

# ALAGAPPA UNIVERSITY

Accredited with A+ Grade by NAAC (CGPA 3.64) in the Third Cycle

**Karaikudi – 630003.**  
**Tamilnadu , INDIA**

## Directorate of Distance Education



## PROGRAMME PROJECT REPORT (PPR)

## MASTER OF COMPUTER APPLICATIONS (M.C.A)

submitted to

**UGC, Distance Education Bureau (DEB),**  
**New Delhi**

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**ALAGAPPA UNIVERSITY, KARAIKUDI**  
**DIRECTORATE OF DISTANCE EDUCATION**  
**MASTER OF COMPUTER APPLICATIONS (M.C.A)**  
**Credit Based Curriculum System (CBCS)**  
**(Academic Year 2020 -2021 Onwards)**

**(a) Programme Mission and Objectives Mission**

Mission is to offer excellent career opportunities in various industries including Corporate sector, government organizations, academia and software development companies in the areas of System analysis/design/developments/supports, mobile application programming, game programming, web and e-commerce development, database administration, software testing, education and training etc.

The Programme thrust is on giving the students a thorough and sound background in theoretical and skill-oriented courses relevant to the latest computer software application development.

**Programme Objectives:**

- ✓ Discover, investigate the requirements of a problem and find the solution to them using computing principles.
- ✓ Create and evaluate a computer-based system, components and process to meet the specific needs of applications.
- ✓ Utilize current techniques and tools necessary for complex computing practices.
- ✓ Develop and integrate effectively system-based components into user environment.
- ✓ Identify the need and develop the skill to employ in learning as a computing professional in IT and ITES.
- ✓ Execute effectively in a team environment to achieve a common goal.
- ✓ Classify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.
- ✓ Proficiency in developing application with required domain knowledge.
- ✓ To facilitate learners to nurture skills to practice their professions competently to meet the ever-changing needs of society such as Digital India, Safety and Privacy.

**(b) Relevance of the program with HEI's and Alagappa University Mission and Goals**

This programme is aligned with HEI's and Alagappa University mission and goals to be offered through distance mode to reach quality higher education to the unreachable and/or rural learners. Higher education in Computer Science offered through distance mode meets the mission of HEI's like digital India and e-cash transaction will enrich the Human resources for the uplift of the nation.

**(c) Nature of prospective target group of learners**

The nature of prospective target group of learners is graduates from various disciplines like Commerce, Mathematics, Physics, Chemistry, Biology, Electronics, and Engineering etc. It also includes the learners who want to become entrepreneurs (self-engagement) like Web Designers, Software Developers, BPO's, KPO' and Network managers/administrators. After MCA the learner can opt for higher studies like M.Tech and Ph.D. Learners interested in Joining IT firms Software, Digital Marketing, System analyst and Web Developments.

**Master of Computer Applications (M.C.A)  
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**(d) Appropriateness of programme to be conducted in Open and Distance Learning mode to acquire specific skills and competence;**

Master of Computer applications (M.C.A) Programme through Distance Learning mode has been designed to impart advanced knowledge in various areas of computer applications including i) Knowledge about various kinds of programming languages ii) Digital Logic fundamentals, Operating systems, RDBMS, Data Structure and Software Engineering iii) inter-disciplinary knowledge like Discrete Mathematics and Accounting and Financial Management iv) Concepts like Artificial Intelligence, Soft computing, Big data analytics, R Programming and Internet of Things. v) Cutting Edge Technologies like Mobile application development and .Net Framework.

Besides imparting theoretical knowledge, a lot of stress is laid on hands-on training, practical, project work and overall development of the personality.

The University provides various opportunities to the learners, basically to the poor and rural people to get a high-quality education in the field of Computer Applications, which can fulfill the demand of the society.

**(e) Instructional Design**

**Revisions of Regulation and Curriculum Design**

1. The University reserves the right to amend or change the regulations, schemes of examinations and syllabi from time to time based on recent market dynamics, industrial developments, research and feedback from stakeholders and learners.
2. Each student should secure 90 credits to complete Master of Computer applications(M.C.A.) programme.
3. Each theory course carries 4 credits, practical course carries 4 credits and project work carry 10 credits with 75 marks in the University End Semester Examination (ESE) and 25 marks in the Continuous Internal Assessment (CIA).

**M.C.A Programme code: 315**

**Master of Computer Applications (M.C.A)**  
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**Courses of Study M.C.A**

S.No	Course Code	Title of the Course	CIA Marks Max	ESE Marks Max	TOT Marks Max	C Max.	Hrs
<b>FIRST YEAR</b>							
<b>I Semester</b>							
1	31511	Digital Computer Organization	25	75	100	4	12
2	31512	Object Oriented Programming and C++	25	75	100	4	12
3	31513	Data Structure and Algorithms	25	75	100	4	12
4	31514	Discrete Mathematics	25	75	100	4	12
5	31515	Data Structures using C++ Lab	25	75	100	4	120
<b>Total</b>			<b>125</b>	<b>375</b>	<b>500</b>	<b>20</b>	<b>168</b>
<b>II Semester</b>							
6	31521	Accounting and Financial Management	25	75	100	4	12
7	31522	Relational Database Management Systems (RDBMS)	25	75	100	4	12
8	31523	Computer Graphics	25	75	100	4	12
9	31524	Visual Programming with •NET	25	75	100	4	12
10	31525	VB.NET and RDBMS Lab	25	75	100	4	120
<b>Total</b>			<b>125</b>	<b>375</b>	<b>500</b>	<b>20</b>	<b>168</b>
<b>SECOND YEAR</b>							
<b>III Semester</b>							
11	31531	Software Engineering	25	75	100	4	12
12	31532	Operating System	25	75	100	4	12
13	31533	Internet and Java Programming	25	75	100	4	12
14	31534	Computer Networks	25	75	100	4	12
15	31535	Data Mining and Warehousing	25	75	100	4	12
16	31536	Internet and Java Programming Lab	25	75	100	4	120
<b>Total</b>			<b>150</b>	<b>450</b>	<b>600</b>	<b>24</b>	<b>180</b>
<b>IV Semester</b>							
17	31541	Internet of Things (IoT)	25	75	100	4	12
18	31542	Artificial Intelligence and Soft Computing	25	75	100	4	12
19	31543	Big Data Analytics and R Programming	25	75	100	4	12
20	31544	Mobile Application Development	25	75	100	4	12
21	31545	Project Work	25	75	100	10	-
<b>Total</b>			<b>125</b>	<b>375</b>	<b>500</b>	<b>26</b>	<b>48</b>
<b>Grand Total</b>			<b>525</b>	<b>1575</b>	<b>2100</b>	<b>90</b>	

**CIA** : Continuous Internal Assessment **ESE** : End semester Examination **Max.** Maximum Marks; **C** : Credits; **Hrs** – PCP Hours

**Course Code Legend:**

3	1	5	S	C
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315 – Programme code for Master of Computer Applications (M.C.A).

S - Semester Number;

C – Course Number in the Semester

**Master of Computer Applications (M.C.A)  
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**Detailed Syllabi**

- The University has been recommended the following bridge courses for the non-computer science background students covering essential basics required to pursue two-year MCA programme.
  - i. Introduction to Information Technology.
  - ii. Programming in C.
  - iii. Introduction to Database Systems.
  - iv. Basics of Computer Networks.
  - v. Problem Solving Techniques.
- The detailed Syllabi of study and shall be as shown in Appendix.

**Duration of the Programme:**

The M.C.A programme shall consist of a period minimum of two years (Four Semesters) and maximum of four years.

**e.3.1 Medium of Instruction**

The medium of instruction is only in **English**. The course material is also in **English**.

**Faculty and Support Staff Requirements:**

The following faculty and support staff is required for this programme.

<b>Staff Category</b>	<b>Required</b>
Core Faculty	4
Faculty for Specialization	2
Laboratory Assistant	1
Clerical Assistant	1

\*Faculty at least in Assistant Professor Level

**Instructional Delivery mechanisms**

The instructional delivery mechanisms of the programme are imparted through distance education methodology includes printed SLM- Study materials, Lab instruction manual, Personal contact session for both theory and practical courses of the programme, e- version of the course materials in the form of CD, e-book, e-tutorials, SWAYAM, Massive Open Online Courses (MOOC) courses, NPTEL, Open Educational Resources(OER),audio, video tutorials and virtual lab.

**Identification of media**

The printed version of SLM – study material shall be given to the learners in addition to MOOC, e-tutorial and virtual lab.

**Student Support Services**

The student support services will be facilitated by the Directorate of Distance Education, Alagappa University, Karaikudi and its approved learning centres located in various parts of Tamilnadu. The pre-admission student support services like counseling about the programme including curriculum design, mode of delivery, fee structure and evaluation methods will be explained by the staff at Directorate of Distance Education or Learning centres. The post - admission student support services like issuing Identity card, study materials will be provided thru Directorate or Learning centres. The face-to-face contact sessions of the programme for both theory and practical's will be held at the Directorate or Learning centres. The student support regarding the conduct of examinations, evaluations, publication of results and certificates done by the Office of the Controller of Examinations, Alagappa University, Karaikudi.

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**(f) Procedure for Admissions, curriculum transaction and evaluation**

**Minimum qualification for admission**

Candidates for admission to the first year of the Master of Computer Applications (M.C.A) programme shall be required to have passed the following examinations. Candidates who have passed;

*B.Sc. Degree in Mathematics/Statistics/Applied Sciences/Computer Science/ Information Technology (or) B.Sc. Degree in Physics/Chemistry/ Electronics as major subject and Mathematics as ancillary subject (or) B.C.A./B.Com./B.B.A.(OR) qualification equivalent thereto. The candidate should have studied 10+2+3 pattern with Mathematics/Statistics/Business Mathematics in +2 level.*

**Curriculum transaction**

- The face to face contact sessions in class room teaching with the support of SLM, Power Point Presentations, web-based tools, audio and animated videos.
- The practical classes are based on the respective subject study materials containing requirement for the laboratory experiments.
- Face to face contact sessions will be conducted for both theory and practical courses in the following manner.

<b>Course Type</b>
Theory courses (12 Hours / course / 4 credits)
Practical courses (120 Hours / course / 4 credits)

**Evaluation**

There shall be two types of evaluation systems; Continuous internal assessment and end semester examination will be conducted by the University according to the following scheme. The internal assessment for both theory and practical's is maximum of 25 marks for each course. The end semester examination for theory and practical is maximum of 75 marks for each course. The candidate failing in any course(s) will be permitted to appear for each failed course(s) in the subsequent examination.

**Internal assessment**

- Internal assessment of theory courses is through home assignment with workbook, case studies, review questions, quiz, multiple choice questions etc., for 25 marks.
- The internal assessment for the practical courses shall be through home assignment which includes workbook designing algorithm, preparing source code, PL/SQL coding etc., for 25 marks.
- Student should submit assignment for theory and practical courses of every course and semester.

**Division of Internal Marks (Assignment)**

<b>Theory</b>		<b>Practical</b>	
<b>Assignment</b>	<b>Marks</b>	<b>Assignment: Model Practical Test</b>	<b>Marks</b>
Long and short answer questions, Workbook, case studies, quiz and multiple choice questions.	25	Algorithm Design, flowchart, DFD preparing source code, PL/SQL coding, output, results.	25

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End Semester Examination (ESE)**

The university end Semester Examinations shall be of three hours duration with maximum of 75 Marks for both theory and practical courses.

**Minimum for a pass:**

To pass in each course, a candidate is required to secure 50% marks in the End Semester examination and 50% marks in the aggregate (marks in End Semester Examination + marks in Internal Assessment).

The students who do not secure required minimum marks for pass in a course(s) shall be required to reappear and pass the same in the subsequent examination,

**Question Paper Pattern - Theory**

The end semester examination will be conducted in the duration of 3 Hours and maximum of 75 Marks.

*All the Blocks Should Be Given Equal Importance*

Part – A (10 x 2 Marks: 20 Marks) Answer all questions

Part – B (5 x 5 Marks: 25 Marks) Answer all questions choosing either (a) or (b)

Part – C (3 x 10 Marks: 30 Marks) (Answer any 3 out of 5 questions)

**End Semester Examination (ESE) - Practical**

- Students are required to prepare a separate lab record for each lab course. The practical counsellor should duly sign this lab record after each session.
- Students shall prepare practical record note book which includes aim, algorithm, source code, input, expected output and result of the experiment and submit during end semester practical examination.
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**Division of marks in ESE – Practical (Maximum 75 marks)**

The end semester practical examination will be conducted in the duration of 3 Hours and maximum of 75 Marks.

