</b></p> <p>Windows Azure platform: Microsoft’s approach, architecture, and main elements, overview of Windows AzureAppFabric, Content Delivery Network, SQL Azure, and Windows Live services</p>	
3	<p><b>Module 3 : Cloud Infrastructure (Lectures : 7)</b></p> <p>Types of services required in implementation – Consulting, Configuration, Customization and Support</p> <p><b>Cloud Management</b></p> <p>An overview of the features of network management systems and a brief introduction of related products from large cloud vendors, Monitoring of an entire cloud computing deployment stack – an overview with mention of some products, Lifecycle management of cloud services (six stages of lifecycle)</p> <p><b>Concepts of Cloud Security</b></p> <p>Cloud security concerns, Security boundary, Security service boundary Overview of security mapping Security of data: Brokered cloud storage access, Storage location and tenancy, encryption, and auditing and compliance Identity management (awareness of Identity protocol standards)</p>	7
4	<p><b>Module 4 : Concepts of Services and Applications (Lectures : 8)</b></p> <p><b>Service Oriented Architecture:</b> Basic concepts of message-based transactions, Protocol stack for an SOA architecture, Event-driven SOA, Enterprise Service Bus, Service catalogs</p> <p><b>Applications in the Cloud:</b> Concepts of cloud transactions, functionality mapping, Application attributes, Cloud service attributes, System abstraction and Cloud Bursting, Applications and Cloud APIs</p> <p><b>Cloud-based Storage:</b> Cloud storage definition – Manned and Unmanned</p> <p><b>Webmail Services:</b> Cloud mail services including Google Gmail, Mail2Web, Windows Live Hotmail, Yahooemail, concepts of Syndication services</p>	8

**RESOURCES:**

1. Cloud Computing Bible by Barrie Sosinsky, Wiley India Pvt. Ltd, 2013
2. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, McGraw Hill Education (India) Private Limited, 2013
3. Cloud computing: A practical approach, Anthony T. Velte, Tata Mcgraw-Hill
4. Cloud Computing, Miller, Pearson
5. Building applications in cloud: Concept, Patterns and Projects, Moyer, Pearson



<b>Course Title: Microelectronics &amp; VLSI Design</b>	<b>Code: IT705D</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 7<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITIES:** Basic Electrical and Electronics Engineering-II(ES-201), Knowledge about transistors, CS301- Analog & Digital Electronics.

**COURSE OBJECTIVE:**

- To introduce VLSI Design concepts, principles and design steps.
- To introduce the principles of devices with emphasis to MOS and nano-device operations this is extremely important to the design of any VLSI circuit
- To study the various processes of IC fabrication.
- To design Combinational & Sequential Logic circuit using VHDL or Verilog.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO Statement	Knowledge Level of revised Bloom's Taxonomy
IT705D.CO1	<b>Explain</b> VLSI Design concept along with design principles to explore VLSI chip design steps.	Understanding (Level -II)
IT705D.CO2	<b>Analyze</b> MOS structures to investigate the characteristics of MOSFETS and C-MOS structures.	Analyzing (Level-IV)
IT705D.CO3	<b>Report</b> different scaling effects based on MOSFETs characteristics to investigate the device performance in sub-micron regime.	Applying (Level-III)
IT705D.CO4	<b>Apply</b> the knowledge of C-MOS digital logic design to implement combinational & sequential logic circuits.	Applying (Level-III)
IT705D.CO5	<b>Discuss</b> different Microelectronic process in Silicon Semiconductor technology for chip fabrication	Understanding (Level -II)
IT705D.CO6	<b>Choose</b> basic VLSI design modeling styles using VHDL for demonstrating combinational and sequential circuits.	Evaluating (Level-V)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	1	1	-	1	-	2	3	-	1	2
CO2	3	2	1	2	2	-	-	-	1	-	2	3	-	1	1
CO3	3	3	1	3	2	-	1	-	1	-	2	3	-	1	2
CO4	3	3	1	3	2	-	1	-	1	-	2	3	-	1	2
CO5	3	3	1	3	2	-	-	-	1	-	2	3	-	1	2
CO6	3	3	1	2	3	-	1	-	1	-	2	3	1	1	2
AVG.	3.00	2.83	1.17	2.50	2.17	1.00	1.00	0	1.00	0	2.00	3.00	1.00	1.00	2.00



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Introduction to VLSI Design:</b> VLSI Design Concepts, Moor's Law, Scale of Integration (SSI, MSI, LSI, VLSI, ULSI—basic idea only), Types of VLSI Chips (Analog & Digital VLSI chips, General purpose, ASIC, PLA, FPGA), Design principles (Digital VLSI—Concept of Regularity, Granularity etc), Design Domains (Behavioral, Structural, Physical), Y-Chart, Digital VLSI Design Steps.	6
2	<b>MOS structure:</b> E-MOS & D-MOS, Charge inversion in E-MOS, Threshold voltage, Flat-band voltage, Potential balance & Charge balance, Inversion, MOS capacitances. <b>Three Terminal MOS Structure:</b> Body effect. <b>Four Terminal MOS Transistor:</b> Drain current, I-V characteristics. Current-voltage equations (simple derivation). <b>Scaling in MOSFET:</b> Short Channel Effects, General scaling, Constant Voltage & Field scaling.] <b>CMOS:</b> CMOS inverter, Simple Combinational Gates- NAND gate and NOR Gate using CMOS.	10
3	<b>Micro-electronic Processes for VLSI Fabrication:</b> Silicon Semiconductor Technology- An Overview, Wafer processing, Oxidation, Epitaxial deposition, Ion-implantation & Diffusion, Cleaning, Etching, Photo-lithography—Positive & Negative photo-resist <b>Basic CMOS Technology</b> – (Steps in fabricating CMOS), Basic n-well CMOS process, p-well CMOS process, Twin tub process, Silicon-on-insulator <b>Layout Design Rule:</b> Stick diagram with examples, Layout rules.	10
4	<b>Hardware Description Language</b> – VHDL or Verilog Combinational & Sequential Logic circuit Design.	10

**RESOURCES**

1. Digital Integrated Circuit, J.M. Rabaey, Chandrasan, Nicolic, Pearson Education.
2. CMOS Digital Integrated Circuit, S.M. Kang & Y. Leblebici, TMH.
3. Modern VLSI Design, Wayne Wolf, Pearson Education.
4. VHDL, Bhaskar, PHI.
5. Advance Digital Design Using Verilog, Michel D. Celliti, PHI
6. Digital Integrated Circuits, Demassa & Ciccone, John Willey & Sons.
7. Modern VLSI Design: systems on silicon, Wayne Wolf; Addison Wesley Longman Publisher
8. Basic VLSI Design, Douglas A. Pucknell & Kamran Eshraghian, PHI
9. CMOS Circuit Design, Layout & Simulation, R.J. Baker, H.W. Lee, D.E. Boyee, PHI.

