

Course No.	Course Name	L-T-P - Credits	Year of Introduction
MA202	Probability distributions, Transforms and Numerical Methods	3-1-0-4	2016
<b>Prerequisite: Nil</b>			
<b>Course Objectives</b>			
<ul style="list-style-type: none"> <li>To introduce the concept of random variables, probability distributions, specific discrete and continuous distributions with practical application in various Engineering and social life situations.</li> <li>To know Laplace and Fourier transforms which has wide application in all Engineering courses.</li> <li>To enable the students to solve various engineering problems using numerical methods.</li> </ul>			
<b>Syllabus</b>			
Discrete random variables and Discrete Probability Distribution. Continuous Random variables and Continuous Probability Distribution. Fourier transforms. Laplace Transforms. Numerical methods-solution of Algebraic and transcendental Equations, Interpolation. Numerical solution of system of Equations. Numerical Integration, Numerical solution of ordinary differential equation of First order.			
<b>Expected outcome .</b>			
After the completion of the course student is expected to have concept of (i) Discrete and continuous probability density functions and special probability distributions. (ii) Laplace and Fourier transforms and apply them in their Engineering branch (iii) numerical methods and their applications in solving Engineering problems.			
<b>Text Books:</b>			
<ol style="list-style-type: none"> <li>Miller and Freund's "Probability and statistics for Engineers"-Pearson-Eighth Edition.</li> <li>Erwin Kreyszig, "Advanced Engineering Mathematics", 10<sup>th</sup> edition, Wiley, 2015.</li> </ol>			
<b>References:</b>			
<ol style="list-style-type: none"> <li>V. Sundarapandian, "Probability, Statistics and Queuing theory", PHI Learning, 2009.</li> <li>C. Ray Wylie and Louis C. Barrett, "Advanced Engineering Mathematics"-Sixth Edition.</li> <li>Jay L. Devore, "Probability and Statistics for Engineering and Science"-Eight Edition.</li> <li>Steven C. Chapra and Raymond P. Canale, "Numerical Methods for Engineers"-Sixth Edition-Mc Graw Hill.</li> </ol>			
<b>Course Plan</b>			
Module	Contents	Hours	Sem. Exam Marks
<b>I</b>	<b>Discrete Probability Distributions.</b> (Relevant topics in section 4.1,4.2,4.4,4.6 Text1 )		
	Discrete Random Variables, Probability distribution function, Cumulative distribution function.	2	
	Mean and Variance of Discrete Probability Distribution.	2	
	Binomial Distribution-Mean and variance.	2	
	Poisson Approximation to the Binomial Distribution. Poisson distribution-Mean and variance.	2	
			15%

<b>II</b>	<b>Continuous Probability Distributions.</b> (Relevant topics in section 5.1,5.2,5.5,5.7 Text1)		
	Continuous Random Variable, Probability density function, Cumulative density function, Mean and variance.	2	
	Normal Distribution, Mean and variance (without proof).	4	
	Uniform Distribution. Mean and variance.	2	
	Exponential Distribution, Mean and variance.	2	15%
<b>FIRST INTERNAL EXAMINATION</b>			
<b>III</b>	<b>Fourier Integrals and transforms.</b> (Relevant topics in section 11.7, 11.8, 11.9 Text2)		15%
	Fourier Integrals. Fourier integral theorem (without proof).	3	
	Fourier Transform and inverse transform.	3	
	Fourier Sine & Cosine Transform, inverse transform.	3	
<b>IV</b>	<b>Laplace transforms.</b> (Relevant topics in section 6.1,6.2,6.3,6.5,6.6 Text2)		15%
	Laplace Transforms, linearity, first shifting Theorem.	3	
	Transform of derivative and Integral, Inverse Laplace transform, Solution of ordinary differential equation using Laplace transform.	4	
	Unit step function, second shifting theorem.	2	
	Convolution Theorem (without proof).	2	
	Differentiation and Integration of transforms.	2	
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	<b>Numerical Techniques.</b> ( Relevant topics in section.19.1,19.2,19.3 Text2)		20%
	Solution Of equations by Iteration, Newton- Raphson Method.	2	
	Interpolation of Unequal intervals-Lagrange's Interpolation formula.	2	
	Interpolation of Equal intervals-Newton's forward difference formula, Newton's Backward difference formula.	3	
<b>VI</b>	<b>Numerical Techniques.</b> ( Relevant topics in section 19.5,20.1,20.3, 21.1 Text2)		20%
	Solution to linear System- Gauss Elimination, Gauss Seidal Iteration Method.	3	
	Numeric Integration-Trapezoidal Rule, Simpson's 1/3 Rule.	3	
	Numerical solution of firstorder ODE-Euler method, Runge-Kutta Method (fourth order).	3	
<b>END SEMESTER EXAM</b>			

## QUESTION PAPER PATTERN:

Maximum Marks : 100

Exam Duration: 3 hours

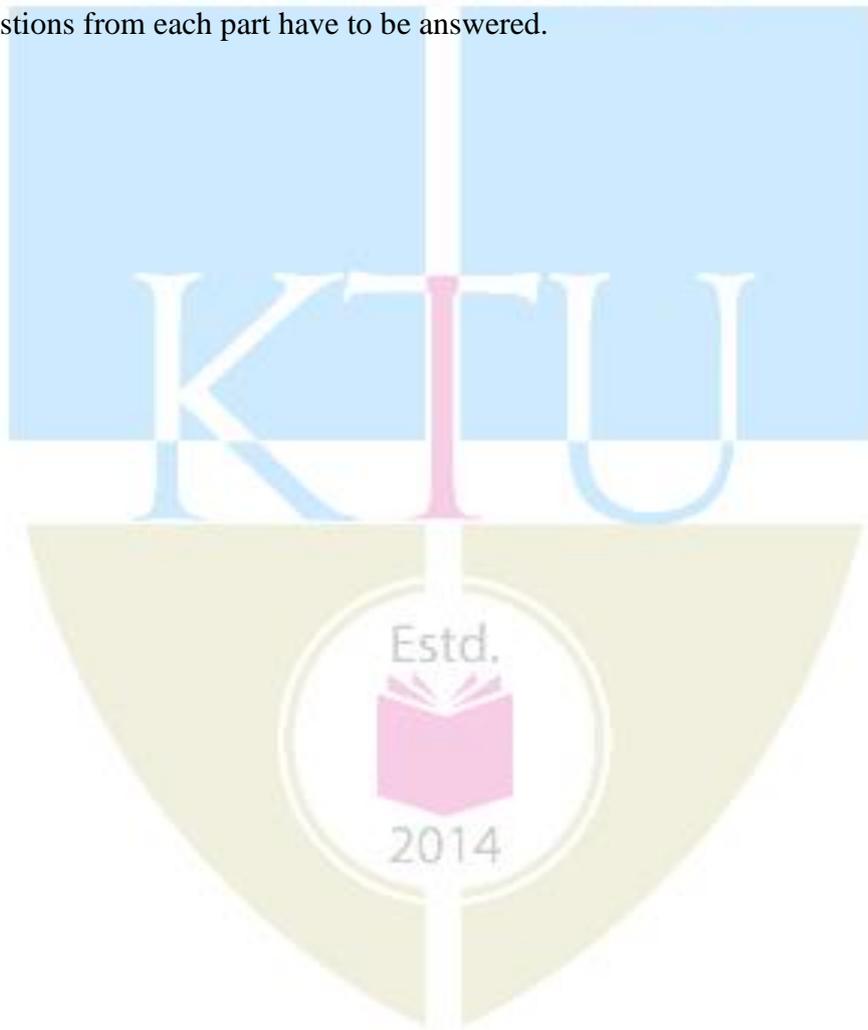
The question paper will consist of 3 parts.