<b>Practical details</b>	<b>Max. Marks</b>
Algorithm / Flowchart	10
Source Code	20
Debugging	10
Execution	10
Results	10
Viva-Voce	5
Record Note	10
<b>Total</b>	<b>75</b>

**Procedure for Completing the Course:**

A student shall be permitted to continue the programme from I to IV semester irrespective of failure(s) in the courses of the earlier semesters. The candidate will qualify for the MCA degree only if he/she passes all the (including arrears) courses with in a period of FIVE years from the date of admission.

**Results and Classification:**

Results will be declared at the end of each semester of the University examination and the marks/grade obtained by the candidate will be forwarded to them by the Controller of Examinations, Alagappa University.



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**f.3.4.1 Marks and grades**

The following table gives the marks, grade points, letter, grades and classification to indicate the performance of the candidate.

Range of Marks	Grade Points	Letter Grade	Description
96 - 100	10.00	S+	First class – Exemplary
91 - 95	9.5	S	
86 - 90	9.0	D++	First class – Distinction
81 - 85	8.5	D+	
76 - 80	8.0	D	
71 - 75	7.5	A++	First Class
66 - 70	7.0	A+	
61 - 65	6.5	A	
56 - 60	6.0	B	Second Class
50 - 55	5.5	C	
Below 50	0.00	F	Fail
ABSENT	0.00	AAA	Absent

**For a semester**

$$\text{Grade Point Average [GPA]} = \frac{\sum C_i G_i}{\sum C_i}$$

$$\begin{aligned} \text{GPA} &= \frac{\text{Sum of the multiplication of Grade points by the credit of the courses}}{\text{Sum of the credit of the courses in the semester}} \\ &= \frac{\text{Sum of [ Credit earned x Grade Points]}}{\text{Sum of the credits earned in the semester}} \end{aligned}$$

**For the entire programme**

$$\begin{aligned} \text{Cumulative Grade Point Average [CGPA]} &= \frac{\sum_n \sum_i C_{ni} G_{ni}}{\sum_n \sum_i C_{ni}} \\ &= \frac{\text{sum of the multiplication of grade points by the credits of the entire programme}}{\text{Sum of the credits of the courses for the entire programme}} \end{aligned}$$

Where

$C_i$  - Credits earned for the course  $i$  in any semester

$G_i$  - Grade Point earned for course  $i$  in any semester

$n$  - is number of all Courses successfully cleared during the particular semester in the case of GPA and during all the semesters (programme) in the case of CGPA.

CGPA	Grade	Classification of Final Result
9.6 – 10.00	S+	First class – Exemplary*
9.1 – 9.5	S	
8.6 – 9.0	D++	First class with Distinction*
8.1 – 8.5	D+	
7.6 – 8.0	D	
7.1 – 7.5	A++	First Class
6.6 – 7.0	A+	
6.1 – 6.5	A	
5.6 – 6.0	B+	Second Class
5.0 – 5.5	C	
Below 5.0	U	Reappear

\* The candidates who have passed in the first appearance and within the prescribed semester

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**Fees Structure**

<b>Fee Particulars</b>	<b>First Year</b>	<b>Second Year</b>
Admission Processing Fees	300	--
Course Fees	23,100	23,100
ICT fees	150	150
<b>Total Fees</b>	<b>23,550</b>	<b>23,250</b>

\*The above mentioned fees structure is exclusive of examination fees.

**Requirement of the laboratory support and library resources Laboratory Support**

A well- equipped Computer Laboratory was established in the Alagappa University, Karaikudi with necessary software's as per the practical's syllabi for conducting face to face contact sessions for practical courses of this programme.

**Library Resources**

The Directorate of Distance Education, Alagappa University provides library facility with number of books and Self Learning materials for Computer Science programmes. The Central library of Alagappa University provides the collection of volumes of Self Learning Materials, Printed books, Subscriptions to printed periodicals and Non-book materials in print form for the learner's references. All these library resources are meant for learner's reference purpose only.

**(g) Cost estimate of the programme and the provisions:**

<b>Expense details</b>	<b>Amount in (Rs.) Approx.</b>
Programme development (Single time Investment) Honorarium to lesson writers Theory (17xRs.25,000/- per course) Practical (4x Rs. 5000/- per course)	4,45,000/-
Programme delivery Printing of study materials (for 500 copies) (21 Courses x Rs 300/- x 500 copies)	31,50,000/-
Programme maintenance (per year) Honorarium to resource persons	5,00,000/-

**(h) Quality assurance mechanism and expected programme outcomes:**

Quality assurance comprises the policies, procedures and mechanisms which that specified quality specifications and standards are maintained.

**University's Moto:** ' *Excellence in Action* '

**University's Vision and Mission**

**Vision**

Achieving Excellence in all spheres of Education, with particular emphasis on ' PEARL' - Pedagogy, Extension, Administration, Research and Learning.

**Mission**

Affording a High Quality Higher Education to the learners so that they are transformed into intellectually competent human resources that will help in the uplift of the nation to Educational,

## **Master of Computer Applications (M.C.A)**

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Social, Technological, Environmental and Economic Magnificence (ESTEEM).

#### **University Objectives**

1. Providing for instructions and training in such branches of Learning at the university may determine.
2. Fostering Research for the Advancement and Dissemination of Knowledge and Application.

#### **3. i.4 Quality Policy**

Attaining Benchmark Quality in every domain of 'PEARL' to assure Stakeholder Delight through Professionalism exhibited in terms of strong purpose, sincere efforts, steadfast direction and skillful execution.

#### **i.5 Quality Quote**

Quality Unleashes Opportunities Towards Excellence (QUOTE).

#### **Course benchmarks**

The benchmark qualities of the programme may be reviewed based on the performance of students in their assignments, internal and end semester examinations and number of enrolments of students. Feedback from the alumni, students, parents, stakeholders and employers will be received to analyze the benchmark qualities for the further improvement of the programme.

#### **Expected Programme Outcomes:**

- ✓ To widen the ability to plan, analyze, design, code, test, implement & maintain a software product for real time application development system.
- ✓ To support learners capability to setup their own enterprise in various sectors of Computer applications.
- ✓ To improve the knowledge of the learners in finding solutions and developing system based applications for real time problems in various domains involving technical, managerial, economical & social constraints.
- ✓ To develop in problem solving and programming skills in the various computing fields of IT industries.
- ✓ To prepare the learners to pursue higher studies in computing or related disciplines and to work in the fields of teaching and research.

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### **BRIDGE COURSES**

<b>BRIDGE COURSE - I</b>
<b>INTRODUCTION TO INFORMATION TECHNOLOGY</b>

#### **Course Objectives:**

- To educate the beginners the fundamentals of computer hardware and software.
- To teach them the basic concepts of internet and programming concepts.

#### **Course Outcomes:**

- Learn word processing using MS word
- Understand about internet concepts

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**Internet and World Wide Web:**

Internet and World Wide Web-Web Multimedia-Recent Trends in IT- Anatomy of Computer-Central Processing Unit-Memory **Input and Output Devices:** Input and Output Devices- Secondary Storage Media-Introduction to Software-User Interfaces-Types of Operating Systems **Word Processing:** Word Processing: Formatting Documents-Word Processing Features-Desktop Publishing-Spreadsheet Applications & Database Applications-Internet Connectivity. **Communications:** Communications: Network Applications-The Electronic Web-Local Area Networks-Multimedia-IT in Business. **Programming and System Development:** Programming and System Development: Programming Languages-Programming Techniques-Personal, Social and Ethical issues.

**Reference and Text Book:**

Dennis P.Curtin, Kim Foley, KunalSen,Cathleen Morin, (2017), “*Information Technology The Breaking Wave*“, Tata McGraw Hill Publication.

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<b>BRIDGE COURSE - II</b>
<b>PROGRAMMING IN C</b>

**Course Objectives:**

- To understand structure of program.
- To introduce the concepts of coding.
- To understand Arrays, Strings, Functions and Pointers.

**Course Outcomes:**

- Able to understand and design the solution to a problem using C
- Understand and implement Structures, Arrays and function.

**Basic Structure of C Programs** – Programming Style – Character Set – C Tokens – Keywords and Identifiers – Constants, Variables and Data Types – Declaration of Variables – Defining Symbolic Constants – Declaring a variable as a constant -Operators and Expressions.

**Managing I/O Operations:** Reading and Writing a Character – Formatted Input and Output. Decision making and branching – Flow of control **Arrays:** One-Dimensional Arrays – Declaration, Initialization – Two- Dimensional Arrays – Multi-dimensional Arrays – Dynamic Arrays – Initialization. **Strings:** Declaration, Initialization of String variables – Reading and Writing strings– String handling functions. **User-defined functions:** Need – Multi-function programs – Elements of user defined functions – Definition – Return values and their types – Function calls, declaration, category – All types of arguments and return values – Nesting of functions – Recursion – Passing arrays, Strings to functions – Scope visibility and life time of variables. **Structures and Unions:** Structure Definition  
– Giving Values to Members – Structure Initialization – Arrays of Structures – Arrays within Structures – Structures within Structures – Structures and Functions – Unions. **Pointers:** Introduction – Understanding Pointers – Accessing the Address of a Variable – Declaring and Initializing Pointers – Accessing a Variable through its Pointer.

**Reference and Text Books:**

1. Ashok N.Kamthane, (2006) , *Programming with ANSI and Turbo C*, Pearson Education.
2. Balagurusamy.E , (2012), 6th Edition *Programming in ANSI C*., Tata McGraw Hill Publishing Company.

3. Gottfried,(2006), *Programming with C*, Schaum's Outline Series, Tata McGraw Hill.

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<b>BRIDGE COURSE - III</b>
<b>INTRODUCTION TO DATABASE SYSTEMS</b>

**Course Objectives:**

- To understand DBMS and its Life Cycle
- To introduce the concepts of Database Architecture
- To understand Data Normalization and related Normal Forms
- To understand Relational Algebra and its operations.

**Course Outcomes:**

- Describe DBMS and DDLC.
- Describe Normalization for Database design.
- Understand the Relational Algebraic Operations.

**Introduction to Database Management Systems:** Why a Database – Characteristics of Data in a Database – Database Management System: Transaction Management System – Concurrency- Control – Security Management – Language Interface – Storage Management – Why DBMS – Types of Database Management Systems: Hierarchical Model – Network Model – Relational Model - **Database Development Life Cycle** : Database Development Life Cycle Phases - **Database Architecture** : Conceptual, Physical and Logical Database Models –**Data Normalization** Data Normalization : Keys and Relationships – First Normal Form – Second Normal Form – 3NF – BCNF – 4NF – 5NF – DKNF – **Relational Algebra** : Relational Algebraic Operations – UNION, INTERSECTION, DIFFERENCE – CARTESIAN PRODUCT – SELECT – PROJECT – RENAME – JOIN – DIVISION.

**Reference and Text Books:**

1. Alexis Leon, Mathews Leon(2008), *Database Management Systems*, Tata McGraw Hill Education.
2. ElmasriRamez, NavatheShamkant(2017), *Fundamentals of Database System*, 7<sup>th</sup> Edition, Pearson Education.
3. Raghu Ramakrishnan(2014), Johannes Gehrke, *Database Management Systems*, Tata McGraw Hill Education.

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<b>BRIDGE COURSE - IV</b>
<b>BASICS OF COMPUTER NETWORKS</b>

**Course Objectives:**

- To understand networking concepts and basic communication model
- To understand network architectures and components required for data communication.

**Course Outcomes:**

- Able to understand the working principles of various application protocols
- Acquire knowledge about security issues and services available.

**Introduction to Computer Networks:** Definition of a Computer Network, Classification of networks: Based on transmission technology, Based on the their scale, Local area networks, Metropolitan area networks, Wide area networks - Merits and De-merits of Layered

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Architecture, Service Primitives: Reference models: The OSI Reference Model, The TCP/IP Reference Model, Comparison of the OSI & the TCP/IP Reference Models-Network topologies; Linear Bus Topology, Ring Topology, Star Topology, Hierarchical or Tree Topology, Topology Comparison, Considerations when choosing a Topology - Switching; Circuit switching, Message switching, Packet switching, Implementation of packet switching, Relationship between Packet Size and Transmission time, Comparison of switching techniques-Multiplexing-Transmission medium-Data Link Layer-Network Layer- Transport Layer.