## SEMESTER VII PRACTICAL

<b>Course Title: Group Discussion</b>	<b>Code: HU781</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 7<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES: Nil**

**COURSE OBJECTIVE:**

- Develop speaking power, thinking power and listening abilities.
- Learn how to use the logical approach while speaking on any topic to motivate others in the group.
- Improve analytical abilities to think on a particular given topic.
- Develop awareness and responsibility of how to use values in improving your own professionalism.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
HU781.CO1	<b>Identify</b> a solution to a specific problem or issue.	Remembering (Level I)
HU781.CO2	<b>Establish</b> motivation for any topic of interest and develop a thought process for group discussion.	Creating (Level VI)
HU781.CO3	<b>Use</b> proper attitude and communication skill to convince others in a group discussion.	Applying (Level III)
HU781.CO4	<b>Demonstrate</b> the leadership quality with logical thought and motivate the entire discussion in a good direction.	Applying (Level III)
HU781.CO5	<b>Understand</b> the key techniques and behaviours required to facilitate a group discussion.	Understanding (Level II)
HU781.CO6	<b>Impart</b> skills to improve confidence in public speaking platforms.	Applying (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	1	1	1	1	3	-	-	1	3	3	3
CO2	3	3	3	3	1	1	1	1	3	1	1	1	3	2	3
CO3	1	-	-	-	-	-	-	-	3	1	-	1	1	1	1
CO4	2	1	-	-	-	2	-	-	3	1	2	1	3	3	2
CO5	1	1	1	-	2	3	3	3	3	1	1	-	1	2	3
CO6	2	2	2	3	3	1	-	-	-	-	-	-	1	2	2
<b>AVG.</b>	<b>2.00</b>	<b>2.00</b>	<b>2.25</b>	<b>2.67</b>	<b>1.75</b>	<b>1.60</b>	<b>1.67</b>	<b>1.67</b>	<b>3.00</b>	<b>1.00</b>	<b>1.33</b>	<b>1.00</b>	<b>2.00</b>	<b>2.17</b>	<b>2.34</b>

**RESOURCES:**

1. <https://www.youtube.com/watch?v=vCYMgOB3BR8>
2. <https://www.youtube.com/watch?v=BguYUJ7cWrs>





<b>Course Title: Internet Technology Lab</b>	<b>Code: IT791</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 7<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Before you begin, it's important that you know Windows or Unix. A working knowledge of Windows or UNIX makes it much easier to learn HTML.

You should be familiar with:

- Basic word processing using any text editor.
- How to create directories and files.
- How to navigate through different directories.
- Basic understanding on internet browsing using a browser like Internet Explorer or Firefox etc.
- Basic understanding on developing simple Web Pages using HTML or XHTML.
- Basic understanding of the introductory terms of css, HTML and javascript.

**COURSE OBJECTIVE:**

- Understand best technologies for solving web client/server problems
- Analyze and design real time web applications
- Use Java script for dynamic effects and to validate form input entry
- Analyze to Use appropriate client-side or Server-side applications

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT791.CO1	<b>Understand</b> networking concepts and internet and web application architectures	Understanding (Level I)
IT791.CO2	<b>Create</b> a web page and identify its elements and attributes.	Creating (Level VI)
IT791.CO3	<b>Develop</b> a solution using the technologies taught like PERL and Java script.	Developing (Level III)
IT791.CO4	<b>Evaluate</b> fundamental tools and technologies for web design.	Evaluating (Level V)
IT791.CO5	<b>Develop</b> the concepts of Client-Server programming for a given problem	Developing (Level III)
IT791.CO6	<b>Understand</b> the security issues while using different technologies for web programming	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	-	-	1	1	1	1	-	1	-	3	3	1
CO2	2	3	2	-	2	1	1	1	1	2	1	-	2	1	1
CO3	2	2	3	-	3	-	-	-	2	1	2	-	3	2	1
CO4	2	2	3	1	2	2	2	2	1	-	1	1	3	1	1
CO5	2	1	3	2	-	3	3	3	-	1	-	2	2	3	1
CO6	2	1	3	2	-	-	-	-	-	-	-	2	3	3	1
<b>AVG.</b>	<b>2.00</b>	<b>1.83</b>	<b>2.83</b>	<b>1.67</b>	<b>2.33</b>	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.25</b>	<b>1.33</b>	<b>1.25</b>	<b>1.67</b>	<b>2.67</b>	<b>2.17</b>	<b>1.00</b>



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<p><b>Applet</b></p> <ol style="list-style-type: none"> <li>1. Create a banner using Applet</li> <li>2. Display clock using Applet</li> <li>3. Create different shapes using Applet</li> <li>4. Fill colors in shapes using Applet</li> <li>5. Go to a link using Applet</li> <li>6. Create an event listener in Applet</li> <li>7. Display image using Applet</li> <li>8. Open a link in a new window using Applet</li> <li>9. Play sound using Applet</li> <li>10. Read a file using Applet</li> <li>11. Write to a file using AppletJavaScript</li> <li>12. Validate the fields of a form using JavaScript.</li> <li>13. Guess a number based on user input.</li> <li>14. Program on image rollover using JavaScript.</li> <li>15. Display clock using JavaScript.</li> <li>16. Prompt, alert, array, looping in JavaScript.</li> <li>17. Calculator using JavaScript.</li> <li>18. Validate e-mail, phone no. using reg-ex in JavaScript.Pperl</li> <li>19. Write a perl script to implement associative array.</li> <li>20. Write a perl script to implement the regular expression as follows:               <ol style="list-style-type: none"> <li>a). If a string contains any vowel, count the total number of vowels.</li> <li>b). If a string starts with MCA and end with bw, print 1 else 0.</li> <li>c). If string starts with 0 or any no. a's, then print 1 else 0.</li> </ol> </li> <li>21. Write an html code to call a perl script from cgi-bin.</li> <li>22. Implement the following with regular expression in Perl:               <ol style="list-style-type: none"> <li>a). a*bc</li> <li>b). a* at least 2 b's</li> <li>c). a*exactly 3 b's</li> </ol> </li> <li>23. A simple File operation using Perl.</li> </ol>	6
2	<p><b>Client Server Programming</b></p> <ol style="list-style-type: none"> <li>24. Write a socket program to get the current date and time from the server.</li> <li>25. Write a socket program where the client will send lowercase letters and the server will return uppercase letter.</li> <li>26. Write a server and a client program to implement TCP chat server-client.</li> <li>27. Create a simple calculator application using Java RMI.</li> </ol>	9
3	<p><b>HTML</b></p> <ol style="list-style-type: none"> <li>1. Start your web page with an &lt;html&gt; tag           <ol style="list-style-type: none"> <li>i) Add a heading.</li> <li>ii) Add a title.</li> <li>iii) Start the &lt;body&gt; section.</li> <li>iv) Add the following text using &lt;H1&gt; and &lt;/H1&gt; tags: This Web page was designed by (your name)</li> <li>v) Add the following text using &lt;H2&gt; and &lt;/H2&gt; tags: My HTML assignment</li> <li>vi) Add a horizontal line</li> <li>vii) Insert an image to your web page.</li> </ol> <p>Note: You should then refer to your image with just the filename, and NOT the entire pathname to the file.</p> <ol style="list-style-type: none"> <li>viii) Add another horizontal line.</li> <li>ix) Enter a paragraph of text.</li> </ol> <p>Write about things you have learned in html.</p> <p>Make sure the text in this paragraph is a color other than black, but something one can see.</p> <p>Add a link that takes you to your favorite webpage.</p> <li>x) Start a new paragraph. Add a three item ordered list. Make it creative (don't just say</li> </li></ol>	10