Part A will have 3 questions of 15 marks each uniformly covering modules I and II. Each question may have two sub questions.

Part B will have 3 questions of 15 marks each uniformly covering modules III and IV. Each question may have two sub questions.

Part C will have 3 questions of 20 marks each uniformly covering modules V and VI. Each question may have three sub questions.

Any two questions from each part have to be answered.



Course code	Course Name	L-T-P -Credits	Year of Introduction
CS202	Computer Organization and Architecture	3-1-0-4	2016

**Pre-requisite:** CS203 Switching theory and logic design

**Course Objectives**

1. To impart an understanding of the internal organization and operations of a computer.
2. To introduce the concepts of processor logic design and control logic design.

**Syllabus**

Fundamental building blocks and functional units of a computer. Execution phases of an instruction. Arithmetic Algorithms. Design of the processing unit – how arithmetic and logic operations are performed. Design of the control unit – hardwired and microprogrammed control. I/O organisation – interrupts, DMA, different interface standards. Memory Subsystem – different types.

**Expected outcome**

Students will be able to:

1. identify the basic structure and functional units of a digital computer.
2. analyze the effect of addressing modes on the execution time of a program.
3. design processing unit using the concepts of ALU and control logic design.
4. identify the pros and cons of different types of control logic design in processors.
5. select appropriate interfacing standards for I/O devices.
6. identify the roles of various functional units of a computer in instruction execution.

**Text Books:**

1. Hamacher C., Z. Vranesic and S. Zaky, *Computer Organization* ,5/e, McGraw Hill, 2011.
2. Mano M. M., *Digital Logic & Computer Design*, 4/e, Pearson Education, 2013.

**References:**

1. Mano M. M., *Digital Logic & Computer Design*, 4/e, Pearson Education, 2013.
2. Patterson D.A. and J. L. Hennessey, *Computer Organization and Design*, 5/e, Morgan Kauffmann Publishers, 2013.
3. William Stallings, *Computer Organization and Architecture: Designing for Performance*, Pearson, 9/e, 2013.
4. Chaudhuri P., *Computer Organization and Design*, 2/e, Prentice Hall, 2008.
5. Rajaraman V. and T. Radhakrishnan, *Computer Organization and Architecture*, Prentice Hall, 2011.
6. Messmer H. P., *The Indispensable PC Hardware Book*, 4/e, Addison-Wesley, 2001

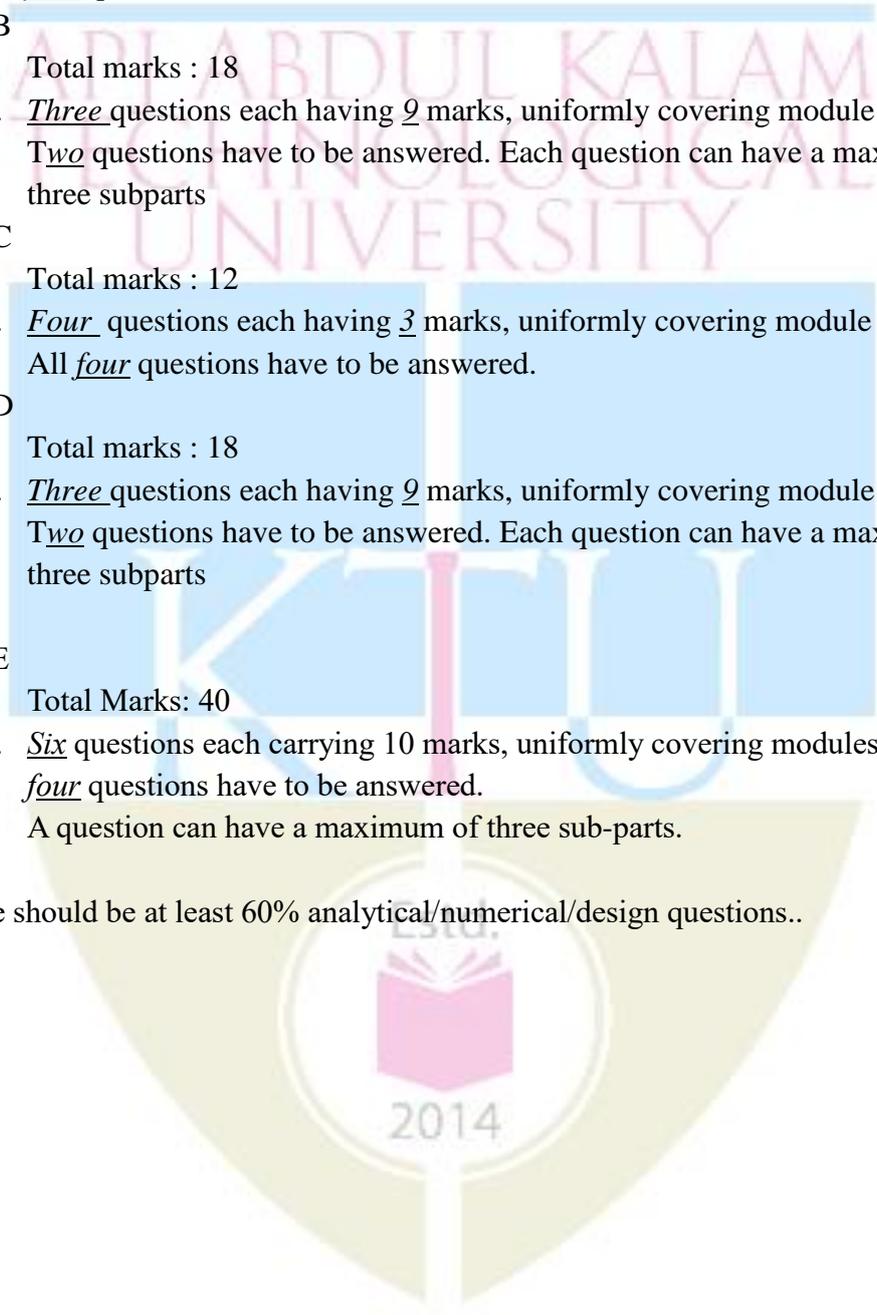
**Course Plan**

Module	Contents	Hours (51)	Sem.ExamMarks
I	<b>Basic Structure of computers</b> –functional units – basic operational concepts –bus structures – software. Memory locations and addresses – memory operations – instructions and instruction sequencing – addressing modes – ARM Example (programs not required). Basic I/O operations – stacks subroutine calls.	6	15%

<b>II</b>	<p><b>Basic processing unit</b> – fundamental concepts – instruction cycle - execution of a complete instruction –multiple- bus organization – sequencing of control signals.</p> <p><b>Arithmetic algorithms:</b> Algorithms for multiplication and division of binary and BCD numbers — array multiplier —Booth’s multiplication algorithm — restoring and non-restoring division — algorithms for floating point, multiplication and division.</p>	10	15%
<b>FIRST INTERNAL EXAMINATION</b>			
<b>III</b>	<p><b>I/O organization:</b> accessing of I/O devices – interrupts –direct memory access –buses –interface circuits –standard I/O interfaces (PCI, SCSI, USB)</p>	8	15%
<b>IV</b>	<p><b>Memory system :</b> basic concepts –semiconductor RAMs –memory system considerations – semiconductor ROMs –flash memory –cache memory and mapping functions.</p>	9	15%
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	<p><b>Processor Logic Design:</b> Register transfer logic – inter register transfer – arithmetic, logic and shift micro operations –conditional control statements.</p> <p><b>Processor organization:</b>–design of arithmetic unit, logic unit, arithmetic logic unit and shifter –status register –processor unit –design of accumulator.</p>	9	20%
<b>VI</b>	<p><b>Control Logic Design:</b> Control organization – design of hardwired control –control of processor unit –PLA control. <b>Micro-programmed control:</b> Microinstructions –horizontal and vertical micro instructions – micro-program sequencer –micro programmed CPU organization.</p>	9	20%
<b>END SEMESTER EXAM</b>			

### Question Paper Pattern:

1. There will be *five* parts in the question paper – A, B, C, D, E
2. Part A
  - a. Total marks : 12
  - b. Four questions each having 3 marks, uniformly covering module I and II; All four questions have to be answered.
3. Part B
  - a. Total marks : 18
  - b. Three questions each having 9 marks, uniformly covering module I and II; Two questions have to be answered. Each question can have a maximum of three subparts
4. Part C
  - a. Total marks : 12
  - b. Four questions each having 3 marks, uniformly covering module III and IV; All four questions have to be answered.
5. Part D
  - a. Total marks : 18
  - b. Three questions each having 9 marks, uniformly covering module III and IV; Two questions have to be answered. Each question can have a maximum of three subparts
6. Part E
  - a. Total Marks: 40
  - b. Six questions each carrying 10 marks, uniformly covering modules V and VI; four questions have to be answered.
  - c. A question can have a maximum of three sub-parts.
7. There should be at least 60% analytical/numerical/design questions..