**Reference and Text Books:**

1. Andrew S. Tanenbaum and David J. Wetherall(2011), “*Computer Networks*”, 5<sup>th</sup> Edition, University of Washington, Pearson.
2. Bhushan Trivedi, 2016, “*Data Communication and Networks*” Oxford University Press.
3. Easwarakumar K S, R S Rajesh, R.Balasubramanian, (2010), “*Computer Networks: Fundamental and Application*”, 1/e, Vikas Publishing.
4. Rajneesh Agarwal, (2011), “*Data Communication and Computer Networks*”, 1/e, Vikas Publishing.

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<b>BRIDGE COURSE - V</b>
<b>PROBLEM SOLVING TECHNIQUES</b>

**Course Objectives:**

- To understand about introduction of computers
- To acquire knowledge on problem solving techniques
- To understand the basics of programming

**Course Outcomes:**

- Able to write algorithm, pseudo code.
- Able to draw flowchart.

**Introduction:** Overview of computer-history-what is hardware-software-components of computer-input devices-output devices-memory-types of software- introduction to programming languages-assembler-interpreter-compiler.

**Problem solving:** Identification of problem – steps of problem solving-overview of problem solving techniques-Algorithm-method of writing-Rules-Examples- Flowchart-Symbols used in flowchart-conditional statement-looping statements-connectors-Examples-Pseudo code-Definition- method of writing-data types-high level languages- logical operators-conditional statement-for loop-while loop-Data Structures-Examples.

**Programming:** Architecture of a computer program- Programming languages- first Program -- Writing, compiling, and executing a program – finding errors and debugging

**Reference and Text Books:**

1. Ata Elahi Springer, (2018), *Computer Systems: Digital Design, Fundamentals of Computer Architecture and Assembly Language*.
2. Harold Abelson, *Structure and Interpretation of Computer Programs*, 2nd Edition, MIT Electrical Engineering.
3. Pradeep K. Sinha &Priti Sinha, (2012), *Computer Fundamentals*, BPB publications.

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Appendix

Detailed Syllabi

FIRST YEAR

SEMESTER I

Course Code	Title of the Course	Credits	Hours
31511	DIGITAL COMPUTER ORGANIZATION	4	12

**Course Objectives:**

- To impart the knowledge in the field of digital electronics.
- To impart knowledge about the various components of a computer and its internals.

**Course Requirements:**

- Before studying this course, the student has knowledge about basic principles of number system.
- Concepts of digital, Boolean and instruction

**Course Outcome:**

After the completion of this course, the student will be able to :

- Design and realize the functionality of the computer hardware with basic gates and other components using combinational and sequential logic.
- Understand the importance of the hardware-software interface

Unit No	Description
	<b>BLOCK 1 :NUMBER SYSTEMS</b>
1	<b>Number Systems :</b> Binary, Octal, Decimal and Hexadecimal number systems – Conversion from one base to another base – Use of complements – binary arithmetic – Numeric and Character codes.
2	<b>Boolean algebra and Combinational Circuits:</b> Fundamental concepts of Boolean Algebra – De Morgan’s theorems
3	<b>Simplification of expressions</b> – Sum of products and products of sums – Karnaugh map simplification – Quine - McKluskey method – two level implementation of Combinational Circuits.
	<b>BLOCK 2 COMBINATIONAL CIRCUITS AND SEQUENTIAL CIRCUITS</b>
4	<b>Combinational Circuits:</b> Half Adder – Full Adder – Subtractors – Decoders – Encoders – Multiplexers – Demultiplexer.
5	<b>Sequential Circuits:</b> Flip flops – Registers – Shift Registers – Binary Counters – BCD Counters – Memory Unit.
6	<b>Data Representation :</b> Data Types – Complements – Fixed Point Representations – Floating Point Representations – Other Binary Codes –Error detection codes.
	<b>BLOCK 3 : BASIC COMPUTER ORGANIZATION AND DESIGN</b>
7	<b>Instruction Codes :</b> Instruction Codes – Computer Registers – Computer Instructions – Timing and Control

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<b>8</b>	<b>Instruction cycle:</b> – Memory reference instructions – Input output and Interrupt – Complete Computer Description – Design on Basic Computer – Design of Accumulator logic
<b>BLOCK : 4 CENTRAL PROCESSING UNIT</b>	
<b>9</b>	Introduction – General Register organization – Stack organization
<b>10</b>	<b>Instruction formats:</b> – Addressing modes – Data transfer and manipulation – Program control.
<b>11</b>	<b>Input – output organization:</b> Peripheral devices – Input output interface – Asynchronous data transfer – Modes of transfer
<b>12</b>	<b>Priority interrupt:</b> – DMA – IOP – Serial Communication.
<b>BLOCK : 5 MEMORY ORGANIZATION</b>	
<b>13</b>	Memory Hierarchy – Main memory – Auxiliary memory – Associative memory
<b>14</b>	<b>Memory organization:</b> Cache memory – Virtual memory – Memory management hardware.

**Reference and Text Books:**

1. Albert Paul Malvino and Jerald A. Brown,(2008), *Digital Computer Electronics*, 3rd Edition, Tata McGraw Hill.
2. M. Morris Mano (2008), *Digital Logic and Computer Design*, Pearson Education.
3. Thomas C. Bartee (2008), *Digital Computer Fundamentals*, 6th Edition, Tata McGraw Hill.
4. V.C. Hamacher et al(2011), *Computer Organization*, 5th Edition, Tata McGraw Hill.

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Course Code	Title of the Course	Credits	Hours
<b>31512</b>	<b>OBJECT ORIENTED PROGRAMMING and C++</b>	<b>4</b>	<b>12</b>

**Course Objectives:**

- To provide an overview of working principles of object oriented paradigm
- To understand and apply the OOPs fundamentals
- To implement the features of OOP in real world applications

**Course Outcome:**

- Able to understand the object oriented programming techniques

Unit No.	Contents
<b>BLOCK 1: INTRODUCTION</b>	
<b>1</b>	<b>Introduction and Features:</b> Evolution of Object Oriented Language, Object oriented Paradigm, Basic concept of object-oriented programming- objects, classes, encapsulation and data abstraction, inheritance, polymorphism, dynamic binding, message passing
<b>2</b>	<b>Popular OOP languages.</b> Moving from C to C++ Introduction – Predefined console streams, hierarchy of console stream classes,
<b>3</b>	<b>I/O operations;</b> Unformatted I/O operations, formatted console I/O operations, manipulators, custom/user-defined manipulators.
<b>BLOCK 2 : CLASSES AND OBJECTS</b>	
<b>4</b>	<b>Classes and Objects:</b> Introduction, class specification, class objects, accessing class members, defining member functions, accessing member functions within a class, outside member functions as inline, private member function,
<b>5</b>	<b>Memory allocation for objects:</b> array of objects, function prototype, call by reference, return by reference, objects as function arguments, inline function, friend function, constant parameter and member function.



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<b>6</b>	<b>Object Initialization:</b> Introduction - constructors, default constructor, parameterized constructors, multiple constructors in a class, dynamic initialization through constructors, copy constructor, dynamic constructor, destructor. Dynamic Objects: Introduction, pointers to objects, array of pointers to objects, this pointer.
	<b>BLOCK 3 : INHERITANCE, POLYMORPHISM AND DATA CONVERSION</b>
<b>7</b>	<b>Inheritance:</b> Introduction, derived class declaration, forms of inheritance, inheritance and member accessibility, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance.
<b>8</b>	<b>Polymorphism:</b> Introduction, Function overloading, Operator overloading introduction, unary operator overloading, binary operator overloading, assignment operator overloading, overloading with friend functions.
<b>9</b>	<b>Data conversion:</b> conversion between basic data types, conversion between objects and basic types, conversion between objects of different classes. Virtual function: Introduction, need for virtual functions, pure virtual functions, abstract classes.
	<b>BLOCK 4 : TEMPLATES AND FILES</b>
<b>10</b>	<b>Generic Programming with Templates:</b> Introduction - class templates – class template with multiple arguments
<b>11</b>	<b>Function template:</b> function template with multiple arguments. inheritance of class template.
<b>12</b>	<b>Streams with Files:</b> Introduction, hierarchy of file stream classes, opening and closing of files, file pointers and their manipulators, sequential access to a file, file input/output with stream class, random access to a file.
	<b>BLOCK 5 : EXCEPTION HANDLING</b>
<b>13</b>	<b>Exception Handling:</b> Introduction– Basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism. Exceptions in constructors and destructors
<b>14</b>	<b>Other Exception Handling methods:</b> Handling uncaught exceptions, exceptions in operator overloaded functions, exception in inheritance tree, exceptions in class templates, memory allocation failure exception.

**Reference and Text Books:**

- Balagurusamy.E,(2020),*Object oriented programming in C++*, 8<sup>th</sup> Edition, Tata McGrawHill Publications.
- RoberLafore, (2010),*Object Oriented Programming in C++*, Fourth Edition, Galgotia Publications Pvt. Ltd., New Delhi.
- Venugopal K.R and Rajkumar, T.Ravishankar (2006), *Mastering C++*, Tata McGrawHill Publishing Company Ltd.

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Course Code	Title of the Course	Credits	Hours
<b>31513</b>	<b>DATA STRUCTURE AND ALGORITHMS</b>	<b>4</b>	<b>12</b>

**Course Objectives:**

- The learner should be able to learn the fundamentals of Algorithms, various data structures, should be able to use them appropriately as per need during development of programs.
- Also, the learner should know different sorting and searching techniques so that correct techniques can be used in different programs
- To understand the complexity of the program does not increase due the sorting/ search

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technique employed.

**Course Outcome:**

After the completion of this course, the student will able to;

- To write programs using structures, strings, arrays, pointers and strings for solving complex computational problem.
- Use the data structures for real time applications
- Able to analyze the efficiency of DataStructures

Unit No	Contents
	<b>BLOCK 1 : INTRODUCTION</b>
1	<b>Introduction to Data Structure :</b> Types of Data Structure , Primitive data types
	<b>Algorithms:</b> –Time and space Complexity of algorithms
2	<b>Arrays:</b> Array initialization, Definition of Array, Characteristic of Array ,One-dimensional Array, Two-dimensional array and Multi dimensional array
	<b>BLOCK 2 : LINEAR DATA STRUCTURE</b>
3	<b>Stack :</b> Stack related terms, Operations on a stack,
4	<b>Representation of Stack:</b> Implementation of a stack – application of Stack. Expression Evaluation Polish notation.
5	<b>Queues:</b> Operations on queue Circular Queue, Representation of Queues, Application of Queues
6	<b>List:</b> Merging lists, Linked list, Single linked list, Double LinkedList, Header Linked list
7	<b>Operation on Linked List :</b> Insertion and Deletion of linked list
8	<b>Traversal:</b> Traversing a linked list , Representation of linked list.
	<b>BLOCK:3 NON-LINEAR DATASTRUCTURE</b>
9	<b>Trees:</b> Binary Trees, Types of Binary trees, Binary Tree Representation
10	<b>Binary Tree operations / Applications :</b> Traversing Binary Trees, Binary Search tree,
11	<b>Operations on Binary Tree:</b> Insertion and Deletion operations, Hashing Techniques.
	<b>BLOCK 4 : SEARCHING TECHNIQUES</b>
12	<b>Searching :</b> Introduction, Searching, Linear Search, Binary Search
	<b>BLOCK5 : SORTINGTECHNIQUES</b>
13	<b>Sorting:</b> Bubble sort, Insertion sort, Radix sort
14	<b>Other sorting Techniques:</b> Selection sort, Quick sort, Tree sort.

**Reference and Text Books:**

1. Ashok N Kamthane, (2007), *Programming and Data Structure*, Pearson Edition.
2. Ellis Horowitz and Sartaj Sahini, (2007), *Fundamentals of Data structures*, Second Edition,Universities press.
3. Lipschutz, Vijayalakshmi PaiG.A.,(2006),*Data Structures*, Seymour Second Edition , Schaum’s Outlines, Tata Mc-Graw Hill Private Ltd.