	<p>item 1, item 2, etc... and keep it clean)!</p> <p>xi) Close out your body and html tags.</p> <p>2. Start your web page with an &lt;html&gt; tag</p> <ol style="list-style-type: none"> <li>i) Add a heading.</li> <li>ii) Add a title.</li> <li>iii) Start the &lt;body&gt; section.</li> <li>iv) Start a new paragraph. Use alignment attribute, Use bold, italic, underline tags, Use font tag and associated attributes, Use heading tags, Use preserve tag, Use non breaking spaces (escape character).</li> </ol> <p>3. Start your web page with an &lt;html&gt; tag</p> <ol style="list-style-type: none"> <li>i) Add a heading.</li> <li>ii) Add a title.</li> <li>iii) Start the &lt;body&gt; section.</li> <li>iv) Start a new paragraph. Create Hyperlinks:             <ol style="list-style-type: none"> <li>(a) Within the HTML document.</li> <li>(b) To another URL.</li> <li>(c) To a file that can be rendered in the browser.</li> </ol> </li> </ol> <p>4. Start your web page with an &lt;html&gt; tag</p> <ol style="list-style-type: none"> <li>i) Add a heading.</li> <li>ii) Add a title.</li> <li>iii) Start the &lt;body&gt; section.</li> </ol> <p>Create an unordered list,          Create an ordered list,          Use various bullet styles,          Create nested lists,          Use the font tag in conjunction with lists,          Create definition lists,          Use graphics as bullets</p> <p>5. Start your web page with an &lt;html&gt; tag</p> <ol style="list-style-type: none"> <li>i) Add a heading.</li> <li>ii) Add a title.</li> <li>iii) Start the &lt;body&gt; section.</li> </ol> <p>a) Create a simple table          Create borders and adjust border size.          Adjust table cell spacing.          Change border color.          Change table background color.</p> <p>b) Align a new table on HTML page.          Perform cell text alignment,          Create multi-column tables,          Display information about your academic qualification into this table.</p> <p>6. Start your web page with an &lt;html&gt; tag</p> <ol style="list-style-type: none"> <li>i) Add a heading.</li> <li>ii) Add a title.</li> <li>iii) Start the &lt;body&gt; section.</li> </ol> <p>Create a frameset:          Use frame tags,          Create vertical (column) frames,          Create horizontal (row) frames,          Create complex framesets,          Use the hyperlink tag to target displaying an HTML page to another frame.</p> <p>7. Start your web page with an &lt;html&gt; tag</p> <ol style="list-style-type: none"> <li>i) Add a heading.</li> <li>ii) Add a title.</li> <li>iii) Start the &lt;body&gt; section. Create a simple HTML form.</li> </ol>	
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	<p>Use the input tag to create a: text box; text area box; check box; list box; radio button; password field; popup menu; hiddenfield. Use submit and reset buttons. Create an admission form using the above information.</p> <p>8. Create a web page that will include an image. Then create image map to watch different parts of that image closely.</p> <p>9. Using frames as an interface, create a series of web pages where the theme is to provide resources (internet, intranet, static HTML pages) pertaining to the subject of HTML. Ideally, your goal is to create a resource that you can use long after this module when needing information on HTML. As a minimum requirement to this assignment your webpage should:</p> <ul style="list-style-type: none"> <li>• Consist of at least 3 frames.</li> <li>• Contain at least 5 URLs to internet and/or intranet sites that you can reference as part of your job.</li> <li>• Contain at least 5 references to documents that you have created that you use on a regular basis.</li> <li>• Contain at least 5 references to documents others have created that you use on a regular basis.</li> <li>• Be organized in a fashion that is logical and intuitive to you.</li> <li>• Is done with enough quality that you would not be opposed to it being a link at another site.</li> </ul>	
4	<p>Create a web page as you wish and the html elements of the page will be styled by CSS.</p> <p><b>XML</b></p> <ol style="list-style-type: none"> <li>1. Write a XML program that will create an XML document which contains your mailing address.</li> <li>2. Write a XML program that will create an XML document which contains description of three book category.</li> <li>3. Create an XML document that contains the name and price per pound of coffee beans.             <ol style="list-style-type: none"> <li>i) In your XML document mention all properties of XML declaration.</li> <li>ii) The root element has name &lt;coffee_bean&gt;</li> <li>iii) Create nested elements for different types of coffee.</li> <li>iv) Validate the document and if any parsing error is present, fix them.</li> </ol> </li> <li>4. Create an XML document that contains airline flight information.             <ol style="list-style-type: none"> <li>i) In your XML document mention all properties of XML declaration.</li> <li>ii) The root element has name &lt;airlines&gt;</li> <li>iii) Create three nested &lt;carrier&gt; elements for three separate airlines. Each element should include a name attribute.</li> <li>iv) Within each &lt;carrier&gt; nest at least two &lt;flight&gt;, each of which contains departure_city, destination_city, fl_no,dept_time.</li> <li>v) Validate the document and if any parsing error is present fix them.</li> </ol> </li> <li>5. Create an XML version of your resume. Include elements such as your name and position desired. Nest each of your former employers within an &lt;employer&gt; element. Also, nest your educational experience within an &lt;education&gt; element. Create any other nested elements that you deem appropriate, such as &lt;references&gt; or &lt;spcl_skills&gt; elements.</li> <li>6. Create a DTD on product catalog.</li> </ol>	4

**RESOURCES:**

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013. (Chapters 1-5,7,8,9).
2. Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011. (Chapters 5,6,12)



<b>Course Title: Multimedia Lab</b>	<b>Code: IT792</b>
<b>Type Of Course: Lab</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 7<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS392 Data Structure & Algorithm, IT691 Database Management System, IT692 Computer Networking.