Course code	Course Name	L-T-P -Credits	Year of Introduction
CS204	Operating Systems	3-1-0-4	2016
<b>Pre-requisite:</b> CS205 Data structures			
<b>Course Objectives</b>			
<ol style="list-style-type: none"> <li>To impart fundamental understanding of the purpose, structure, functions of operating system.</li> <li>To impart the key design issues of an operating system</li> </ol>			
<b>Syllabus</b>			
Basic concepts of Operating System, its structure, Process management, inter-process communication, process synchronization, CPU Scheduling, deadlocks, Memory Management, swapping, segmentation, paging, Storage Management - disk scheduling, RAID, File System Interface-implementation. Protection.			
<b>Expected outcome</b>			
Students will be able to:			
<ol style="list-style-type: none"> <li>identify the significance of operating system in computing devices.</li> <li>exemplify the communication between application programs and hardware devices through system calls.</li> <li>compare and illustrate various process scheduling algorithms.</li> <li>apply appropriate memory and file management schemes.</li> <li>illustrate various disk scheduling algorithms.</li> <li>appreciate the need of access control and protection in an operating system.</li> </ol>			
<b>Text Book:</b>			
<ol style="list-style-type: none"> <li>Abraham Silberschatz, Peter B Galvin, Greg Gagne, Operating System Concepts, 9/e, Wiley India, 2015.</li> </ol>			
<b>References:</b>			
<ol style="list-style-type: none"> <li>Garry Nutt, Operating Systems: 3/e, Pearson Education, 2004</li> <li>Bhatt P. C. P., An Introduction to Operating Systems: Concepts and Practice, 3/e, Prentice Hall of India, 2010.</li> <li>William Stallings, Operating Systems: Internals and Design Principles, Pearson, Global Edition, 2015.</li> <li>Andrew S Tanenbaum, Herbert Bos, Modern Operating Systems, Pearson, 4/e, 2015.</li> <li>Madnick S. and J. Donovan, Operating Systems, McGraw Hill, 2001.</li> <li>Hanson P. B., Operating System Principle, Prentice Hall of India, 2001.</li> <li>Deitel H. M., An Introduction to Operating System Principles, Addison-Wesley, 1990.</li> </ol>			
<b>Course Plan</b>			
Module	Contents	Hours (52)	Sem. Exam marks

<b>I</b>	<p><b>Introduction:</b> Functions of an operating system. Single processor, multiprocessor and clustered systems – overview. Kernel Data Structures – Operating Systems used in different computing environments.</p> <p><b>Operating System Interfaces and implementation</b> - User Interfaces, System Calls – examples. Operating System implementation – approaches. Operating System Structure – Monolithic, Layered, Micro-kernel, Modular. System Boot process.</p>	7	15%
<b>II</b>	<p><b>Process Management:</b> Process Concept – Processes-States – Process Control Block – Threads. Scheduling – Queues – Schedulers – Context Switching. Process Creation and Termination.</p> <p><b>Inter Process Communication:</b> Shared Memory, Message Passing, Pipes.</p>	9	15%
<b>FIRST INTERNAL EXAMINATION</b>			
<b>III</b>	<p><b>Process Synchronization:</b> Critical Section- Peterson's solution. Synchronization – Locks, Semaphores, Monitors, Classical Problems – Producer Consumer, Dining Philosophers and Readers-Writers Problems</p>	9	15%
<b>IV</b>	<p><b>CPU Scheduling</b> – Scheduling Criteria – Scheduling Algorithms.</p> <p><b>Deadlocks</b> – Conditions, Modeling using graphs. Handling – Prevention – Avoidance – Detection-Recovery.</p>	8	15%
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	<p><b>Memory Management:</b> Main Memory – Swapping – Contiguous Memory allocation – Segmentation – Paging – Demand paging</p>	9	20%
<b>VI</b>	<p><b>Storage Management:</b> <i>Overview of mass storage structure- disks and tapes. Disk structure – accessing disks.</i> Disk scheduling and management. Swap Space.</p> <p><b>File System Interface:</b> File Concepts – Attributes – operations – types – structure – access methods. File system mounting. Protection. File system implementation. Directory implementation – allocation methods. Free space Management.</p> <p><b>Protection</b>– Goals, Principles, Domain. Access Matrix.</p>	10	20%
<b>END SEMESTER EXAM</b>			

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  - b. Four questions each having 3 marks, uniformly covering module I and II; All four questions have to be answered.
3. Part B
  - a. Total marks : 18
  - b. Three questions each having 9 marks, uniformly covering module I and II; Two questions have to be answered. Each question can have a maximum of three subparts
4. Part C
  - a. Total marks : 12
  - b. Four questions each having 3 marks, uniformly covering module III and IV; All four questions have to be answered.
5. Part D
  - a. Total marks : 18
  - b. Three questions each having 9 marks, uniformly covering module III and IV; Two questions have to be answered. Each question can have a maximum of three subparts
6. Part E
  - a. Total Marks: 40
  - b. Six questions each carrying 10 marks, uniformly covering modules V and VI; four questions have to be answered.
  - c. A question can have a maximum of three sub-parts.
7. There should be at least 60% analytical/numerical/design questions.

Course code	Course Name	L-T-P - Credits	Year of Introduction
CS206	Object Oriented Design and Programming	2-1-0-3	2016
<b>Pre-requisite:</b> CS205 Data structures			
<b>Course Objectives</b>			
<ol style="list-style-type: none"> <li>1. To introduce basic concepts of object oriented design techniques.</li> <li>2. To give a thorough understanding of Java language.</li> <li>3. To provide basic exposure to the basics of multithreading, database connectivity etc.</li> <li>4. To impart the techniques of creating GUI based applications.</li> </ol>			
<b>Syllabus</b>			
Object oriented concepts, Object oriented systems development life cycle, Unified Modeling Language, Java Overview, Classes and objects, Parameter passing, Overloading, Inheritance, Overriding, Packages, Exception Handling, Input/Output, Threads and multithreading, Applets, Event Handling mechanism, Working with frames and graphics, AWT Controls, Swings, Java database connectivity.			
<b>Expected outcome.</b>			
Students will be able to:			
<ol style="list-style-type: none"> <li>1. apply object oriented principles in software design process.</li> <li>2. develop Java programs for real applications using java constructs and libraries.</li> <li>3. understand and apply various object oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using Java language.</li> <li>4. implement Exception Handling in java.</li> <li>5. use graphical user interface and Event Handling in java.</li> <li>6. develop and deploy Applet in java.</li> </ol>			
<b>Text Books:</b>			
<ol style="list-style-type: none"> <li>1. Herbert Schildt, Java: The Complete Reference, 8/e, Tata McGraw Hill, 2011.</li> <li>2. Bahrami A., Object Oriented Systems Development using the Unified Modeling Language, McGraw Hill, 1999.</li> </ol>			
<b>References:</b>			
<ol style="list-style-type: none"> <li>1. Y. Daniel Liang, Introduction to Java Programming, 7/e, Pearson, 2013.</li> <li>2. Nageswararao R., Core Java: An Integrated Approach, Dreamtech Press, 2008.</li> <li>3. Flanagan D., Java in A Nutshell, 5/e, O'Reilly, 2005.</li> <li>4. Barclay K., J. Savage, Object Oriented Design with UML and Java, Elsevier, 2004.</li> <li>5. Sierra K., Head First Java, 2/e, O'Reilly, 2005.</li> <li>6. Balagurusamy E., Programming JAVA a Primer, 5/e, McGraw Hill, 2014.</li> <li>7.</li> </ol>			
<b>Course Plan</b>			
Module	Contents	Hours (42)	Sem. ExamMarks
I	Object oriented concepts, Object oriented systems development life cycle. Unified Modeling Language, UML class diagram, Use-case diagram.  Java Overview: Java virtual machine, <i>data types</i> , <i>operators</i> , <i>control statements</i> , Introduction to Java programming.	08	15%