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Course Code	Title of the Course	Credits	Hours
31514	DISCRETE MATHEMATICS	4	12

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**Course Objectives:**

- To understand the concepts and operations Set theory, Graph Theory
- To understand and apply the Mathematical Logic in computer science.

**Course Requirements:**

- Knowledge about Logics and graphs

**Course Outcome:**

- Acquire the basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems
- Acquire the knowledge of logical operations and predicate calculus needed for computing skills
- Able to design and solve Boolean functions for defined problems

Unit No.	Contents
	<b>BLOCK 1 : MATHEMATICAL LOGIC</b>
1	<b>Mathematical Logic:</b> Statements and Notation - connectives -normal forms – The theory of inference for the statement calculus -
2	<b>Predicate Calculus:</b> The predicate calculus - Inference theory and predicate calculus.
3	<b>Set theory:</b> Sets – Basic concepts – notation - inclusion and equality of sets - the power set
	<b>BLOCK 2 : RELATIONS</b>
4	<b>Relations and ordering</b> properties – relation matrix and graph of a relation
5	<b>Relations</b> Partition – equivalence and compatibility relations
6	<b>Composition and partial ordering:</b> Composition – partial ordering – partially ordered set
	<b>BLOCK 3 : FUNCTIONS</b>
7	<b>Functions</b> – definition – composition – inverse – binary and n-ary operations
8	<b>Other Functions</b> : Characteristic function – hashing function.
	<b>BLOCK 4 : ALGEBRAIC STRUCTURES</b>
9	<b>Algebraic Structures:</b> Algebraic Systems: Examples and General Properties
10	<b>Semigroups and Monoids:</b> Definitions and Examples - Homomorphism of Semigroups and Monoids - Subsemigroups and Submonoids
11	<b>Groups:</b> Definitions and Examples - Cosets and Lagrange's Theorem
12	<b>Normal Subgroups</b> – Algebraic Systems with two Binary Operations.
	<b>BLOCK 5 : GRAPH AND FINITE PROBABILITY</b>
13	<b>Graph theory:</b> Basic concepts – definition–paths - reach -ability and connectedness – matrix representation of graphs -trees.
14	<b>Finite Probability</b> – Probability Distributions – Conditional Probability Independence – Bayes' Theorem – Mathematical Expectation

**Reference and Text Books:**

1. BernandKolman, Roberty C. Busby, Sharn Cutter Ross, (2006), *Discrete Mathematical Structures*, Pearson Education.
2. J.P. Tremblay and R. Manohar,(2017), *Discrete mathematical structures with applications to Computer Science*, TMH Publishing Company.
3. Judith L. Gersting,(2014), *Mathematical Structures for Computer Science*, 7thEdition,

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W.H.Freeman and Company.

4. Narsingh Deo, (2003), *Graph Theory with Applications to Engineering and Computer Science*, PHI.
5. Ramasamy (2006), *Discrete Mathematical Structures with application to combinatorics*, Universities Press.
6. Richard Johnsonbaugh(2001), *Discrete Mathematics*, Fifth Edition, Pearson Education.
7. Venkatraman M K, Sridharan N and Chandrasekaran N,(2004), *Discrete Mathematics*, The National Publishing Company.

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Course Code	Title of the Course	Credits	Hours
31515	DATA STRUCTURE USING C++ LAB	4	120

**Course Objectives:**

- To be able to solve data structure problems using C++ language
- To learn and implement C++ language programming techniques
- To introduce the efficiency of the algorithm
- The course is designed to develop skills to design and analyze simple linear and non linear data structures.
- It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem.
- To be able to solve fundamental data structure problems using C++ language
- To learn and implement linear data structure programming techniques

**Course Outcome:**

- Students can develop programming knowledge
- Students can solve any kind of problems using C++ language
- Data Structure based problems can be solved
- Be able to design and analyze the time and space efficiency of the data structure
- Be capable to identify the appropriate data structure for given problem
- Have practical knowledge on the applications of data structures

**Experiments based on C++ programming and Data Structures Theory concepts**

Unit No.	Contents
	<b>BLOCK 1 : SIMPLE C++ PROGRAMS</b>
1	<b>Introduction</b> Simple C++ Programs
2	<b>Control Structures:</b> Using if and switch constructs Programs
3	<b>Looping , Arrays ,Structure statements:</b> for, while, do-while, Strings and Matrices Programs Problems
	<b>BLOCK 2 : OOPs CONCEPTS</b>
4	<b>Functions:</b> static function, friend function ,constructor , destructor and operator overloading and Recursive programs
5	<b>Inheritance and polymorphism:</b> Inheritance types and polymorphism types, Virtual function
6	<b>File:</b> File Handling C++ Programs, opening and closing a data file - creating a data file, processing a data file.
7	<b>Pointers :</b> Pointers and Pointers with Arrays Programs

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	<b>BLOCK 3: LINEAR DATA STRUCTURE</b>
<b>8</b>	<b>Stacks :</b> Stack Implementation, expression evaluation, Polish notation
<b>9</b>	<b>Queues:</b> Queue Implementation, Applications of Queue
<b>10</b>	<b>Linked List programs:</b> List, Merging lists, Linked list, Single linked list, Double Linked List, Header Linked list, Insertion and Deletion of linked list, Traversing a linked list.
	<b>BLOCK 4 : NON LINEAR DATA STRUCTURE</b>
<b>11</b>	<b>Tree Programs :</b> Trees, Binary Trees, Types of Binary trees, Binary Tree Representation, Traversing Binary Trees, Binary Search tree, Insertion and Deletion operations,
<b>12</b>	<b>Graphs:</b> Shortest Path Algorithms ○ Dijkstra's Algorithm ○ Graphs with Negative Edge costs ○ Acyclic Graphs ○ All Pairs Shortest Paths Algorithm <b>Minimum cost Spanning Trees</b> ○ Kruskal's Algorithm ○ Prims's Algorithm ○ Applications □ Breadth First Search
	<b>BLOCK 5 : SEARCHING AND SORTING ALGORITHMS</b>
<b>13</b>	<b>Searching Techniques:</b> Linear and Binary search Programs
<b>14</b>	<b>Sorting techniques:</b> Bubble sort, Quick sort, Insertion sort, Merge sort

**Experiments based on C++ programming**

- Simple C++ Programs
- Experiments using controls structures
- Experiments using arrays, Matrices and strings
- Problems using various types of functions and recursive programs
- Experiments using inheritance and polymorphism
- Experiments based on file handling in C++
- Practical problems using pointers and arrays.
- Problems based on real-time applications.

**Experiments based on data structures using C++**

- Design and Implement List data structure using i) array ii) singly linked list.
- Design and Implement basic operations on doubly linked list.
- Design and Implement stack using i) array ii) singly linked list
- Design and Implement Queue using i) array ii) singly linked list
- Design and Implement basic operations on Circular Queue
- Experiment on conversion of infix to postfix notation
- Design and implement expression evaluation
- Design and Implement basic operations (insertion, deletion, search, find min and find max) on Binary Search trees.
- Implementation of Breadth First Search Techniques.
- Implementation of Depth First Search Techniques.
- Implementation of various sorting techniques

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- Implementation of searching techniques (Linear, Binary Search) using arrays.

**Reference and Text Books:**

1. Ashok N Kamthane(2007), Programming and Data Structure, Pearson Edition.
2. Balagurusamy.E (2020), *Object oriented programming in C++*, 8<sup>th</sup> Edition, Tata McGraw Hill Publications.
3. Ellis Horowitz and Sartaj Sahini (2008), *Fundamentals of Data structures in C*, Second edition, Universities press.
4. Robert Lafore (2010), *Object Oriented Programming in C++*, Fourth Edition, Galgotia Publications Pvt. Ltd., New Delhi.
5. Seymour Lipschutz, G.A.Vijayalakshmi Pai (2006), *Data Structures*, Second Edition , Schaum’s Outlines, Tata Mc-Graw Hill Private Ltd.
6. Venugopal K.R and Rajkumar, T.Ravishankar (2017), *Mastering C++*, Tata McGraw Hill Publishing Company Ltd.

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**SEMESTER II**

Course Code	Title of the Course	Credits	Hours
31521	ACCOUNTING AND FINANCIAL MANAGEMENT	4	12

**Course Objectives:**

- To understand the process of estimating the cost of a particular product.
- To Prepare the estimate for various business activities such as purchase, sale, production and cash budgets

**Course Requirements:**

- Basic principles of Accounting

**Course Outcome:**

- Able to do balance sheet preparation and do analysis
- Able to do the budget preparation and control of a company

Unit No	Contents
	<b>BLOCK 1 : INTRODUCTION - Financial Accounting:</b>
1	<b>Financial Accounting:</b> Meaning and Scope – Principles – Concepts – Conventions
2	<b>Accounting process:</b> Journal - Ledger – Trail Balance – Trading Account – Profit and Loss Account – Balance Sheet
3	<b>Accounting Ratio Analysis</b> – Funds Flow Analysis –Cash Flow Analysis – Computerized account.
	<b>BLOCK 2 : COST AND MANAGEMENT ACCOUNTING</b>
4	<b>Introduction:</b> Meaning Scope and uses of cost and management accounting – Elements of Cost
5	<b>Cost Sheet</b> – Marginal Costing and Cost Volume Profit Analysis
6	<b>Break Even Analysis:</b> Concept, Applications and Limitations
	<b>BLOCK 3 : STANDARD COSTING AND BUDGETING:</b>

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7	<b>Introduction :</b> Concept and importance standard costing - Variance Analysis – Material – Labor – Overhead – Sales – Profit Variances -
8	<b>Budgets and Budgetary Control</b> – Meaning and Types of budgets – Sales Budget – Production Budget
9	<b>Budgets:</b> Cash Budget – Master Budget – Flexible budgeting – Zero Base Budgeting.
<b>BLOCK 4 : FINANCIAL MANAGEMENT</b>	
10	<b>Introduction:</b> Objectives and Functions of Financial Management – Risk – Return Relationship – Time Value of Money
11	<b>Capital Budgeting:</b> Basic Methods of Appraisal of investments –
12	<b>Working Capital:</b> Concepts of working Capital ,Factors Affecting working Capital – Estimation of working capital requirements
<b>BLOCK 5 : COST OF CAPITAL</b>	
13	<b>Cost of Capital Structure and Dividend:</b> Meaning and types of Cost of Capital – computation of cost for debt and equity sources of capital and weighted average cost of capital
14	<b>Capital Structure</b> Meaning and types of capital structure – determinants of capital structure – types of Dividend Policy – Types of Dividend decision.

**Reference and Text Books:**

1. Ambrish Gupta (2005), Financial Accounting for Management, Pearson Education.
2. Iyengar S.P, “Cost and Management Accounting”, Sultan Chand & Sons.
3. Khan and Jain (2011), *Management accounting: Text, problems and case.*
4. Maheswari S N (2018), Financial and Management Accounting, Sultan Chand & Sons.
5. Maheswari S.N (2010), “*Management Accounting & Financial Accounting*”, Vikas Publications.
6. Pandey I M(2015), Financial Management, 11th Edition, Vikas Publications.
7. Pandey.M, “*Elements of Management Accounting*”, Vikas Publishing House.
8. Ravi M Kishore(2010), *Management Accounting and Financial Analysis*”, Taxmons.
9. Shula and T.S.Grewal (2010), “*Advanced Accounting*”, S.Chand and Company.

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Course Code	Title of the Course	Credits	Hours
31522	<b>RELATIONAL DATABASE MANAGEMENT SYSTEMS (RDBMS)</b>	4	12

**Course Objectives:**

- To understand the fundamentals of data models
- To make a study of SQL and relational database design.
- To know about data storage techniques an query processing.
- To impart knowledge in transaction processing, concurrency control techniques and External storage

**Course Requirements:**

- Knowledge about the basic concepts of the database.

**Course Outcome:**

- Design a database using ER diagrams and map ER into Relations and normalize the relations

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- Acquire the knowledge of query evaluation to monitor the performance of the DBMS.
- Develop a simple database application using normalization.