**COURSE OBJECTIVE:**

- To learn the basics and Fundamentals of Multimedia.
- To introduce Multimedia components and Tools.
- To understand how Multimedia can be incorporated.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT792.CO1	<b>Define</b> importance of the fundamental concepts of Sound editing Tools.	Remembering (Level I)
IT792.CO2	<b>Apply</b> various types of Photo editing Tools.	Applying (Level III)
IT792.CO3	<b>Design</b> Video editing, Animation Tools.	Creating (Level VI)
IT792.CO4	<b>Create</b> the page using HTML (basic tags, table form, frame, link to other Image)	Creating (Level VI)
IT792.CO5	<b>Design</b> different types of stylesheet using DHTML	Evaluating (Level V)
IT792.CO6	<b>Develop</b> web Page using HTML, DHTML and photo, video editing tools.	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	2	-	1	-	-	-	-	-	-	1	1	-	1
CO2	1	-	2	-	1	-	-	-	-	-	-	1	1	-	1
CO3	1	-	2	-	1	-	-	-	-	-	-	1	1	-	1
CO4	1	-	2	-	1	-	-	-	-	-	-	1	1	-	1
CO5	1	-	2	-	1	-	-	-	-	-	-	1	1	-	1
CO6	1	-	2	-	2	-	-	-	-	-	2	1	1	2	1
AVG.	1.00	0	2.00	0	1.17	0	0	0	0	0	2.00	1.00	1.00	2.00	1.00



**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	Sound capturing & editing using tools like SOUNDFORGE	3
2	Image editing using tools like Adobe Photoshop	6
3	Creating/editing motion video/animation clips (using tools like Flash / Adobe Premier)	6
4	Creation of Content using HTML (basic tags, table form, frame, link to other Image)	6
5	Creating stylesheet using DHTML	6
6	Home Page creation using HTML, DHTML.	6

**RESOURCES:**

1. Adobe , Adobe Photoshop 6.0: Classroom in a book Pearson Ed.
2. Anushka Wirasinha , Flash in a Flash- Web Development , PHI
3. Macromedia Flash5 fast and easy Web Development, Design, PHI
4. Castro, HTML4 for the World Wide Web, Pearson Ed.
5. Schurman & Purdi , Dynamic HTML in Action, Second Edition , PHI
6. Lozano, Multimedia- Sound & Video , PHI

<b>Course Title: E-Commerce Lab</b>	<b>Code: IT793A</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Elective</b>
<b>Semester: 7<sup>th</sup></b>	<b>Contact Hours: 3P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam: 60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** CS-492 S/w Tools Lab, IT-491 OOP & UML Lab, IT-691 DBMS Lab, IT-692 Comp. N/w Lab.

**COURSE OBJECTIVE:**

- Introduce various web development tools.
- Illustrate building of B2B, B2C and C2C website front interfaces and their middle-tier logic.
- Develop website back-end with proper schema design.
- Develop payment interfaces.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT793A.CO1	Apply the concepts of commercial website development using VB, ASP, JSP, and SQL.	Applying (Level III)
IT793A.CO2	Design B2C website interface.	Evaluating (Level V)
IT793A.CO3	Design B2B website interface.	Evaluating (Level V)
IT793A.CO4	Design C2C website interface.	Evaluating (Level V)
IT793A.CO5	Create online applications with proper databases.	Creating (Level VI)
IT793A.CO6	Develop payment interfaces in digital mode.	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**



	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	2	3	-	2	-	-	1	2	2	2	2	3	3	2
<b>CO2</b>	3	3	3	3	2	1	-	1	2	2	2	2	3	3	2
<b>CO3</b>	3	3	3	3	2	1	-	1	2	2	2	2	3	3	2
<b>CO4</b>	3	3	3	3	2	1	-	1	2	2	2	2	3	3	2
<b>CO5</b>	3	3	3	3	3	1	1	1	2	3	2	2	3	3	2
<b>CO6</b>	3	3	3	3	3	1	1	1	2	3	2	2	3	3	2
<b>AVG.</b>	<b>3.00</b>	<b>2.83</b>	<b>3.00</b>	<b>3.00</b>	<b>2.33</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>2.00</b>	<b>2.33</b>	<b>2.00</b>	<b>2.00</b>	<b>3.00</b>	<b>3.00</b>	<b>2.00</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>Creating E-Commerce Site [12L]</b> Designing and maintaining commercial Webpages. Advertising in the Website, Portals and Vortal.	12
2	<b>B2C Website Interface [6L]</b> Comparison Shopping in B2C.	6
3	<b>B2B Website Interface [6L]</b> Exchanges Handling in B2B.	6
4	<b>C2C E-Commerce Interactions [6L]</b> Designing Virtual Shopping Carts, Online Auction.	6
5	<b>E-Commerce Applications [9L]</b> Developing Online Store, Online Banking.	9
6	<b>E-Commerce Payment Applications [9L]</b> Developing Credit Card Transaction Processing.	9

**RESOURCES:**

1. W Clarke, "E-Commerce through ASP", BPB.
2. Mathew Reynolds, "Beginning E-Commerce with VB, ASP, SQL Server 7.0 & MTS", Wrox Publishers.
3. Allamaraju et al, "Professional Java Server Programming J2EE 1.3 Edition", SPD.



Course Title: <b>Industrial Training</b>	Code: <b>IT794</b>
Type Of Course: <b>Practical</b>	Course Designation: <b>Compulsory</b>
Semester: <b>7<sup>th</sup></b>	Contact Hours: <b>4 weeks (during 6<sup>th</sup> -7<sup>th</sup> Sem-break)</b>
Writer: <b>Course Coordinator</b>	<b>Final Exam: 100 Marks</b>
	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Subject knowledge on Computer science.