<b>II</b>	Classes fundamentals, objects, methods, constructors, parameter passing, overloading, access control keywords.	07	15%
<b>FIRST INTERNAL EXAMINATION</b>			
<b>III</b>	Inheritance basics, method overriding, abstract classes, interface. Defining and importing packages. Exception handling fundamentals, multiple catch and nested try statements.	06	15%
<b>IV</b>	Input/Output: files, stream classes, reading console input. Threads: thread model, use of Thread class and Runnable interface, thread synchronization, multithreading.	06	15%
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	String class - basics. Applet basics and methods. Event Handling: delegation event model, event classes, sources, listeners.	07	20%
<b>VI</b>	Introduction to AWT: working with frames, graphics, color, font. AWT Control fundamentals. Swing overview. Java database connectivity: JDBC overview, creating and executing queries, dynamic queries.	08	20%
<b>END SEMESTER EXAM</b>			

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4. Part C
  - a. Total marks : 12
  - b. Four questions each having 3 marks, uniformly covering module III and IV; All four questions have to be answered.
5. Part D
  - a. Total marks : 18
  - b. Three questions each having 9 marks, uniformly covering module III and IV; Two questions have to be answered. Each question can have a maximum of three subparts

6. Part E
  - a. Total Marks: 40
  - b. Six questions each carrying 10 marks, uniformly covering modules V and VI; four questions have to be answered.
  - c. A question can have a maximum of three sub-parts.
7. There should be at least 60% analytical/design questions.



Course code	Course Name	L-T-P - Credits	Year of Introduction
CS208	Principles of Database Design	2-1-0-3	2016

**Pre-requisite:** CS205 Data structures

**Course Objectives**

- To impart the basic understanding of the theory and applications of database management systems.
- To give basic level understanding of internals of database systems.
- To expose to some of the recent trends in databases.

**Syllabus:**

Types of data, database and DBMS, Languages and users. Software Architecture, E-R and Extended E-R Modelling, Relational Model – concepts and languages, relational algebra and tuple relational calculus, SQL, views, assertions and triggers, relational db design, FDs and normal forms, Secondary storage organization, indexing and hashing, query optimization, concurrent transaction processing and recovery principles, recent topics.

**Expected outcome.**

Students will be able to:

1. define, explain and illustrate the fundamental concepts of databases.
2. construct an Entity-Relationship (E-R) model from specifications and to perform the transformation of the conceptual model into corresponding logical data structures.
3. model and design a relational database following the design principles.
4. develop queries for relational database in the context of practical applications
5. define, explain and illustrate fundamental principles of data organization, query optimization and concurrent transaction processing.
6. appreciate the latest trends in databases.

**Text Books:**

1. Elmasri R. and S. Navathe, *Database Systems: Models, Languages, Design and Application Programming*, Pearson Education, 2013.
2. Silberschatz A., H. F. Korth and S. Sudarshan, *Database System Concepts*, 6/e, McGraw Hill, 2011.

**References:**

1. Powers S., *Practical RDF*, O'Reilly Media, 2003.
2. Plunkett T., B. Macdonald, *et al.*, *Oracle Big Data Hand Book*, Oracle Press, 2013.

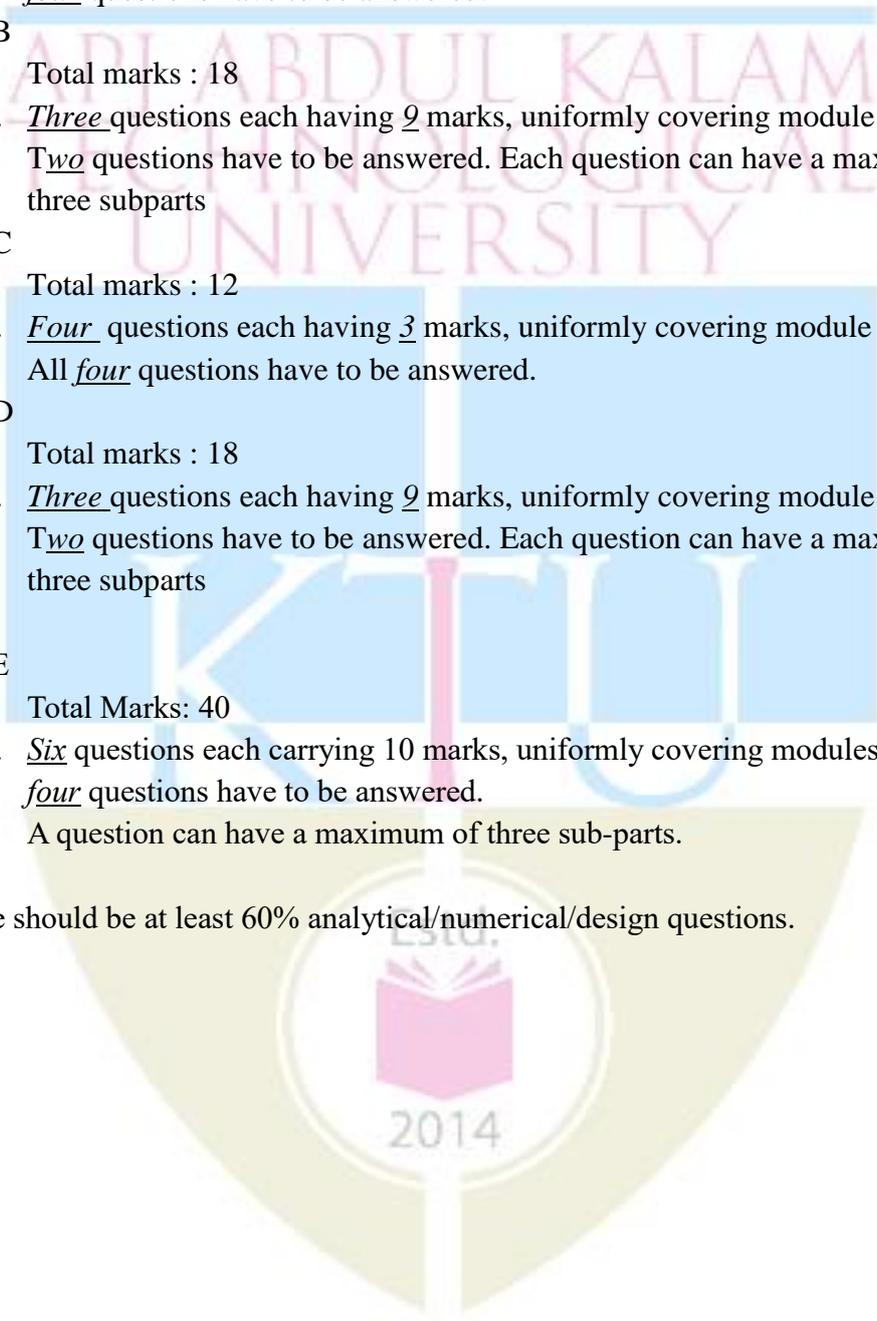
**Course Plan**

Module	Contents	Hours (42)	Sem. Exam Marks
I	<b>Introduction:</b> Data: structured, semi-structured and unstructured data, Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS. Database architectures and classification. (Reading: Elmasri Navathe, Ch. 1 and 2. Additional Reading: Silberschatz, Korth, Ch. 1) <b>Entity-Relationship Model:</b> Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-	06	15%