Unit No	Contents
	<b>BLOCK 1 INTRODUCTION</b>
1	<b>Data base System Applications</b> , data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model
2	<b>Model</b> :Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor.
3	<b>History of Data base Systems</b> - Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.
	<b>BLOCK 2 : RELATIONAL MODEL</b>
4	<b>Introduction</b> – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying / altering Tables and Views.
5	<b>Relational Algebra</b> – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews –
6	<b>Relational calculus</b> – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.
	<b>BLOCK 3 : SQL QUERY</b>
7	<b>Form of Basic SQL Query</b> – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases. Schema refinement
8	<b>Normal forms</b> :Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF–
9	<b>Join</b> : Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.
	<b>BLOCK4 TRANSACTION</b>
10	<b>Introduction</b> :Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability
11	<b>Protocols</b> : Lock Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.
12	<b>Recovery and Atomicity</b> – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage- Advance Recovery systems- Remote Backup systems
	<b>BLOCK 5 STORAGE</b>
13	<b>Data on External Storage</b> – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and



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<b>14</b>	<b>Performance Tuning-</b> Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.
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**Reference and Text Books:**

1. Colin Ritchie (2004), Relational Database Principles 2nd Edition.
2. ElmasriNavrate, Fundamentals of Database Systems, Pearson Education.
3. Peter Rob & Carlos Coronel, *Data base Systems design, Implementation, and Management*, 7th Edition.
4. Raghurama Krishnan, Johannes Gehrke(2014), *Data base Management Systems*, 3<sup>rd</sup> Edition, TATAMcGrawHill.
5. Silberschatz, Korth (2019), *Data base System Concepts*, 7th Edition, Tata McGraw Hill.
6. Sharad Maheswari and Ruchin Jain (2006), *Database management systems Complete Practical Approach*, Firewall media.

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Course Code	Title of the Course	Credits	Hours
<b>31523</b>	<b>COMPUTER GRAPHICS</b>	<b>4</b>	<b>12</b>

**Course Objectives:**

- To understand computational development of graphics
- To provide in-depth knowledge of display systems, image synthesis, shape modeling of 3D application.

**Course Outcome:**

- Enhance the perspective of modern computer system with modeling, analysis and interpretation of 2D and 3D visual information.
- Able to develop interactive animations.

Unit No.	Contents
	<b>BLOCK 1 : INTRODUCTION</b>
<b>1</b>	<b>Introduction</b> Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.
<b>2</b>	<b>Output primitives:</b> Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms.
<b>3</b>	<b>Filled area primitives:</b> Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

	<b>BLOCK 2 : 2 D TRANSFORM AND CLIPPING</b>
<b>4</b>	<b>2-D geometrical transform:</b> Translation, scaling, rotation, reflection and shear transformations
<b>5</b>	<b>2D Matrix representations:</b> homogeneous coordinates, composite transforms, transformations between coordinate systems.
<b>6</b>	<b>2-D viewing:</b> The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions,
<b>7</b>	<b>Clipping Algorithms:</b> Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.
	<b>BLOCK 3 : 3D OBJECT REPRESENTATION</b>
<b>8</b>	<b>Introduction:</b> Polygon surfaces, quadric surfaces, spline representation,
<b>9</b>	<b>Curve and surfaces:</b> Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

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	<b>BLOCK 4 : 3D GEMETRIC TRANSFORMATION</b>
<b>10</b>	<b>3-D Geometric transformations:</b> Translation, rotation, scaling, reflection and shear transformations, composite transformations.
<b>11</b>	<b>3-D viewing:</b> Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.
	<b>BLOCK 5 : VISIBLE SURFACE DETECTION METHODS AND ANIMATION</b>
<b>12</b>	<b>Classification,</b> back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.
<b>13</b>	<b>Computer animation:</b> Design of animation sequence, general computer animation functions, raster animation,
<b>14</b>	<b>Other Animation Techniques:</b> Computer animation languages, key frame systems, motion specifications.

**Reference and Text Books:**

1. Donald Hearn and M.Pauline Baker (2007), *Computer Graphics C version*, Pearson Education.
2. M. Newman and F. Sproull, (2004), *Interactive Computer Graphics*, McGraw Hill.
3. Foley, VanDam, Feiner and Hughes,(2004),*Computer Graphics Principles and Practice*, 2nd Edition in C, Pearson Education.
4. Plastok and Gordon Kalley (2000), *Computer*, McGraw Hill.

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Course Code	Title of the Course	Credits	Hours
31524	VISUAL PROGRAMMING WITH .NET	4	12

**Course Objective:**

- To develop an understanding of Visual Basic .Net
- To develop the skills necessary to create software solutions using VB with .Net
- To learn how to analyze certain types of problems with a software solution in mind

**Course Requirements:**

- Basic knowledge of Visual Basic

**Course Outcome:**

- Able to understand and design the solution to a problem using VB.Net
- Understand and implement the features of .Net for providing programmed solutions to complex problems.

Unit No	Contents
	<b>BLOCK 1 : INTRODUCTION</b>
<b>1</b>	<b>Introduction</b> - What Is Visual Studio? - Navigating the Visual Studio - The Menu – Toolbar - Work Area
<b>2</b>	<b>Toolbox</b> - Solution Explorer - Status Bar - Managing VS Windows
<b>3</b>	<b>Visual Studio Project Types</b> - Windows Projects - Web Projects - Office Projects - SharePoint Projects - Database Projects
	<b>BLOCK 2 : C# AND VB.NET</b>

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4	<b>Basic Syntax</b> - Code Skeleton - The Main Method - The Program Class - The First Program Namespace - VS Code Editor - Class and Member Locators – Bookmarks - Running Programs - Primitive Types and Expressions - Enums - Branching Statements - Loops
5	<b>Creating Classes</b> - Class Inheritance – Class Snippet - Writing Methods - Parameters Passing - Returning Data
6	<b>Method Snippets</b> - Coding Fields and Properties - Declaring and Using Properties - The Property Snippet
<b>BLOCK 3 : UNDERSTANDING DELEGATES AND EVENTS</b>	
7	Events - Delegates - Handler Code - Implementing Interfaces - The interface Snippet - Applying Arrays and Generics -
8	<b>Creating and Building Projects</b> - Constructing Solutions and Projects - Navigating the Solution Explorer - Examining Property Settings – AssemblyName - Default Namespace - Target Framework - Output Type
9	<b>Building Projects</b> :Startup Object - Icon and Manifest - Compiling Applications - Rebuilding Solutions/Projects - Cleaning Solutions/Projects - Managing Dependencies, Compilation Settings - Navigating with Class View - Using the Class Designer - Class Designer Code Generation
<b>BLOCK 4 : DEBUGGING WITH VISUAL STUDIO</b>	
10	<b>Debugging methods:</b> Breakpoints - Stepping Through Code – Inspecting Application State - Locals and Autos Windows - Watch Windows - The Immediate Window - The Call Stack Window - The Quick Watch Window - Watching Variables with Pin To Source - Working with IntelliTrace
11	<b>Working with Databases</b> - Server Explorer - Creating a Database - Adding Tables - Relating Tables with Foreign Keys - Adding Stored Procedures - Configuring Database Options
<b>BLOCK 5 : BUILDING PROGRAMS WITH VS 2010</b>	
12	Building Desktop Applications with WPF - Starting a WPF Project - Understanding Layout - Grid Layout - StackPanel Layout - DockPanel Layout - WrapPanel Layout - Canvas Layout
13	<b>Using WPF Controls</b> - Managing Windows for Controls - Setting Properties - Handling Events - Coding Event Handlers - Working with Data in WPF - Data Source - Configuring a ComboBox
14	<b>Reading and Saving Data</b> - Using the DataGrid - Summary -Creating Web Applications with ASP.NET MVC - Designing Silverlight Applications- Deploying Web Services with WCF

**Reference and Text Books:**

1. Andrew Moore(2010), *Visual Studio 2010 All-in-One for Dummies*, Wiley Publishing.
2. Joe Mayo(2010), *Visual Studio 2010 - A Beginner's Guide*, Tata Mc Graw Hill Edition.
3. Nick Randolph, David Gardner (2010), *Professional Visual Studio 2010*, Wiley Publishing.

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Course Code	Title of the Course	Credits	Hours
31525	VB .NET and RDBMS LAB	4	120

**Course Objectives:**

- To develop an understanding of Visual Basic .Net
- To develop the skills necessary to create software solutions using VB with .Net
- To learn how to analyze certain types of problems with a software solution in mind

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- To understand the fundamentals of data models
- To make a study of SQL and relational database design.
- To know about data storage techniques and query processing.
- To impart knowledge in transaction processing, concurrency control techniques and External storage.

**Course Requirements:**

- Basic knowledge of Visual Basic and file system

**Course Outcome:**

- Able to understand and design the solution to a problem using VB. Net
- Understand and implement the features of .Net for providing programmed solutions to complex problems
- Design a database using ER diagrams and map ER into Relations and normalize the relations
- Acquire the knowledge of query evaluation to monitor the performance of the DBMS.
- Develop a simple database applications using normalization.

**Lab Experiments should be based on Visual Programming with .NET Theory for solving real time applications.**

<b>Contents</b>
<b>SIMPLE APPLICATIONS</b>
<b>Simple Applications:</b> Developing simple applications using VB.NET <ul style="list-style-type: none"> <li>a. Finding factorial Value</li> <li>b. Money Conversion</li> <li>c. Quadratic Equation</li> <li>d. Temperature Conversion</li> <li>e. Login control</li> </ul>
<b>Login form:</b> Create and Validate Login Form, Program to design Class, Program to demonstrate Inheritance, Polymorphism and Interfaces.
<b>CONTROLS</b>
<b>Controls:</b> Advance Controls, Common Dialog Controls. <ul style="list-style-type: none"> <li>2. Adrotator Control</li> <li>3. Calendar control               <ul style="list-style-type: none"> <li>a. Display messages in a calendar control</li> <li>b. Display vacation in a calendar control</li> <li>c. Selected day in a calendar control usings tyle</li> <li>d. Difference between two calendar dates</li> </ul> </li> <li>4. Treeview control a) Treeview control and datalist b)Treeview operations</li> <li>5. Validation controls</li> </ul>
<b>Active X Controls:</b> Working with intrinsic controls and ActiveX controls
<b>MDI AND DATA CONTROLS</b>
<b>MDI:</b> Application with multiple forms
<b>Data controls:</b> Application using data controls
<b>DIALOGS AND MENU</b>
<b>Dialogs:</b> Application with dialogs
<b>Common Dialogs:</b> Application using Common Dialogs

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<b>Menus:</b> Application with Menus
<b>EVENTS AND DATABASE</b>
<b>Events and Database:</b> Drag and Drop Events Database Management Creating ActiveX Controls
<b>DataGridView:</b> ADO.NET Code to show records in DataGridView Control. <ol style="list-style-type: none"> <li>1. Databinding using datalist control</li> <li>2. Datalist control templates</li> <li>3. Databinding using datagrid</li> <li>4. Datagrid control template</li> <li>5. Datagrid hyperlink</li> <li>6. Datagrid button column</li> <li>7. Datalist event</li> <li>8. Datagrid paging</li> </ol>
<b>Database operations:</b> ADO.NET Code to perform Insert, Delete, Update and Select operations.
<b>CRYSTAL REPORTS AND WEB APPLICATION</b>
<b>Crystal Reports</b>
<b>Web Application</b> using ASP.NET that uses validation controls.