**COURSE OBJECTIVE:**

- Develop knowledge to increase the level of the project work.
- Acquire practical experience in order to improve their knowledge.
- Achieve exposure and experience in terms of technology development and teamwork practices.
- Understand different policies, procedures and regulations.
- Achieve exposure for effective communication, professional perspective and reporting.
- Build enthusiasm and proactive attitude among team members to increase confidence.
- Understand a variety of activities in the field of duties.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT794.CO1	<b>Demonstrate</b> the use, interpretation and application of an appropriate international engineering standard in a specific situation	Understanding(Level II)
IT794.CO2	<b>Analyze</b> a given engineering problem, identify an appropriate problem solving methodology, implement the methodology and propose a meaningful solution	Analyzing(Level IV)
IT794.CO3	<b>Apply</b> prior acquired knowledge in problem solving	Applying(Level III)
IT794.CO4	<b>Identify</b> sources of hazards, and apply appropriate health & safety measures	Applying(Level III)
IT794.CO5	<b>Adapt</b> to work in a team and manage a project within a given time frame	Creating(Level VI)
IT794.CO6	<b>Adapt</b> an accurate approach to decision engineering making	Creating(Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	2	1	-	-	-	-	2	2	1	1	1
CO2	3	3	3	2	2	-	-	-	-	-	2	2	2	3	1
CO3	2	-	3	2	3	-	-	-	-	-	2	2	2	2	-
CO4	2	-	-	-	2	3	2	-	-	-	-	2	-	1	-
CO5	-	-	-	-	-	-	-	-	3	-	2	2	1	2	-
CO6	1	2	2	3	2	-	-	-	-	-	2	2	1	2	2
AVG.	2.00	2.33	2.50	2.25	2.20	2.00	2.00	0	3.00	0	2.00	2.00	1.40	1.83	1.33





<b>Course Title: Project-1</b>	<b>Code: IT795</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 7<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 60 Marks</b>	<b>Final Exam: 40 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Knowledge of Information Technology related problems, tools and techniques.

**COURSE OBJECTIVE:**

- To understand the basic concepts & broad principles of Industrial and research related projects.
- To apply the theoretical concepts to solve problems with teamwork and multidisciplinary approach.
- Demonstrate professionalism with ethics; present effective communication skills and relate engineering issues to broader societal context.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT795.CO1	<b>Identify</b> problems in the area of Information Technology	Applying ( Level III)
IT795.CO2	<b>Survey</b> the Research Methodologies and Field Study related to the problems	Analyzing (Level V)
IT795.CO3	<b>Relate</b> the current technologies and tools to develop applications for the problems	Understanding (Level II)
IT795.CO4	<b>Organize</b> as teams with effective coding, writing and communication skills	Applying (Level III)
IT795.CO5	<b>Apply</b> the engineering and management principles to achieve the goal of the project	Applying (Level III)
IT795.CO6	<b>Estimate</b> the phases of the project.	Evaluating (Level V)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	2	3	3	3	3	3	3	-	-	-	2	2	2	3	3
<b>CO2</b>	2	3	3	3	1	2	3	-	-	-	-	2	1	3	3
<b>CO3</b>	2	2	-	2	3	-	-	-	-	-	-	2	3	1	2
<b>CO4</b>	2	2	-	2	3	-	-	2	3	3	-	-	2	2	-
<b>CO5</b>	1	1	1	2	-	2	2	2	2	1	2	-	1	2	2
<b>CO6</b>	1	-	3	-	2	-	-	-	-	-	3	-	1	-	2
<b>AVG.</b>	<b>2</b>	<b>2.5</b>	<b>3</b>	<b>2.5</b>	<b>2.5</b>	<b>2.5</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1.67</b>	<b>2.2</b>	<b>2.4</b>

**UNIVERSITY GUIDELINES:**

The final year project is to be carried out in two semesters, 7<sup>th</sup> and the 8<sup>th</sup>. The part of the project work carried out in 7<sup>th</sup> semester is termed as Project-1 and subsequently evaluated in the 7<sup>th</sup> semester for 100 marks, of which 60 marks will be evaluated as Internal Assessment and 40 marks will be evaluated as External Assessment. The final part of the project work carried out in 8<sup>th</sup> semester in continuation to that of previous semester is termed as Project-2. The Project-2 is evaluated for 100 marks again, of which 60 marks will be evaluated as Internal Assessment and 40 marks will be evaluated as External Assessment.



## SEMESTER VIII THEORY

<b>Course Title: Organizational Behavior</b>	<b>Code: HU801A</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 8<sup>th</sup></b>	<b>Contact Hours: 2L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:**

- HU101 English Language & Tech: In Profession Basic command of English to talk about day- to-day events and experiences of life
- HU401 Communication Values And Ethics: Communication Skills. Effects of Technological Growth, Ethics of Profession, Profession and Human Value.

**COURSE OBJECTIVE:**

- To improve the student’s Personality and Attitude.
- To improve the skill of theories of Motivation
- To improve the skill of Group Behavior.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom’s Taxonomy
HU801A.CO1	<b>Explain</b> Organizational Behaviour, Personality and Attitude.	Evaluating(Level V)
HU801A.CO2	<b>Develop</b> Group Behaviour & Communication skill.	Developing (Level III)
HU801A.CO3	<b>Illustrate</b> different motivation theorems.	Understanding (Level II)
HU801A.CO4	<b>Interpret</b> the Organizational Politics.	Evaluating(Level V)
HU801A.CO5	<b>Examine</b> different type of conflict management.	Analyzing(Level III)
HU801A.CO6	<b>Improve</b> Organizational Design structure.	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	-	-	2	-	3	-	-	1	-
CO2	-	-	-	-	-	3	-	-	2	-	3	-	-	2	-
CO3	-	-	-	-	-	3	-	-	2	-	3	-	-	1	-
CO4	-	-	-	-	-	3	-	-	2	-	3	-	-	2	-
CO5	-	-	-	-	-	3	-	-	2	-	3	-	-	2	-
CO6	-	-	-	-	-	3	-	-	2	-	3	-	-	2	-
AVG.	0	0	0	0	0	3.00	0	0	2.00	0	3.00	0	0	1.67	0



### UNIVERSITY SYLLABUS:

Unit	Content	Hrs./Unit
1	Organizational Behaviour: Definition, Importance, Historical Background, Fundamental Concepts of OB, Challenges and Opportunities for OB.	2
2	Personality and Attitudes: Meaning of personality, Personality Determinants and Traits, Development of Personality, Types of Attitudes, Job Satisfaction.	2
3	Perception: Definition, Nature and Importance, Factors influencing Perception, Perceptual Selectivity, Link between Perception and Decision Making.	2
4	Motivation: Definition, Theories of Motivation - Maslow's Hierarchy of Needs Theory, McGregor's Theory X & Y, Herzberg's Motivation-Hygiene Theory, Alderfer's ERG Theory, McClelland's Theory of Needs, Vroom's Expectancy Theory.	4
5	Group Behaviour: Characteristics of Group, Types of Groups, Stages of Group Development, Group Decision Making.	2
6	Communication: Communication Process, Direction of Communication, Barriers to Effective Communication.	2
7	Leadership: Definition, Importance, Theories of Leadership Styles.	2
8	Organizational Politics: Definition, Factors contributing to Political Behaviour.	2
9	Conflict Management: Traditional vis-a-vis Modern View of Conflict, Functional and Dysfunctional Conflict, Conflict Process, Negotiation – Bargaining Strategies, Negotiation Process	2
10	Organizational Design: Various Organizational Structures and their Effects on Human Behaviour, Concepts of Organizational Climate and Organizational Culture.	4