	Relationship Diagram, Weak Entity Sets, Relationships of degree greater than 2 (Reading: Elmasri Navathe, Ch. 7.1-7.8)		
<b>II</b>	<b>Relational Model:</b> Structure of relational Databases, Integrity Constraints, synthesizing ER diagram to relational schema (Reading: Elmasri Navathe, Ch. 3 and 8.1, Additional Reading: Silbershatz, Korth, Ch. 2.1-2.4) <b>Database Languages:</b> Concept of DDL and DML relational algebra (Reading: Silbershatz, Korth, Ch 2.5-2.6 and 6.1-6.2, Elmasri Navathe, Ch. 6.1-6.5)	<b>06</b>	<b>15%</b>
<b>FIRST INTERNAL EXAM</b>			
<b>III</b>	<b>Structured Query Language (SQL):</b> Basic SQL Structure, examples, Set operations, Aggregate Functions, nested sub-queries (Reading: Elmasri Navathe, Ch. 4 and 5.1) <b>Views, assertions and triggers</b> (Reading: Elmasri Navathe, Ch. 5.2-5.3, Optional reading: Silbershatz, Korth Ch. 5.3).	<b>07</b>	<b>15%</b>
<b>IV</b>	<b>Relational Database Design:</b> Different anomalies in designing a database, normalization, functional dependency (FD), Armstrong's Axioms, closures, Equivalence of FDs, minimal Cover (proofs not required). Normalization using functional dependencies, 1NF, 2NF, 3NF and BCNF, lossless and dependency preserving decompositions (Reading: Elmasri and Navathe, Ch. 14.1-14.5, 15.1-15.2. Additional Reading: Silbershatz, Korth Ch. 8.1-8.5)	<b>07</b>	<b>15%</b>
<b>SECOND INTERNAL EXAM</b>			
<b>V</b>	<b>Physical Data Organization:</b> index structures, primary, secondary and clustering indices, Single level and Multi-level indexing, B+-Trees (basic structure only, algorithms not needed), (Reading Elmasri and Navathe, Ch. 17.1-17.4) <b>Query Optimization:</b> heuristics-based query optimization, (Reading Elmasri and Navathe, Ch. 18.1, 18.7)	<b>07</b>	<b>20%</b>
<b>VI</b>	<b>Transaction Processing Concepts:</b> overview of concurrency control and recovery acid properties, serial and concurrent schedules, conflict serializability. Two-phase locking, failure classification, storage structure, stable storage, log based recovery, deferred database modification, check-pointing, (Reading Elmasri and Navathe, Ch. 20.1-20.5 (except 20.5.4-20.5.5) , Silbershatz, Korth Ch. 15.1 (except 15.1.4-15.1.5), Ch. 16.1 – 16.5) <b>Recent topics (preliminary ideas only):</b> Semantic Web and RDF(Reading: Powers Ch.1, 2), GIS, biological databases (Reading: Elmasri and Navathe Ch. 23.3-23.4) Big Data (Reading: Plunkett and Macdonald, Ch. 1, 2)	<b>09</b>	<b>20%</b>
<b>END SEMESTER EXAM</b>			

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Course code	Course Name	L-T-P - Credits	Year of Introduction
HS200	Business Economics	3-0-0-3	2016
<b>Prerequisite: Nil</b>			
<b>Course Objectives</b> <ul style="list-style-type: none"> <li>To familiarize the prospective engineers with elementary Principles of Economics and Business Economics.</li> <li>To acquaint the students with tools and techniques that are useful in their profession in Business Decision Making which will enhance their employability;</li> <li>To apply business analysis to the “firm” under different market conditions;</li> <li>To apply economic models to examine current economic scenario and evaluate policy options for addressing economic issues</li> <li>To gain understanding of some Macroeconomic concepts to improve their ability to understand the business climate;</li> <li>To prepare and analyse various business tools like balance sheet, cost benefit analysis and rate of returns at an elementary level</li> </ul>			
<b>Syllabus</b> Business Economics - basic concepts, tools and analysis, scarcity and choices , resource allocation, marginal analysis, opportunity costs and production possibility curve. Fundamentals of microeconomics - Demand and Supply Analysis, equilibrium, elasticity, production and production function, cost analysis, break-even analysis and markets. Basics of macroeconomics - the circular flow models, national income analysis, inflation, trade cycles, money and credit, and monetary policy. Business decisions - investment analysis, Capital Budgeting decisions, forecasting techniques and elementary Balance Sheet and taxation, business financing, international investments			
<b>Expected outcome .</b> A student who has undergone this course would be able to <ol style="list-style-type: none"> <li>make investment decisions based on capital budgeting methods in alignment with microeconomic and macroeconomic theories.</li> <li>able to analyse the profitability of the firm, economy of operation, determination of price under various market situations with good grasp on the effect of trade cycles in business.</li> <li>gain knowledge on Monetary theory, measures by RBI in controlling interest rate and emerging concepts like Bit Coin.</li> <li>gain knowledge of elementary accounting concepts used for preparing balance sheet and interpretation of balance sheet</li> </ol>			
<b>Text Books</b> <ol style="list-style-type: none"> <li>Geetika, Piyali Ghosh and Chodhury, <i>Managerial Economics</i>, Tata McGraw Hill, 2015</li> <li>Gregory Mankiw, <i>Principles of Macroeconomics</i>, Cengage Learning, 2006.</li> <li>M.Kasi Reddy and S.Saraswathi, <i>Economics and Financial Accounting</i>. Prentice Hall of India. New Delhi.</li> </ol>			

**References:**

1. Dornbusch, Fischer and Startz, *Macroeconomics*, McGraw Hill, 11th edition, 2010.
2. Khan M Y, *Indian Financial System*, Tata McGraw Hill, 7th edition, 2011.
3. Samuelson, *Managerial Economics*, 6<sup>th</sup> edition, Wiley
4. Snyder C and Nicholson W, *Fundamentals of Microeconomics*, Cengage Learning (India), 2010.
5. Truett, *Managerial Economics: Analysis, Problems, Cases*, 8<sup>th</sup> Edition, Wiley
6. Welch, *Economics: Theory and Practice* 7<sup>th</sup> Edition, Wiley
7. Uma Kapila, *Indian Economy Since Independence, 26th Edition: A Comprehensive and Critical Analysis of India's Economy, 1947-2015*
8. C Rangarajan, *Indian Economy, Essays on monetary and finance*, UBS Publishers'Distributors, 1998
9. A.Ramachandra Aryasri, *Managerial Economics and Financial Analysis*, Tata McGraw-Hill, New Delhi.
10. Dominick Salvatore, *Managerial Economics in Global Economy*, Thomas Western College Publishing, Singapore.
11. I.M .Pandey, *Financial Management*, Vikas Publishing House. New Delhi.
12. Dominick Salvatore, *Theory and Problems of Micro Economic Theory*. Tata Mac Graw-Hill, New Delhi.
13. T.N.Hajela.*Money, Banking and Public Finance*. Anne Books. New Delhi.
14. G.S.Gupta. *Macro Economics-Theory and Applications*. Tata Mac Graw- Hill, New Delhi.
15. Yogesh, Maheswari, *Management Economics* , PHI learning, NewDelhi, 2012
16. Timothy Taylor , *Principles of Economics*, 3<sup>rd</sup>edition, TEXTBOOK MEDIA.
17. Varshney and Maheshwari. *Managerial Economics*. Sultan Chand. New Delhi