**RDBMS**



*Practical Lab exercises based on the following for solving various real-time applications like student, employee, electricity, railway etc., database manipulations.*

<b>Contents</b>
<b>TABLE MANIPULATION</b>
<b>Table</b> creation, renaming a Table, copying another table, Dropping a Table
<b>Table Description:</b> Describing Table Definitions, Modifying Tables, Joining tables, Number and Date functions.
<b>SQL QUERIES AND SUB QUERIES</b>
<b>SQL Queries:</b> Queries, Sub Queries, and aggregate functions
<b>DDL:</b> Experiments using database DDL SQL statements
<b>DML:</b> Experiment using database DML SQL statements
<b>DCL:</b> Experiment using database DCL SQL statements
<b>INDEX AND VIEW</b>
<b>Index :</b> Experiment using database index creation, Renaming a index, Copying another index, Dropping a index
<b>Views:</b> Create Views, Partition and locks
<b>EXCEPTION HANDLING AND PL/SQL</b>
<b>Exception Handling:</b> PL/SQL Procedure for application using exception handling
<b>Cursor:</b> PL/SQL Procedure for application using cursors
<b>Trigger:</b> PL/SQL Procedure for application using triggers
<b>Package:</b> PL/SQL Procedure for application using package
<b>Reports:</b> DBMS programs to prepare report using functions
<b>APPLICATION DEVELOPMENT</b>
<b>Design and Develop Application:</b> Library information system, Students mark sheet processing, Telephone directory maintenance, Gas booking and delivering, Electricity bill processing, Bank Transaction, Pay roll processing. Personal information system, Question database and conducting Quiz and Personal diary

**Reference and Text Books:**

1. Andrew Moore (2010), *Visual Studio 2010 All-in-One for Dummies*, Weiley Publishing.
2. Colin Ritchie (2004), *Relational Database Principles*, 2nd Edition.
3. ElmasriNavrate, *Fundamentals of Database Systems*, Pearson Education.
4. Joe Mayo (2010), *Visual Studio 2010 - A Beginner's Guide*, Tata Mc Graw Hill Edition.
5. Nick Randolph (2010), David Gardner, *Professional Visual Studio 2010*, Wiley Publishing.
6. Peter Rob & Carlos Coronel, *Data base Systems design, Implementation, and Management*, 7th Edition.
7. Raghurama Krishnan (2014), Johannes Gehrke, *Data base Management Systems*, 3rd Edition, TATA McGrawHill.
8. Sharad Maheswari and Ruchin Jain (2006), *Database management systems Complete Practical Approach*, Firewall media.
9. Silberschatz, Korth (2019), *Data base System Concepts*, 7th Edition, Tata McGraw Hill.

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**SECOND YEAR**  
**SEMESTER III**

Course Code	Title of the Course	Credits	Hours
31531	SOFTWARE ENGINEERING	4	12

**Course Objective:**

- To know of how to do project planning for the software process.
- To learn the cost estimation techniques during the analysis of the project.
- To understand the quality concepts for ensuring the functionality of the software

**Course Requirement:**

- Fundamental concepts of Software Engineering

**Course Outcome:**

- Understand the activities during the project scheduling of any software application.
- Learn the risk management activities and the resource allocation for the projects.
- Able to create reliable, replicable cost estimation that links to the requirements of project planning and managing.

Unit No.	Contents
	<b>BLOCK 1 : INTRODUCTION</b>
<b>1</b>	<b>Software:</b> Role of software, Software myths. Generic view of process: A layered technology, a process framework, The Capability Maturity Model Integration (CMMI)
<b>2</b>	<b>Process patterns,</b> Process assessment, Personal and Team process models.
<b>3</b>	<b>Process model:</b> The waterfall model, Incremental process models, Evolutionary process models, The Unified process.
	<b>BLOCK 2 : REQUIREMENT ENGINEERING:</b>
<b>4</b>	Design and Construction, Requirement Engineering Tasks, Requirements Engineering Process, Validating Requirements.
<b>5</b>	<b>Building the Analysis Model:</b> Requirement analysis, Data Modeling concepts, Object-Oriented Analysis

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<b>6</b>	<b>Modeling:</b> Scenario-Based Modeling, Flow-Oriented Modeling Class-Based Modeling, Creating a Behavioral Model.
<b>BLOCK3 : SYSTEM DESIGN</b>	
<b>7</b>	<b>Design Engineering:</b> Design process and quality, Design concepts, the design model.
<b>8</b>	<b>Architectural Design:</b> Software architecture, Data design, Architectural styles and patterns, Architectural Design.
<b>9</b>	<b>User interface design:</b> The Golden rules, User interface analysis and design, Interface analysis, Interface design steps, Design evaluation.
<b>BLOCK 4 : SYSTEM TESTING</b>	
<b>10</b>	<b>Testing Strategies:</b> Approach to Software Testing, Unit Testing, Integration Testing, Test strategies for Object-Oriented Software, Validation Testing, System Testing, the art of Debugging, Black-Box and White-Box testing.
<b>11</b>	<b>Product Metrics:</b> Software Quality, Product Metrics, Metrics for Analysis Model, Design Model, Source code and Metrics for testing, Metrics for maintenance. Metrics for Process and Projects Domains: Software Measurement, Metrics for Software Quality and Software Process.
<b>BLOCK 5 : RISK and QUALITY MANAGEMENT</b>	
<b>12</b>	<b>Risk Strategies:</b> Reactive vs. Proactive Risk strategies, software risks, Risk identification.
<b>13</b>	<b>Risk Protection and refinement:</b> Risk projection, Risk refinement, Risk Mitigation, Monitoring and Management, RMMM Plan.
<b>14</b>	<b>Quality Management:</b> Quality concepts, Software quality assurance, Software Reviews, Formal Technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

**Reference and Text Books:**

1. Agarwal K.K & Yogesh Singh(2007), *Software Engineering*, 3rd Edition New Age International Publishers.
2. James F. Peters, Witold Pedrycz (2000), *Software Engineering an Engineering Approach*, John Wiley & Sons.
3. Roger S. Pressman (2015), *Software Engineering - A practitioner's Approach*, McGraw-Hill 8th Edition.
4. Richard Fairlay (2008), *Software Engineering Concepts*, McGraw Hill Book Company.
5. Pankaj Jalote (2005), *An Integrated Approach to Software Engineering*, 3rd Edition , Narosa Publishing House.
6. Somzerville (2007), *Software Engineering*, 8th Edition, Pearson Education.
7. Waman S Jawadekar (2004), *Software Engineering Principles and Practice*, Tata McGraw-Hill.

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Course Code	Title of the Course	Credits	Hours
<b>31532</b>	<b>OPERATING SYSTEMS</b>	<b>4</b>	<b>12</b>

**Course Objectives:**

- Able to understand the operating system principles
- Able to know the Principles of Deadlock, processor scheduling and memory management.

**Course Requirements:**

- To be aware of the evolution and fundamental principles of operating system,

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 processes and their communication

**Course Outcome**

- Students have acquired the knowledge about the types of operating systems
- Students have acquired the knowledge about the functions of operating system

Unit No.	Contents
	<b>BLOCK 1 : INTRODUCTION</b>
1	<b>Introduction:</b> Definition of Operating Systems – Computer System Organization
2	<b>Computer System Architecture</b> – Operating System Structure – Operating System Operations
3	<b>System Structures:</b> Operating System Services – System Calls – System Programs – Operating System Design and Implementation.
	<b>BLOCK 2 : PROCESS CONCEPT</b>
4	<b>Process Concept:</b> Process Scheduling – Operations on Processes – Inter Process Communication
5	<b>Process Scheduling:</b> Scheduling Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple Processor Scheduling
	<b>BLOCK 3 : SYNCHRONIZATION</b>
6	<b>Synchronization:</b> The Critical Section Problem – Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Monitors
7	<b>Deadlocks:</b> Deadlocks Characterization – Methods for Handling Deadlocks
8	<b>Deadlock</b> Prevention – Avoidance – Detection – Recovery from Deadlock.
	<b>BLOCK 4 : MEMORY MANAGEMENT</b>
9	<b>Memory Management Strategies:</b> Swapping – Contiguous Memory Allocation – Paging – Segmentation
	<b>BLOCK 5 : FILE SYSTEM</b>
10	<b>File Concept</b> – Access Methods – Directory
11	<b>Structure</b> – File System Mounting – File Sharing – Protection.
12	<b>Implementing File Systems:</b> File System Structure – File System Implementation
13	<b>Directory Implementation</b> – Allocation Methods – Free Space Management
14	<b>Secondary Storage Structure:</b> Overview of Mass Storage Structure – Disk Structure – Disk Attachment – Disk Scheduling – Disk Management.

**Reference and Text Books:**

1. Abraham Silberschatz (2009), Peter Baer Galvin and Greg Gagne, “*Operating System Principles*”, 7th Edition, Wiley India Edition.
2. Andrew S.Tanenbaum (2006), *Operating Systems Design and Implementation*, 3rd edition, Prentice Hall.
3. Harvey M. Deitel (2007), *An Introduction to Operating Systems*, 3rd Edition, Addison Wesley.

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Course Code	Title of the Course	Credits	Hours
31533	INTERNET AND JAVA PROGRAMMING	4	12

**Course Objectives:**

- To provide an overview of working principles of internet, web related functionalities
- To understand and apply the fundamentals core java, packages, database connectivity for computing



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**Course Requirements:**

- Basic knowledge of internet and programming principles

**Course Outcome:**

- Able to understand the internet standards and recent web Technologies
- Able to implement, compile, test and run Java program,
- Able to make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API

Unit No.	Contents
	<b>BLOCK 1 : INTRODUCTION</b>
1	<b>Basic Internet Concepts:</b> Connecting to the Internet – Domain Name System – E-mail
2	<b>The World Wide Web</b> – Internet Search Engines – Web Browsers – Chatting and conferencing on the Internet
3	<b>Online Chatting</b> –Messaging – Usenet Newsgroup – Internet Relay chat (IRC) – FTP – Telnet.
	<b>BLOCK 2 : FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING</b>
4	<b>Basic concepts</b> of OOP – Benefits – Applications. Java Evolution: Features – how java differs from C and C++ - java and internet- java support system – java environment
5	<b>Overview of Java Language</b> –Introduction – Simple Java Program – Comments – Java Program Structure – Tokens – Java Statements – Implementing a Java Program – JVM – Command Line Arguments. Constants – Variables – Data Types – Type Casting.
6	<b>Operators and Expressions:</b> Arithmetic Operators – Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special Operators – Arithmetic Expressions, Evaluation of Expression – Precedence of Arithmetic Operators – Type Conversions – Operator Precedence and associativity – Mathematical Functions. <b>Decision Making and Branching:</b> If –if....else –Nesting of if..... Else – else if–switch. Decision Making and Looping: While – do – for – jump in loops – labeled loops.
	<b>BLOCK 3 : CLASSES, OBJECTS AND METHODS</b>
7	<b>class:</b> Defining a class –fields –methods –creating objects – accessing class members – constructors – methods overloading –static members –nesting of methods – Inheritance –overriding methods –final variables-classes –methods
8	<b>Arrays, Strings and Vectors</b> :One dimensional Arrays –creating of array – Two dimensional arrays- strings –vectors –Wrapper classes – Enumerated Types - Interfaces: Multiple Inheritance
9	<b>Packages:</b> Defining interface –Extending interfaces – Implementing Interfaces - Putting Classes Together
	<b>BLOCK 4: MULTITHREADING, EXCEPTION AND APPLETS</b>
10	<b>Multithreaded Programming</b> – Creating Threads –Extending the thread class – Stopping and Blocking a thread –Life cycle of a thread –using thread methods – Thread Exceptions –Priority –Synchronization –Implementing the ‘Runnable’ Interface
11	<b>Managing Error and Exceptions:</b> Types of errors –Exceptions –Syntax of

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	Exception Handling code – Multiple Catch statements –using finally statement – Throwing our own Exceptions – using exceptions for Debugging - Graphics Programming: The Graphics Class – Lines and Rectangles – Circles and Ellipses – Drawing Arcs – Drawing Polygons – Line Graphs – Using Control Loops in Applets – Drawing Bar Charts.
<b>12</b>	<b>Applet Programming:</b> How applets differ from Applications – preparing to write applets – Building Applet Code – Applet life cycle – creating an Executable Applet – Designing a Web Page – Applet Tag – Adding Applet to HTML file – Running the Applet – Passing parameters to Applets – Displaying Numerical values – Getting input from the user
	<b>BLOCK 5 : MANAGING INPUT/OUTPUT FILES IN JAVA</b>
<b>13</b>	<b>Introduction</b> – concept of streams –stream classes – byte stream classes – character Stream
<b>14</b>	<b>I/O classes:</b> –using stream –using the file class –Input / output Exceptions – creation of files – Reading / writing characters – reading writing bytes Random access files- Interactive input and output –Other stream classes

**Reference and Text Books:**

1. Balagurusamy.E (2010), *Programming with Java*, 4e, Tata McGraw-Hill.
2. Deitel, Deitel and Nieto (2000), *Internet and World Wide Web – How to program*, Pearson Education.
3. Cay S. Horstmann (2003), *Gary Cornell, Core Java*, Volume I and II, 5th Edition, Pearson Education.
4. Elliotte Rusty Harold (2000), *Java Network Programming*, O’Reilly Publishers.
5. Ed Roman (1998), *Enterprise Java Beans*, Wiley Publishers.
6. Hunt (2004), *Guide to J2EE Enterprise Java*, Springer Publications.
7. Krishnamoorthy R and Prabhu.S (2013), *Internet and Java Programming*, New Age\ International Publishers.
8. Mohamal Ibrahim .B (2006), *Java : J2SE – A Practical Approach*, Firewall media.
9. Naughton and H.Schildt (2006), *Java 2 - The complete reference*, Fourth edition, Tata McGraw-Hill.
10. Topley (2002), *J2ME in A Nutshell*, O’Reilly Publishers.