### RESOURCES:

1. Robbins,S.P.&Judge,T.A.:OrganizationalBehavior,PearsonEducation,15<sup>th</sup>Edn.
2. Luthans,Fred:OrganizationalBehavior,McGrawHill,12<sup>th</sup>Edn.
3. Shukla,Madhukar:UnderstandingOrganizations–OrganizationalTheory&PracticeinIndia,PHI
4. Fincham,R.&Rhodes,P.:PrinciplesofOrganizationalBehaviour,OUP,4<sup>th</sup>Edn.
5. Hersey,P.,Blanchard,K.H.,Johnson,D.E.ManagementofOrganizationalBehaviorLeadingHumanResources,PHI ,10<sup>th</sup>Edn.



<b>Course Title: Project Management</b>	<b>Code: HU801B</b>
<b>Type of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 8<sup>th</sup></b>	<b>Contact Hours: 2L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITIES:** Software engineering theory knowledge

**COURSE OBJECTIVE:**

- Understand key concepts of project management and project lifecycle
- Apply the Project Management Techniques.
- Describe the Project Management Planning Process.
- Project Management Team concepts.
- Develop project management skills

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
HU801B.CO1	<b>Understand</b> project characteristics and various stages of a project.	Understanding (Level I)
HU801B.CO2	<b>Creating</b> the Quality management plan and analyses	Creating (Level VI)
HU801B.CO3	<b>Develop</b> new knowledge to their own projects.	Developing (Level III)
HU801B.CO4	<b>Evaluate</b> Cost management plan and <b>Project Audit</b> scheme	Evaluating (Level V)
HU801B.CO5	<b>Analyze</b> the learning and understand techniques for Project planning, scheduling and Execution Control.	Analyzing (Level VI)
HU801B.CO6	<b>Understand</b> the conceptual clarity about project organization and feasibility analyses	Understanding (Level II)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	1	2	1	1	1	3	2	1	2	3	2	2	3	3	1
<b>CO2</b>	3	2	2	2	3	1	3	3	3	1	1	1	3	2	-
<b>CO3</b>	2	3	3	1	1	1	-	2	3	2	2	1	2	3	-
<b>CO4</b>	3	1	2	3	3	2	1	3	3	2	2	3	3	2	1
<b>CO5</b>	1	2	1	2	3	2	-	1	2	1	2	1	3	2	1
<b>CO6</b>	3	3	2	1	2	1	-	2	2	-	2	2	3	2	1
<b>AVG.</b>	<b>2.17</b>	<b>2.17</b>	<b>1.83</b>	<b>1.67</b>	<b>2.33</b>	<b>1.80</b>	<b>2.00</b>	<b>2.00</b>	<b>2.50</b>	<b>1.80</b>	<b>1.83</b>	<b>1.67</b>	<b>2.83</b>	<b>2.33</b>	<b>1.00</b>



### UNIVERSITY SYLLABUS:

Unit	Content	Hrs./Unit
1	Project Management Concepts: Concept and Characteristics of a Project, Importance of Project Management.	1
2	Project Planning: Project Evaluation, Financial Sources, Feasibility Studies.	4
3	Project Scheduling: Importance of Project Scheduling, Work Breakdown Structure and Organization Breakdown Structure, Scheduling Techniques – Gantt Chart and LOB, Network Analysis – CPM/PERT.	6
4	Time Cost Trade-off Analysis – Optimum Project Duration.	2
5	Resource Allocation and Leveling.	2
6	Project Life Cycle.	2
7	Project Cost – Capital & Operating Costs, Project Life Cycle Costing, Project Cost Reduction Methods.	2
8	Project Quality Management: Concept of Project Quality, TQM in Projects, Project Audit.	1
9	Software Project Characteristics and Management	2
10	IT in Projects: Overview of types of Softwares for Projects, Major Features of Project Management Softwares like MS Project, Criterion for Software Selection.	2

### RESOURCES:

1. Gopalkrishnan P. and Rama Mmoorthy: Text Book of Project Management, Macmillan
2. Nicholas John M.: Project Management for Business and Technology - Principles and Practice, Prentice Hall India, 2nd Edn.
3. Levy Ferdinand K., Wiest Jerome D.: A Management Guide to PERT/CPM with GERT/PDM/DCPM and other networks, Prentice Hall India, 2nd Edn.
4. Mantel Jr., Meredith J. R., Shafer S. M., Sutton M. M., Gopalan M. R.: Project Management: Core Text Book, Wiley India, 1st Indian Edn.
5. Maylor H.: Project Management, Pearson, 3rd Edn.
6. Nagarajan K.: Project Management, New Age International Publishers, 5th Edn.
7. Kelkar. S.A, Software Project Management: A concise Study, 2nd Ed., PHI.

<b>Course Title: Cryptography &amp; Network Security</b>	<b>Code: IT801D</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 8<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** IT602 Computer Networking, IT701 Internet Technology.

### COURSE OBJECTIVE:

- Understand basics of Cryptography and Network Security.
- Learning about how to maintain the Confidentiality, Integrity and Authenticity of a data.
- Explain various protocols for network security to protect against the threats in the networks.



**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT801D.CO1	<b>Acquire</b> background knowledge in security issues, services, targets and mechanism.	Understanding (Level II)
IT801D.CO2	<b>Understand</b> the fundamental concept of Cryptography and Network Security, their operational tools.	Understanding (Level II)
IT801D.CO3	<b>Appraise</b> the use Data encryption standard related to security of information.	Evaluating (Level V)
IT801D.CO4	<b>Analyze</b> the vulnerabilities in any computing system and hence be able to design a security solution.	Analyzing Level IV)
IT801D.CO5	<b>Evaluate</b> security mechanisms using rigorous approaches by key ciphers and Hash functions.	Evaluating (Level V)
IT801D.CO6	<b>Demonstrate</b> various network security applications, SSL protocol and Authentication, Firewall, Web Security, Email Security, S/MIME and Malicious software.	Applying (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	1	1	1	-	-	-	1	1	1	1
CO2	3	1	1	-	-	1	1	1	-	-	-	1	1	1	1
CO3	3	2	2	1	-	1	1	1	-	-	-	1	1	1	2
CO4	3	3	3	2	-	1	1	1	-	-	-	1	1	1	2
CO5	3	3	3	2	-	1	1	1	-	-	-	1	1	1	2
CO6	3	2	2	2	-	1	1	1	-	-	-	1	1	1	2
AVG.	3.00	2.00	2.00	1.75	0	1.00	1.00	1.00	0	0	0	1.00	1.00	1.00	1.67