**Course Plan**

Module	Contents	Hours	Sem. Exam Marks
I	<b>Business Economics</b> and its role in managerial decision making-meaning-scope-relevance-economic problems-scarcity Vs choice (2 Hrs)-Basic concepts in economics-scarcity, choice, resource allocation- Trade-off-opportunity cost-marginal analysis- marginal utility theory, Law of diminishing marginal utility -production possibility curve (2 Hrs)	4	15%
II	<b>Basics of Micro Economics I</b> Demand and Supply analysis-equilibrium-elasticity (demand and supply) (3 Hrs.) -Production concepts-average product-marginal product-law of variable proportions- Production function-Cobb Douglas function-problems (3 Hrs.)	6	15%
<b>FIRST INTERNAL EXAMINATION</b>			
III	<b>Basics of Micro Economics II</b> Concept of costs-marginal, average, fixed, variable costs-cost curves-shut down point-long run and short run (3 Hrs.)- Break Even Analysis-Problem-Markets-Perfect Competition, Monopoly and Monopolistic Competition, Oligopoly-Cartel and collusion (3 Hrs.).	6	15%
IV	<b>Basics of Macro Economics</b> - Circular flow of income-two sector and multi-sector models- National Income Concepts-Measurement methods-problems-Inflation, deflation (4 Hrs.)-Trade cycles-Money-stock and flow concept-Quantity theory of money-Fischer's Equation and Cambridge Equation -velocity of circulation of money-credit control methods-SLR, CRR, Open Market Operations-Repo and Reverse Repo rate-emerging concepts in money-bit coin (4 Hrs.).	8	15%

<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	<b>Business Decisions I</b> -Investment analysis-Capital Budgeting-NPV, IRR, Profitability Index, ARR, Payback Period (5 Hrs.)- Business decisions under certainty-uncertainty-selection of alternatives-risk and sensitivity- cost benefit analysis-resource management (4 Hrs.).	9	20%
<b>VI</b>	<b>Business Decisions II</b> Balance sheet preparation-principles and interpretation-forecasting techniques (7 Hrs.)-business financing-sources of capital- Capital and money markets-international financing-FDI, FPI, FII-Basic Principles of taxation-direct tax, indirect tax-GST (2 hrs.).	9	20%
<b>END SEMESTER EXAM</b>			

### Question Paper Pattern

Max. marks: 100, Time: 3 hours

The question paper shall consist of three parts

**Part A**

4 questions uniformly covering modules I and II. Each question carries 10 marks  
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

**Part B**

4 questions uniformly covering modules III and IV. Each question carries 10 marks  
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

**Part C**

6 questions uniformly covering modules V and VI. Each question carries 10 marks  
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

**Note:** In all parts, each question can have a maximum of four sub questions, if needed.



Course code	Course Name	L-T-P-Credits	Year of Introduction
HS210	LIFE SKILLS	2-0-2	2016
<b>Prerequisite : Nil</b>			
<p><b>Course Objectives</b></p> <ul style="list-style-type: none"> <li>• To develop communication competence in prospective engineers.</li> <li>• To enable them to convey thoughts and ideas with clarity and focus.</li> <li>• To develop report writing skills.</li> <li>• To equip them to face interview &amp; Group Discussion.</li> <li>• To inculcate critical thinking process.</li> <li>• To prepare them on problem solving skills.</li> <li>• To provide symbolic, verbal, and graphical interpretations of statements in a problem description.</li> <li>• To understand team dynamics &amp; effectiveness.</li> <li>• To create an awareness on Engineering Ethics and Human Values.</li> <li>• To instill Moral and Social Values, Loyalty and also to learn to appreciate the rights of others.</li> <li>• To learn leadership qualities and practice them.</li> </ul>			
<p><b>Syllabus</b></p> <p><b>Communication Skill:</b> Introduction to Communication, The Process of Communication, Barriers to Communication, Listening Skills, Writing Skills, Technical Writing, Letter Writing, Job Application, Report Writing, Non-verbal Communication and Body Language, Interview Skills, Group Discussion, Presentation Skills, Technology-based Communication.</p> <p><b>Critical Thinking &amp; Problem Solving:</b> Creativity, Lateral thinking, Critical thinking, Multiple Intelligence, Problem Solving, Six thinking hats, Mind Mapping &amp; Analytical Thinking.</p> <p><b>Teamwork:</b> Groups, Teams, Group Vs Teams, Team formation process, Stages of Group, Group Dynamics, Managing Team Performance &amp; Team Conflicts.</p> <p><b>Ethics, Moral &amp; Professional Values:</b> Human Values, Civic Rights, Engineering Ethics, Engineering as Social Experimentation, Environmental Ethics, Global Issues, Code of Ethics like ASME, ASCE, IEEE.</p> <p><b>Leadership Skills:</b> Leadership, Levels of Leadership, Making of a leader, Types of leadership, Transactions Vs Transformational Leadership, VUCA Leaders, DART Leadership, Leadership Grid &amp; leadership Formulation.</p>			
<p><b>Expected outcome</b></p> <p>The students will be able to</p> <ul style="list-style-type: none"> <li>• Communicate effectively.</li> <li>• Make effective presentations.</li> <li>• Write different types of reports.</li> <li>• Face interview &amp; group discussion.</li> <li>• Critically think on a particular problem.</li> <li>• Solve problems.</li> <li>• Work in Group &amp; Teams</li> <li>• Handle Engineering Ethics and Human Values.</li> <li>• Become an effective leader.</li> </ul>			

**Resource Book:**

*Life Skills for Engineers*, Compiled by ICT Academy of Kerala, McGraw Hill Education (India) Private Ltd., 2016

**References:**

- Barun K. Mitra; (2011), *“Personality Development & Soft Skills”*, First Edition; Oxford Publishers.
- Kalyana; (2015) *“Soft Skill for Managers”*; First Edition; Wiley Publishing Ltd.
- Larry James (2016); *“The First Book of Life Skills”*; First Edition; Embassy Books.
- Shalini Verma (2014); *“Development of Life Skills and Professional Practice”*; First Edition; Sultan Chand (G/L) & Company
- John C. Maxwell (2014); *“The 5 Levels of Leadership”*, Centre Street, A division of Hachette Book Group Inc.