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Course Code	Title of the Course	Credits	Hours
<b>31534</b>	<b>COMPUTER NETWORKS</b>	<b>4</b>	<b>12</b>

**Course Objectives:**

- To understand networking concepts and basic communication model
- To understand network architectures and components required for data communication.

**Course Requirements:**

- Basic knowledge of networking

**Course Outcome:**

- Able to understand the working principles of various application protocols
- Acquire knowledge about security issues and services available

Unit No.	Contents
	<b>BLOCK 1 : INTRODUCTION &amp; PHYSICAL LAYER</b>

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1	<b>Introduction;</b> Computer Networks - Applications - Line configuration - Topology - Transmission Modes
2	<b>Categories of Network:</b> LAN, MAN, WAN - OSI Layer.
3	<b>Physical Layer:</b> Analog and Digital Signals Performance - Transmission Media
	<b>BLOCK 2 : DATA LINK LAYER</b>
4	<b>Data Link Layer:</b> Error Detection and correction – Introduction – Block Coding – Cyclic Redundancy Check – Framing – Flow and error Control –
5	<b>Data link layer protocols:</b> stop - wait protocol and sliding window protocol - ARQ, Go-back-n ARQ, selective - repeat ARQ.
6	<b>Multiple Access Protocols:</b> ALOHA – CSMA – CSMA/CD – CSMA/CA.
	<b>BLOCK 3 : NETWORK LAYER</b>
7	<b>Introduction:</b> Circuit switching - packet switching - message switching - Virtual circuit and Datagram subnets
8	<b>Routing algorithm :</b> Static routing -shortest path routing, Flooding, Flow based routing - Dynamic routing - distance vector routing, link state routing
9	<b>Other Routing Algorithms:</b> Hierarchical routing, Broad cast, Multi cast routing - Congestion, Control Algorithms
	<b>BLOCK 4 : TRANSPORT LAYER</b>
10	<b>Introduction:</b> Process to process delivery – UDP – TCP - Connection oriented Vs connectionless services.
11	<b>Applications and services:</b> Domain name system - Remote Logon – Mail Exchange - File Transfer
12	<b>Remote Procedure Call - Remote File Access – WWW and HTTP – SNMP.</b>
	<b>BLOCK 5 : NETWORK SECURITY</b>
13	<b>Introduction:</b> Cryptography – Encryption model – Transposition and Substitution Chipers – Cryptographic principles
14	<b>Symmetric key cryptography:</b> DES – AES – Asymmetric key cryptography: RSA – Security services.

**Reference and Text Books:**

1. Andrew S Tanenbaum (2013), *Computer Networks*, 5th Edition, Pearson Education.
2. Behrouz A. Forouzan, (2017), *Data Communications and Networking*, 4th Edition, TMH.
3. S.Keshav(2008), *An Engineering Approach to Computer Networks*, 2nd Edition, Pearson Education.
4. William Stallings (2007), *Data and Computer Communications*, 8th Edition, PrenticeHall.

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Course Code	Title of the Course	Credits	Hours
31535	DATA MINING AND WAREHOUSING	4	12

**Course Objective:**

- This course presents on depth of to data mining techniques; association rule, clustering, classification, web mining, temporal and sequential data mining and provide a practical exposure using data mining tool orange.
- To enable the students to learn the basic functions, principles and concepts of Data Mining
- To understand the fundamentals of Big Data Analytics

**Course Requirements:**

- Basic Concepts of Database

**Course Outcome:**

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On successful completion of the course the students should have:

- Understand the data mining techniques such as classification and web mining.
- Able to analyze the data and obtain computational intelligence

Unit No.	Contents
	<b>BLOCK 1 : DATA MINING and WAREHOUSING INTRODUCTION</b>
1	<b>Data Warehousing Introduction</b> – Definition-Architecture-Warehouse Schema-Warehouse server-OLAP operations. Data Warehouse technology – Hardware and operating system
2	<b>Data Mining</b> - Definition – DM Techniques – current trends in data mining - Different forms of Knowledge – Data selection, cleaning, Integration, Transformation, Reduction and Enrichment.
3	<b>Data:</b> Types of data - Data Quality - Data Preprocessing - Measures of similarity and dissimilarity. <b>Exploration:</b> Summary statistics – Visualization.
	<b>BLOCK 2 : ASSOICATION RULE MINING AND CLASSIFICATION</b>
4	<b>Association rules:</b> Introduction – Methods to discover association rule – Apriori algorithm Partition Algorithm
5	<b>AR Algorithms:</b> Pincher search algorithm – Dynamic Item set algorithm – FP Tree growth algorithm.
6	<b>Classification:</b> Decision Tree classification – Bayesian Classification – Classification by Back Propagation.
	<b>BLOCK 3 : CLUSTERING TECHNIQUES AND MACHINE LEARNING</b>
7	<b>Introduction</b> – Clustering Paradigms – Partitioning Algorithms – K means & K Mediod algorithms – CLARA – CLARANS – Hierarchical clustering – DBSCAN – BIRCH – Categorical Clustering algorithms – STIRR – ROCK – CACTUS.
8	<b>Introduction to machine learning</b> – Supervised learning – Unsupervised learning – Machine learning and data mining.
9	<b>Neural Networks:</b> Introduction – Use of NN – Working of NN Genetic Algorithm: Introduction –Working of GA.
	<b>BLOCK 4 : WEB MINING AND VISUAL DATA MINING</b>
10	<b>Introduction</b> –Web content mining – Web structure mining –Web usage mining –Text mining –Text clustering, Temporal mining -Spatial mining
11	<b>Visual data mining</b> – Knowledge mining – Various tools and techniques for implementation using Weka, Rapidminer and Matlab.
	<b>BLOCK 5 : INTRODUCTION TO BIG DATA ANALYTICS</b>
12	<b>Big Data Characteristics-</b> Types of Big Data- Traditional Versus Big Data Approach
13	<b>Technologies</b> Available for Big Data
14	<b>Hadoop</b> – Introduction - What is Hadoop? - Core Hadoop Components - Hadoop Ecosystem - Physical Architecture – Hadoop Limitations

**Reference and Text Books:**

1. Arun K Pujari (2008), “*Data Mining Techniques*”, Universitypress.
2. Alex Berson, Stephen J.Smith(2004) , “*Data Warehousing , Data Mining & OLAP*”, TataMcGraw Hill.
3. C S R Prabhu (2002), “*Data Warehousing – concepts, techniques and applications* “, 2<sup>nd</sup> Edition, Prentice Hall of India.
4. DT Editorial Services (2016), “*Black Book- Big Data (Covers Hadoop 2, MapReduce, Hive, Yarn, PIG, R, Data visualization)*”, Dream tech Press edition.
5. Jaiwei Han, Michelinne Kamber (2008), “*Data Mining: Concepts and Techniques*”, Harcourt

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India, Morgan Kauffman publisher.

6. Radha Shankarmani, M Vijayalakshmi (2016), “*Big Data Analytics*”, first Edition, Wiley Publications,
7. Seema Acharya, Subhashini Chellappan (2016), “*Big Data and Analytics*”, Wiley Publication, first edition.

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Course Code	Title of the Course	Credits	Hours
31536	INTERNET AND JAVA PROGRAMMING LAB	4	120

**Course Objective:**

- To understand and practice markup languages
- To understand and practice embedded dynamic scripting on client side Internet Programming
- To understand and practice web development techniques on client-side

**Course Requirement:**

- Basic concepts of Web and Java programming

**Course Outcome:**

- Explore markup languages features and create interactive web pages using them
- Learn and design Client-side validation using scripting languages
- Acquire knowledge about Open source JavaScript libraries
- Able to design front end web page and connect to the back end databases.

**Experiments based on Internet Programming Theory**

Unit No.	Contents
	<b>BLOCK 1 : JAVA FUNDAMENTAL PROBLEMS:</b>
1	Simple Java Problems
2	class and objects
3	Conditional control using java
4	Looping using java
	<b>BLOCK 2 : OOP CONCEPTS</b>
5	Function overloading programs
6	Operator overloading programs
7	Inheritance programs, Packages
8	Polymorphism programs Message passing programs
	<b>BLOCK 3 : THREAD &amp; VIRTUAL FUNCTION</b>
9	Threads
10	Virtual function programs
	<b>BLOCK 4 : I/O AND EXCEPTION HANDLING</b>
11	Exception handling programs
12	I/O manipulation programs,
	<b>BLOCK 4 :NETWORK PROGRAMMING</b>
13	Applet programs
14	Implementation of simple network programs using java

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**Reference and Text books:**

1. Balagurusamy.E (2010), Programming with Java, 4e, Tata McGraw-Hill.
2. Deitel, Deitel and Nieto (2000), Internet and World Wide Web – How to program, Pearson Education.
3. Cay S. Horstmann (2003), *Gary Cornell, Core Java*, Volume I and II, 5th Edition, Pearson Education.
4. Elliotte Rusty Harold (2000), Java Network Programming, O’Reilly Publishers.
5. Ed Roman (1998), *Enterprise Java Beans*, Wiley Publishers.
6. Hunt (2004), *Guide to J2EE Enterprise Java*, Springer Publications.
7. Krishnamoorthy R and Prabhu.S (2013), Internet and Java Programming, New Age International Publishers.
8. Mohamal Ibrahim .B (2006), *Java : J2SE – A Practical Approach*, Firewall media.
9. Naughton and H.Schildt (2006), Java 2 - The complete reference, Fourth edition, Tata McGraw-Hill.
10. Topley (2002), *J2ME in A Nutshell*, O’Reilly Publishers.

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**SEMESTER IV**

Course Code	Title of the Course	Credits	Hours
31541	Internet of Things	4	12

**Course Objectives:**

- To understand the basics of Internet of things and protocols.
- To introduce some of the application areas where Internet of Things can be applied.

**Course Requirements:**

- Basic knowledge about internet and its application.

**Course Outcome:**

- Able to perform data analytics and their role in Internet of things.
- Knowledge of IoT protocols.
- It helps to rely less on physical resources and started to do smarter applications.

Unit No.	Contents
	<b>BLOCK 1: INTRODUCTION</b>
1	Introduction: Definition and characteristics of IoT – Elements of IoT Eco system – IoT challenges.
2	<b>IoT Design:</b> Physical Design of IoT – IoT protocols - Logical Design of IoT – functional blocks – communication models – communication API
3	<b>Technologies:</b> IoT Enabled Technologies – IoT Levels – Domain Specific IoTs
	<b>Block 2 : M2M and IoT components</b>
4	<b>IoT and M2M</b> – Introduction – Difference between IoT and M2M – SDN and NFV for IoT
5	<b>IOT Design Methodology</b> IoT systems management - IoT design methodology-Specifications - Integration and Application Development
6	<b>IOT Components</b> Sensors and activators - Communication modules - Zigbee-

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	RFID-Wi-Fi-Power sources.
	<b>BLOCK 3: IoT Platforms and Applications</b>
7	<b>Building IOT with Hardware Platforms</b> Platform - Arduino/Intel Galileo/Raspberry Pi- Physical device – Interfaces.
8	<b>IoT Applications / case studies Illustration IoT design:</b> Home Automation – Cities- Smart Agriculture – Smart Environment - Smart Grid– Smart Healthcare - Connecting IoT to cloud-Cloud storage for IoT-Data Analytics for IoT- Software & Management - Tools for IoT.
	<b>Block 4: IoT systems Logical Design using Python</b>
9	<b>Introduction:</b> History of Python - Installing Python – Python character set - data types - expressions
10	<b>Decision Statements:</b> Introduction - if , if-else , nested if statements – multi-way if-else if statements. Loop Control Statements: Introduction – while loop – range() function – for loop = nested loops – break and continue statements
11	<b>Functions:</b> Introduction – Syntax and basics of function – use of function – parameters and arguments in function – local and global variables – return statement. Strings: Introduction – The str class – built in functions for string – index[] operator - traversing string – immutable strings – string operators – string operations.
	<b>Block 5 : List, Tuples And Sets</b>
12	<b>Lists :</b> Introduction – creating lists – accessing the elements of a list – negative list indices – list slicing – built-in functions for list – list operator – list methods – passing list to a function – returning list from function
13	<b>Tuples and sets:</b> Introduction to tuples - creating – tuple() function – built-in functions for tuples - indexing -slicing – operators – list and tuples – sorting - traversing. Sets – creating – set in and not in operator – set classes - operations.
14	<b>Python packages of Interest for IoT :</b> JSON, XML – HTTPlib – URL lib – SMTP lib

**Reference and Text Books:**

1. Ashok Namdev Kamthane, Amit Ashok Kamthane(2018),*Programming and Problem solving with Python*, Mc GrawHill Education.
2. ArshdeepBahga, Vijay Madiseti (2015), "*Internet of Things-A hands-on approach*", Universities Press.
3. Jan Ho" ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle.(2014).*From Machine to-Machine to the Internet of Things - Introduction to a New Age of Intelligence*. Elsevier..
4. Manoel Carlos Ramon (2014), *Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers*, Apress,.
5. Marco Schwartz(2014), *Internet of Things with the ArduinoYun*, Packt Publishing.
6. Olivier Hersent, David Boswarthick, Omar Elloumi.(2012).*The Internet of Things – Key Applications and Protocols*. Wiley.