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs/Unit
1	<b>Attacks on Computers &amp; Computer Security (5L)</b> Introduction, Need for Security, Security approaches, Principles of Security, Types of attack.	5
2	<b>Cryptography: Concepts &amp; Techniques (7L)</b> Introduction, Plaintext & Cipher text, Substitution Techniques, Transposition Techniques, Encryption & Decryption, Symmetric & Asymmetric key Cryptography, Key Range & Key Size.	7
3	<b>Symmetric Key Algorithm (8L)</b> Introduction, Algorithm types & Modes, Overview of Symmetric Key Cryptography, DES(Data Encryption Standard) algorithm, IDEA(International Data Encryption Algorithm) algorithm, RC5(Rivest Cipher 5) algorithm.	8
4	<b>Asymmetric Key Algorithm, Digital Signature and RSA (5L)</b> Introduction, Overview of Asymmetric key Cryptography, RSA algorithm, Symmetric & Asymmetric key Cryptography together, Digital Signature, Basic concepts of Message Digest and Hash Function (Algorithms on Message Digest and Hash function not required).	5
5	<b>Internet Security Protocols, User Authentication (6L)</b> Basic Concepts, SSL protocol, Authentication Basics, Password, Authentication Token, Certificate based Authentication, Biometric Authentication.	6
6	<b>Electronic Mail Security (4L)</b> Basics of mail security, Pretty Good Privacy, S/MIME.	4



7	<b>Firewall (3L)</b> Introduction, Types of firewall, Firewall Configurations, DMZ Network	3
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**GATE syllabus (If applicable for GATE):**

GATE syllabus content	Mapping unit of university syllabus
Network security	Unit 1
Basics of public key and private key cryptography, digital signatures and certificates	Unit 2
Authentication Token, Certificate based Authentication, Biometric Authentication.	Unit 6

**RESOURCES:**

1. “Network Security Essentials: Applications and Standards” by William Stallings, Pearson
2. “Designing Network Security”, Merike Kaeo, 2nd Edition, Pearson Books

<b>Course Title: Cyber law and Security Policy</b>	<b>Code: IT802B</b>
<b>Type Of Course: Theory</b>	<b>Course Designation: Elective</b>
<b>Semester: 8<sup>th</sup></b>	<b>Contact Hours: 3L/week</b>
<b>Continuous Assessment: 25 Marks</b>	<b>Final Exam: 70 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** IT-602 Computer Networking.

**COURSE OBJECTIVE:**

- Explain the different types Cyber-crimes.
- Provide cyber-security awareness.
- Create counter measure against cyber-crimes
- Familiar with different cyber-crimes laws in India and outside.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT802B.CO1	<b>Explain</b> the different types of cyber-crime on cyber space.	Understanding (Level II)
IT802B.CO2	<b>Recall</b> the different laws related to cyber-crimes.	Remembering (Level I)
IT802B.CO3	<b>Implement</b> cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software or tools.	Applying (Level III)
IT802B.CO4	<b>Design</b> and develop security architecture for an organization.	Creating (Level VI)
IT802B.CO5	<b>Find</b> solutions in cyber-crime investigations, evidence and applicable law for real world case studies.	Analyzing (Level IV)
IT802B.CO6	<b>Examine</b> the software vulnerabilities and security solutions to reduce the risk of exploitation.	Analyzing (Level IV)



**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	1	1	-	-	1	1	3	1	-	-	2	1	2	1
<b>CO2</b>	1	1	1	-	-	2	1	2	-	-	-	2	1	2	1
<b>CO3</b>	3	3	3	1	3	2	2	2	-	-	-	2	3	3	2
<b>CO4</b>	3	2	3	2	3	1	1	2	-	-	-	2	3	3	2
<b>CO5</b>	3	1	1	3	2	2	-	2	-	-	-	2	2	3	2
<b>CO6</b>	3	3	3	1	2	2	-	2	-	-	-	2	2	3	2
<b>AVG.</b>	<b>2.67</b>	<b>1.83</b>	<b>2.00</b>	<b>1.75</b>	<b>2.50</b>	<b>1.67</b>	<b>1.25</b>	<b>2.17</b>	<b>1.00</b>	<b>0.00</b>	<b>0.00</b>	<b>2.00</b>	<b>2.00</b>	<b>2.67</b>	<b>1.67</b>

**UNIVERSITY SYLLABUS:**

Unit	Content	Hrs./Unit
1	<b>1A: Introduction of Cybercrime:</b> What is cybercrime?, Forgery, Hacking, Software Piracy, Computer Network intrusion	4
	<b>1B: Category of Cybercrime:</b> How criminals plan attacks, passive attack, Active attacks, cyberstalking.	4
2	<b>Cybercrime Mobile &amp; Wireless devices :</b> Security challenges posted by mobile devices, cryptographic security for mobile devices, Attacks on mobile/cellphones, Theft, Virus, Hacking. Bluetooth; Different viruses on laptop.	8
3	<b>Tools and Methods used in Cyber Crime :</b> Proxy servers, password checking, Random checking, Trojan Horses and Backdoors; DOS & DDOS attacks; SQL injection: buffer over flow.	8
4	<b>4A: Phishing &amp; Identity Theft :</b> Phising methods, ID Theft; Online identity method.	4
	<b>4B: Cybercrime &amp; Cyber security:</b> Legal aspects, Indian laws, IT act, Public key certificate.	4

**RESOURCES:**

1. Cyber security by Nina Gobole & Sunit Belapune; Pub: Wiley India.
2. Information Security and Cyber Laws, Pankaj Agarwal
3. Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., Enterprise Cybersecurity -How to Build a Successful Cyberdefense Program Against Advanced Threats, A-press
4. Cyber Law By Bare Act, Govt Of india, It Act 2000.





## SEMESTER VIII PRACTICAL

<b>Course Title: Design Lab</b>	<b>Code: IT891</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 8<sup>th</sup></b>	<b>Contact Hours: 6P/week</b>
<b>Continuous Assessment: 40 Marks</b>	<b>Final Exam:60 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Programming knowledge.