**Course Plan**

Module	Contents	Hours L-T-P		Sem. Exam Marks
		L	P	
I	Need for Effective Communication, Levels of communication; Flow of communication; Use of language in communication; Communication networks; Significance of technical communication, Types of barriers; Miscommunication; Noise; Overcoming measures,	2		See evaluation scheme
	Listening as an active skill; Types of Listeners; Listening for general content; Listening to fill up information; Intensive Listening; Listening for specific information; Developing effective listening skills; Barriers to effective listening skills.		2	
	<b>Technical Writing:</b> Differences between technical and literary style, Elements of style; Common Errors, <b>Letter Writing:</b> Formal, informal and demi-official letters; business letters, <b>Job Application:</b> Cover letter, Differences between bio-data, CV and Resume, <b>Report Writing:</b> Basics of Report Writing; Structure of a report; Types of reports.		4	
	<b>Non-verbal Communication and Body Language:</b> Forms of non-verbal communication; Interpreting body-language cues; Kinesics; Proxemics; Chronemics; Effective use of body language	3		
	<b>Interview Skills:</b> Types of Interviews; Ensuring success in job interviews; Appropriate use of non-verbal communication, <b>Group Discussion:</b> Differences between group discussion and debate; Ensuring success in group discussions, <b>Presentation Skills:</b> Oral presentation and public speaking skills; business presentations, <b>Technology-based Communication:</b> Netiquettes: effective e-mail messages; power-point presentation; enhancing editing skills using computer software.		4	

<p><b>II</b></p>	<p>Need for Creativity in the 21<sup>st</sup> century, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity</p> <p>Critical thinking Vs Creative thinking, Functions of Left Brain &amp; Right brain, Convergent &amp; Divergent Thinking, Critical reading &amp; Multiple Intelligence.</p> <p>Steps in problem solving, Problem Solving Techniques, Problem Solving through Six Thinking Hats, Mind Mapping, Forced Connections.</p> <p>Problem Solving strategies, Analytical Thinking and quantitative reasoning expressed in written form, Numeric, symbolic, and graphic reasoning, Solving application problems.</p>	<p>2</p> <p>2</p> <p>2</p>	<p>2</p> <p>2</p> <p>2</p>	
<p><b>III</b></p>	<p>Introduction to Groups and Teams, Team Composition, Managing Team Performance, Importance of Group, Stages of Group, Group Cycle, Group thinking, getting acquainted, Clarifying expectations.</p> <p>Group Problem Solving, Achieving Group Consensus.</p> <p>Group Dynamics techniques, Group vs Team, Team Dynamics, Teams for enhancing productivity, Building &amp; Managing Successful Virtual Teams. Managing Team Performance &amp; Managing Conflict in Teams.</p> <p>Working Together in Teams, Team Decision-Making, Team Culture &amp; Power, Team Leader Development.</p>	<p>3</p> <p>3</p> <p>3</p>	<p>2</p> <p>2</p> <p>2</p>	
<p><b>IV</b></p>	<p>Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully.</p> <p>Caring, Sharing, Honesty, Courage, Valuing Time, Cooperation, Commitment, Empathy, Self-Confidence, Character</p> <p>Spirituality, Senses of 'Engineering Ethics', variety of moral issues, Types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, Consensus and controversy, Models of Professional Roles, Theories about right action, Self-interest, customs and religion, application of ethical theories.</p> <p>Engineering as experimentation, engineers as responsible experimenters, Codes of ethics, Balanced outlook on.</p> <p>The challenger case study, Multinational corporations, Environmental ethics, computer ethics,</p>	<p>3</p> <p>3</p> <p>3</p>	<p>2</p> <p>2</p> <p>2</p>	

	Weapons development, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers(India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE), India, etc.	3		
V	Introduction, a framework for considering leadership, entrepreneurial and moral leadership, vision, people selection and development, cultural dimensions of leadership, style, followers, crises.	4	2	
	Growing as a leader, turnaround leadership, gaining control, trust, managing diverse stakeholders, crisis management			
	Implications of national culture and multicultural leadership Types of Leadership, Leadership Traits.	2		
	Leadership Styles, VUCA Leadership, DART Leadership, Transactional vs Transformational Leaders, Leadership Grid, Effective Leaders, making of a Leader, Formulate Leadership		2	
<b>END SEMESTER EXAM</b>				

## EVALUATION SCHEME

### Internal Evaluation

*(Conducted by the College)*

**Total Marks: 100**

### Part – A

*(To be started after completion of Module 1 and to be completed by 30<sup>th</sup> working day of the semester)*

1. Group Discussion – Create groups of about 10 students each and engage them on a GD on a suitable topic for about 20 minutes. Parameters to be used for evaluation is as follows;

- |       |                        |   |          |
|-------|------------------------|---|----------|
| (i)   | Communication Skills   | – | 10 marks |
| (ii)  | Subject Clarity        | – | 10 marks |
| (iii) | Group Dynamics         | - | 10 marks |
| (iv)  | Behaviors & Mannerisms | - | 10 marks |

*(Marks: 40)*

## Part – B

*(To be started from 31<sup>st</sup> working day and to be completed before 60<sup>th</sup> working day of the semester)*

2. Presentation Skills – Identify a suitable topic and ask the students to prepare a presentation (preferably a power point presentation) for about 10 minutes. Parameters to be used for evaluation is as follows;

(i)	Communication Skills*	-	10 marks
(ii)	Platform Skills**	-	10 marks
(iii)	Subject Clarity/Knowledge	-	10 marks

*(Marks: 30)*

\* Language fluency, audibility, voice modulation, rate of speech, listening, summarizes key learnings etc.

\*\* Postures/Gestures, Smiles/Expressions, Movements, usage of floor area etc.

## Part – C

*(To be conducted before the termination of semester)*

3. Sample Letter writing or report writing following the guidelines and procedures. Parameters to be used for evaluation is as follows;

(i)	Usage of English & Grammar	-	10 marks
(ii)	Following the format	-	10 marks
(iii)	Content clarity	-	10 marks

*(Marks: 30)*

**External Evaluation**  
*(Conducted by the University)*

Total Marks: 50

Time: 2 hrs.

## Part – A

### Short Answer questions

There will be one question from each area (five questions in total). Each question should be written in about maximum of 400 words. Parameters to be used for evaluation are as follows;

- (i) Content Clarity/Subject Knowledge
- (ii) Presentation style
- (iii) Organization of content