**COURSE OBJECTIVE:**

- Ability to perform requirement analysis, feasibility Study, and functional specification.
- Ability to design various models (DFD, ERD, Class Diagram, Activity Diagram, Sequence diagram, Database schema details etc.) as per functional specification.
- Demonstration of the implemented software and submission of report.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT891.CO1	<b>Illustrate</b> the concept of requirement analysis and feasibility study for a given mini project.	Understanding (Level II)
IT891.CO2	<b>Apply</b> the functional specification of the project.	Applying (Level III)
IT891.CO3	<b>Propose</b> various models as per the functional specification prepared.	Creating (Level VI)
IT891.CO4	<b>Develop</b> the software according to the workflow diagrams.	Creating (Level VI)
IT891.CO5	<b>Demonstrating</b> the implemented software developed for the project.	Understanding (Level II)
IT891.CO6	<b>Designing</b> the project report.	Applying (Level III)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	3	2	2	1	2	2	3	2	2	-	-	3	1	1
<b>CO2</b>	3	3	2	3	1	1	1	2	2	2	-	-	3	1	2
<b>CO3</b>	3	3	3	3	3	1	1	2	2	1	-	-	3	1	2
<b>CO4</b>	3	3	3	2	3	-	-	1	2	-	-	-	3	1	2
<b>CO5</b>	3	2	2	2	2	-	-	1	2	3	-	-	3	2	2
<b>CO6</b>	3	1	-	-	2	-	-	1	2	2	-	-	3	2	-
<b>AVG.</b>	<b>3.00</b>	<b>2.50</b>	<b>2.40</b>	<b>2.40</b>	<b>2.00</b>	<b>1.33</b>	<b>1.33</b>	<b>1.67</b>	<b>2.00</b>	<b>2.00</b>	<b>0</b>	<b>0</b>	<b>3.00</b>	<b>1.33</b>	<b>1.80</b>



**UNIVERSITY SYLLABUS:**

Any three topics from the following may be chosen:

Unit	Content
1	C and C++ ; Basic and Intermediate Levels , Advanced C++
2	Java and Netbeans
3	Java Business Application
4	PHP & MySQL
5	Python
6	Scilab
7	Linux and Ubuntu

<b>Course Title: Project-2</b>	<b>Code: IT892</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 8<sup>th</sup></b>	<b>Contact Hours: 12L/week</b>
<b>Continuous Assessment: 60 Marks</b>	<b>Final Exam: 40 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISTIES:** Knowledge of Information Technology related problems, tools and techniques.

**COURSE OBJECTIVE:**

- Demonstrate a sound technical knowledge of their selected project topic.
- Design engineering solutions to complex problems utilizing a systems approach.
- Demonstrate the knowledge, skills and attitudes of a professional engineer.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom's Taxonomy
IT892.CO1	<b>Design</b> the modules with underlying technical concepts, theory and mathematical formulation	Creating (Level VI)
IT892.CO2	<b>Build</b> the modules with hardware or software	Applying (Level III)
IT892.CO3	<b>Analyze</b> the results and outcomes of the executable modules.	Analyzing (Level IV)
IT892.CO4	<b>Combine</b> all the modules through effective team work after efficient testing.	Creating (Level VI)
IT892.CO5	<b>Compile</b> the project report.	Creating (Level VI)
IT892.CO6	<b>Defend</b> the completed project	Evaluating (Level V)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	2	1	1	-	-	-	-	-	3	1	3
CO2	2	2	3	3	3	1	-	-	3	-	-	-	3	1	3
CO3	3	2	2	3	3	-	1	-	3	-	2	2	2	3	2
CO4	2	2	2	2	2	-	-	-	2	2	2	2	2	3	2
CO5	2	-	2	-	2	-	-	2	3	3	3	3	2	3	-
CO6	2	-	2	-	2	-	-	2	3	3	3	3	2	3	-
AVG.	2.16	2	2	2.5	2.33	1	1	2	2.8	2.67	2.5	2.5	2.33	2.33	2.5



**UNIVERSITY GUIDELINES:**

The final year project is to be carried out in two semesters, 7<sup>th</sup> and the 8<sup>th</sup>. The part of the project work carried out in 7<sup>th</sup> semester is termed as Project-1 and subsequently evaluated in the 7<sup>th</sup> semester for 100 marks, of which 60 marks will be evaluated as Internal Assessment and 40 marks will be evaluated as External Assessment. The final part of the project work carried out in 8<sup>th</sup> semester in continuation to that of previous semester is termed as Project-2. The Project-2 is evaluated for 100 marks again, of which 60 marks will be evaluated as Internal Assessment and 40 marks will be evaluated as External Assessment.

<b>Course Title: Grand-Viva</b>	<b>Code: IT893</b>
<b>Type Of Course: Practical</b>	<b>Course Designation: Compulsory</b>
<b>Semester: 8<sup>th</sup></b>	<b>Contact Hours:</b>
<b>Continuous Assessment: 00 Marks</b>	<b>Final Exam: 100 Marks</b>
<b>Writer: Course Coordinator</b>	<b>Approved by Program Assessment Committee(PAC)</b>

**PRE-REQUISITIES:** Subject knowledge on Information Technology.

**COURSE OBJECTIVE:**

- Develop comprehensive knowledge on all subjects related to Computer science.
- Evaluate and access the student’s 4 year knowledge.

**COURSE OUTCOMES (COs)**

On completion of the course students will be able to

Course Outcomes	CO statement	Knowledge Level of revised Bloom’s Taxonomy
IT893.CO1	<b>Demonstrate</b> comprehensive knowledge on all subjects related to Computer science.	Understanding (Level II)
IT893.CO2	<b>Identify</b> the techniques applicable to professional practice.	Applying (Level III)
IT893.CO3	<b>Demonstrate</b> knowledge in the program domain.	Understanding (Level II)
IT893.CO4	<b>Develop</b> the oral communication and presentation skills.	Applying (Level III)
IT893.CO5	<b>Develop</b> the analytical abilities to respond during interview.	Creating (Level VI)
IT893.CO6	<b>Solve</b> real life problems using subject knowledge.	Creating (Level VI)

**Mapping of COs with POs and PSOs (Course Articulation Matrix):**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	2	2	-	2	-	2	-	-	2	2	3	3	2	2
<b>CO2</b>	2	3	-	2	-	-	-	-	-	-	-	-	-	3	-
<b>CO3</b>	2	2	2	-	-	-	-	-	-	-	2	2	3	-	2
<b>CO4</b>	2	-	-	-	-	-	-	-	-	3	-	-	-	-	-
<b>CO5</b>	-	2	1	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO6</b>	2	-	2	2	-	-	-	-	-	-	2	2	2	-	-
<b>AVG.</b>	<b>2.20</b>	<b>2.25</b>	<b>1.75</b>	<b>2.00</b>	<b>2.00</b>	<b>0</b>	<b>2.00</b>	<b>0</b>	<b>0</b>	<b>2.50</b>	<b>2.00</b>	<b>2.33</b>	<b>2.67</b>	<b>2.33</b>	<b>2.00</b>