*(Marks: 5 x 6 = 30)*

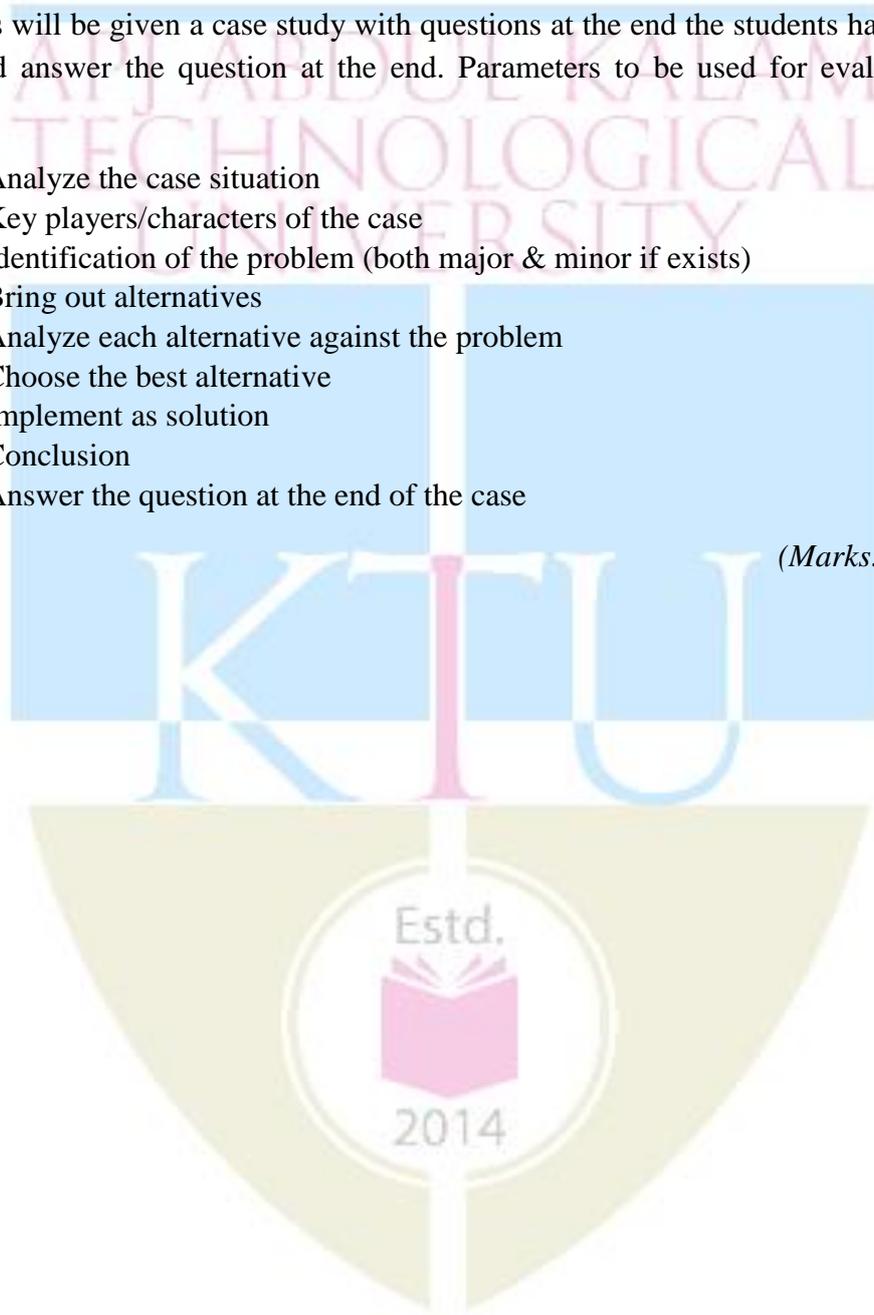
## **Part – B**

### **Case Study**

The students will be given a case study with questions at the end the students have to analyze the case and answer the question at the end. Parameters to be used for evaluation are as follows;

- (i) Analyze the case situation
- (ii) Key players/characters of the case
- (iii) Identification of the problem (both major & minor if exists)
- (iv) Bring out alternatives
- (v) Analyze each alternative against the problem
- (vi) Choose the best alternative
- (vii) Implement as solution
- (viii) Conclusion
- (ix) Answer the question at the end of the case

*(Marks: 1 x 20 = 20)*



Course code	Course Name	L-T-P-Credits	Year of Introduction
CS232	Free and Open Source Software Lab	0-0-3-1	2016

**Pre-requisite:** CS204 Operating systems

**Course Objectives:** To expose students to FOSS environment and introduce them to use open source packages in open source platform.

**List of Exercises/Experiments:**

1. Getting started with Linux basic commands for directory operations, displaying directory structure in tree format etc.
2. Linux commands for operations such as redirection, pipes, filters, job control, changing ownership/permissions of files/links/directory.
3. Advanced linux commands curl, wget, ftp, ssh and grep
4. Shell Programming : Write shell script to show various system configuration like
  - Currently logged user and his login name
  - Your current shell
  - Your home directory
  - Your operating system type
  - Your current path setting
  - Your current working directory
  - Number of users currently logged in
5. Write shell script to show various system configurations like
  - your OS and version, release number, kernel version
  - all available shells
  - computer CPU information like processor type, speed etc
  - memory information
  - hard disk information like size of hard-disk, cache memory, model etc
  - File system (Mounted)
6. Write a shell script to implement a menu driven calculator with following functions
  1. Addition
  2. Subtraction
  3. Multiplication
  4. Division
  5. Modulus
7. Write a script called addnames that is to be called as follows  
*./addnames ulist username*  
 Here *ulist* is the name of the file that contains list of user names and *username* is a particular student's username. The script should
  - check that the correct number of arguments was received and print a message, in case the number of arguments is incorrect
  - check whether the ulist file exists and print an error message if it does not
  - check whether the username already exists in the file. If the username exists, print a message stating that the name already exists. Otherwise, add the username to the end of the list.

8. Version Control System setup and usage using GIT. Try the following features.
  - Creating a repository
  - Checking out a repository
  - Adding content to the repository
  - Committing the data to a repository
  - Updating the local copy
  - Comparing different revisions
  - Revert
  - Conflicts and a conflict Resolution
9. Shell script which starts on system boot up and kills every process which uses more than a specified amount of memory or CPU.
10. Introduction to packet management system : Given a set of RPM or DEB, build and maintain, and serve packages over http or ftp. Configure client systems to access the package repository.
11. Perform simple text processing using Perl, Awk.
12. Running PHP : simple applications like login forms after setting up a LAMP stack
13. Virtualisation environment (e.g., xen, kqemu, virtualbox or lguest) to test applications, new kernels and isolate applications. It could also be used to expose students to other alternate OS such as freeBSD
14. Compiling from source : learn about the various build systems used like the auto\* family, cmake, ant etc. instead of just running the commands. This could involve the full process like fetching from a cvs and also include autoconf, automake etc.,
15. Kernel configuration, compilation and installation : Download / access the latest kernel source code from *kernel.org*, compile the kernel and install it in the local system. Try to view the source code of the kernel
16. GUI Programming: Create scientific calculator – using any one of Gambas, GTK, QT
17. Installing various software packages. Either the package is yet to be installed or an older version is present. The student can practice installing the latest version. ( Internet access is needed).
  - Install samba and share files to windows
  - Install Common Unix Printing System(CUPS)
18. Set up the complete network interface by configuring services such as gateway, DNS, IP tables etc. using *ifconfig*

**Expected outcome:**

The students will be able to:

1. Identify and apply various Linux commands
2. Develop shell scripts and GUI for specific needs
3. Use tools like GIT
4. Perform basic level application deployment, kernel configuration and installation, packet management and installation etc.

Course code	Course Name	L-T-P - Credits	Year of Introduction
CS234	DIGITAL SYSTEMS LAB	0-0-3-1	2016
<b>Pre-requisite:</b> CS203 Switching theory and logic design			
<b>Course Objectives:</b>			
<ol style="list-style-type: none"> <li>To familiarize students with digital ICs, the building blocks of digital circuits</li> <li>To provide students the opportunity to set up different types of digital circuits and study their behaviour</li> </ol>			
<b>List of Exercises/Experiments :</b> ( minimum 12 exercises/experiments are mandatory)			
<ol style="list-style-type: none"> <li>Familiarizations and verification of the truth tables of basic gates and universal gates.</li> <li>Verification of Demorgan's laws for two variables.</li> <li>Implementation of half adder and full adder circuits using logic gates.</li> <li>Implementation of half subtractor and full subtractor circuits using logic gates.</li> <li>Implementation of parallel adder circuit.</li> <li>Realization of 4 bit adder/subtractor and BCD adder circuits using IC 7483.</li> <li>Implementation of a 2 bit magnitude comparator circuit using logic gates.</li> <li>Design and implementation of code convertor circuits</li> <li>a) BCD to excess 3 code b) binary to gray code</li> <li>Implementation of multiplexer and demultiplexer circuits using logic gates. Familiarization with various multiplexer and demultiplexer ICs.</li> <li>Realization of combinational circuits using multiplexer/demultiplexer ICs.</li> <li>Implementation of SR, D, JK, JK master slave and T flip flops using logic gates. Familiarization with IC 7474 and IC 7476.</li> <li>Implementation of shift registers using flip flop Integrated Circuits.</li> <li>Implementation of ring counter and Johnson counter using flip flop Integrated Circuits.</li> <li>Realization of asynchronous counters using flip flop ICs.</li> <li>Realization of synchronous counters using flip flop ICs. Familiarization with various counter Integrated Circuits.</li> <li>Implementation of a BCD to 7 segment decoder and display.</li> <li>Simulation of Half adder, Full adder using VHDL.</li> </ol> <p><i>(Note: The experiments may be done using hardware components and/or VHDL)</i></p>			
<b>Course outcome:</b>			
Students will be able to:			
<ol style="list-style-type: none"> <li>identify and explain the digital ICs and their use in implementing digital circuits.</li> <li>design and implement different kinds of digital circuits.</li> </ol>			