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Course Code	Title of the Course	Credits	Hours
31542	ARTIFICIAL INTELLIGENCE AND SOFT COMPUTING	4	12

**Course Objective:**

- To learn the key aspects of Artificial Intelligence (AI) and Soft computing principles and

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approaches.

- To know about the components and building block hypothesis of Genetic algorithm.
- To study the fuzzy logic components.

**Course Requirements:**

- Basic concepts of Artificial Intelligence, Fuzzy Set and Neural Networks

**Course Outcome:**

- Write Genetic Algorithm to solve the optimization problem
- Solve real-world problems using AI, fuzzy concepts and develop a Fuzzy expert system to derive decisions.

Unit No.	Contents
<b>ARTIFICIAL INTELLIGENCE</b>	
<b>BLOCK 1 : PROBLEMS AND SEARCH</b>	
<b>1</b>	<b>Introduction:</b> The Artificial Intelligence (AI) Problem – What is an AI technique - Criteria for success.
<b>2</b>	<b>Problems, Problem Spaces, Search:</b> Defining Problems, Problem Spaces, Search State space search - Production Systems – Problem characteristics - Production system characteristics – Application areas.
<b>3</b>	<b>Heuristic Search techniques:</b> Generate and Test - Hill Climbing- Best-First search – Problem reduction – constraint satisfaction - Means-end analysis.
<b>BLOCK 2 : KNOWLEDGE REPRESENTATION</b>	
<b>4</b>	<b>Knowledge representation issues:</b> Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.
<b>5</b>	<b>Using Predicate logic:</b> Representing simple facts in logic – Representing Instance and ISA relationships - Computable functions and predicates - Resolution.
<b>6</b>	<b>Representing knowledge using rules:</b> Procedural Vs Declarative knowledge – Logic programming - Forward Vs Backward reasoning - Matching – Control knowledge.
<b>SOFT COMPUTING</b>	
<b>BLOCK 3: INTRODUCTION</b>	
<b>7</b>	<b>Introduction:</b> Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics – Applications.
<b>8</b>	<b>Artificial Neural Network (ANN):</b> Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process.
<b>9</b>	<b>ANN model:</b> McCulloch-Pitts Model –Linear Separability -Hebb Network.
<b>BLOCK 4: FUZZY LOGIC</b>	
<b>10</b>	<b>Fuzzy Sets:</b> Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets
<b>11</b>	<b>Fuzzy Relations:</b> Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation
<b>12</b>	<b>Membership Functions:</b> Features – Fuzzification – Methods of Membership value assignments – Defuzzification – Methods.
<b>BLOCK 5 : GENETIC ALGORITHM</b>	
<b>13</b>	<b>Genetic Algorithm:</b> Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function.



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<b>14</b>	<b>Genetic Operators:</b> Selection – Cross Over - Inversion and Deletion - Mutation – Simple and General GA - The Schema Theorem - Classification of Genetic Algorithm – Genetic Programming – Applications of GA.
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**Reference and Text Books:**

1. Elaine Rich and Kevin Knight (2008), "*Artificial Intelligence*", Tata McGraw Hill, Third Edition, Publishers company Pvt Ltd.
2. Jang J.S.R., C.T. Sun, E. Mizutani (2015), "*Neuro-Fuzzy and Soft Computing*", Pearson.
3. Rajasekaran .S, G.A.V. Pai (2017), "*Neural Networks, Fuzzy Logic, Genetic Algorithms*", second edition, Prentice Hall India.
4. Sivanandam S.N., S.N. Deepa (2011), "*Principles of Soft Computing*", 2nd edition, Wiley India.
5. Venugopal C.K (2019), *Artificial Intelligence and Machine Learning*, Pacific Books International.

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Course Code	Title of the Course	Credits	Hours
<b>31543</b>	<b>BIG DATA ANALYTICS AND R PROGRAMMING</b>	<b>4</b>	<b>12</b>

**Course Objective:**

- Able to understand the characteristics of Big Data.
- Student will learn how to use R for effective data analysis
- 

**Course Requirement:**

- Basic Knowledge about data mining and programming

**Course Outcome:**

- Understood the importance of Big Data Analytics and social networks
- Learn the R data structures, packages and objects for data analytics

Unit No.	Contents
	<b>BIG DATA</b>
	<b>BLOCK 1 : BIG DATA</b>
<b>1</b>	<b>Introduction:</b> Big Data Characteristics- Types of Big Data- Traditional Versus Big Data Approach.
<b>2</b>	<b>Technologies</b> Available for Big Data - Infrastructure for Big data – Use of data analytics – Big data Challenges - Desired Properties of a Big Data System -
<b>3</b>	<b>Hadoop</b> – Introduction - What is Hadoop? - Core Hadoop Components – Hadoop Ecosystem - Physical Architecture – Hadoop Limitations.
	<b>BLOCK 2 : MapReduce</b>
<b>4</b>	MapReduce and The New Software Stack- MapReduce- Algorithms Using MapReduce
<b>5</b>	Finding Similar Items – Introduction - Nearest Neighbor Search - Applications of Nearest Neighbor Search- Similarity of Documents
<b>6</b>	Collaborative Filtering as a Similar-Sets Problem - Recommendation Based on User Ratings- Distance Measures.

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	<b>BLOCK 3: NoSQL</b>
7	What is NoSQL? - NoSQL Business Drivers - NoSQL Case Studies - NoSQL Data Architectural Patterns
8	Variations of NoSQL Architectural Patterns - Using NoSQL to Manage Big Data
	<b>R PROGRAMMING</b>
	<b>BLOCK 4: Introduction to R Programming</b>
9	Introduction to R – History of R - Features of R - Essentials of the R language – R-Environment setup – Basic syntax: command prompt, script file, comments. Data types - Variables – operators: operator types -expressions.
10	Control statements – Decision making- if – if-else – nested if - switch– loops – repeat- while – for – loop control statements - break – next statement.
11	Functions: function definition -function components –built-in functions – user defined function - calling function - Recursion - Strings: Rules of strings - string manipulation.
	<b>BLOCK 5: OBJECTS AND PACKAGES</b>
12	<b>Objects:</b> Vectors – Vector creation – Vector Manipulation – Lists: Creating a list, naming, accessing, manipulating list elements- merge list -converting list to Vector – Arrays- Names columns and rows – Accessing array elements, manipulating array elements – operations of array elements-
13	<b>Matrices</b> – Accessing elements of Matrix – operations on matrix– Factors – Frames – Create data frames - getting the structure of data frame- Extract data from data frame
14	<b>Packages</b> – available R packages - install a new package – load package to library - Data reshaping – joining columns and rows in a data frame- merging dt frames – melting and casting.

**Reference and Text Books:**

1. Andrie de Vries, Joris Meys(2016), *R Programming for Dummies*, 2nd edition, Wiley.
2. DT Editorial Services (2016), “*Black Book- Big Data (Covers Hadoop 2, MapReduce, Hive, Yarn, PIG, R, Data visualization)*”, Dream tech Press edition.
3. Mark Gardener(2013), *Beginning R The Statistical Programming Language*, Kindle edition.
4. Rajendra B. Patil (2017) , HirenDand & Rupali Dahake, *A practical Approach to R*, First edition , Shroff/X-Team.
5. Radha Shankarmani, M Vijayalakshmi (2016), “*Big Data Analytics*”, second Edition, Wiley Publications.
6. Scott Burger(2018), *Introduction to Machine Learning with R: Rigorous Mathematical Analysis*, Shroff/O'Reilly.
7. Seema Acharya, Subhashini Chellappan (2016), “*Big Data and Analytics*”, first edition, Wiley Publication.

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Course Code	Title of the Course	Credits	Hours
31544	MOBILE APPLICATION DEVELOPMENT	4	12

**Course objective:**

- To provide an overall knowledge about mobile devices, communication methodologies and its application development

**Course outcome:**

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- Able to know mobile ecosystem, mobile information architecture
- Able to know J2ME architecture and development and case studies

Unit No.	Contents
	<b>BLOCK 1: MOBILE ECOSYSTEM</b>
1	Introduction: The mobile ecosystem, operators, networks
2	Devices : platforms, operating systems
3	Applications : application frameworks, applications, services
	<b>BLOCK 2 : MOBILE DEVICE PROFILES</b>
4	Categories : SMS, mobile websites, mobile web widgets
5	Native applications: Games, utility apps, location based services(LBS)
6	Apps : Informative apps, Enterprise apps
	<b>BLOCK 3 : MOBILE INFORMATION ARCHITECTURE</b>
7	Introduction : sitemaps, click streams, wireframes, prototyping, architecture
8	Mobile design : Interpreting design, Elements of mobile design
9	Mobile design tools : Designing for different device/ screens
	<b>BLOCK 4 : J2ME</b>
10	Introduction : J2ME architecture and development environment, small computing device requirements, Run-time environment, MIDlet programming
11	Languages : J2ME, J2ME SDK, J2ME wireless toolkit
	<b>BLOCK 5 : CASE STUDY</b>
12	Introduction : Google Android introduction, Android development Environment
13	Development framework, SDK, Eclipse, Emulator, Android AVD
14	Project framework: Apple IOS, RIM Blackberry, Samsung Bada, Nokia Symbian, Microsoft windows phone

**Reference and Text Books**

1. Brian Fling(2009), *Mobile Design and Development*, OReilly media.
2. James Keogh, J2ME (2003), *The Complete Reference*, Tata McHill.
3. Mark L.Murphy (2009), *Beginning Android*”, Apress.
4. Pei zheng and Lionel Ni (2006), *Smart phone and Next Generation Mobile Computing*, Elsevier.

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Course Code	Title of the Course	Credits	Hours
31545	PROJECT WORK	10	-

**Course Objective:**

- To provide practical training on some live projects that will increase capability to work on actual problem in industry.
- To undergo in an industrial environment or may be an in house training on some latest software which is in high demand in market and it will be useful for their future employment in industry.
- 

**Course Requirement:**

- Basic concepts of Web and C/ Java /VB /ASP .NET programming

**Course Outcome:**

- Explore markup languages features and create interactive web pages
- Able to design front end web page and connect to the back end databases.
- Able to study, design, develop , implement and maintain software applications

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**Instructions**

- *Design, develop and implement project work based on latest cutting edge technologies using latest software's.*
- *Do the project under the supervision of Alagappa university recognized supervisor.*
- *Submit the project report documentation (2 copies)*

The **layout guidelines** for the Project & Seminar Report:

A4 size paper

Font: Arial (10 points) or Times New Roman (12 points)

Line spacing: 1.5 Top & bottom margins: 1 inch/ 2.5 cm

Left & right margins: 1.25 inches/ 3 cm

***The project report composed of the following sections;***

Title Page

Student declaration

Certificate

Acknowledgement

Table of contents

Abstract of the project

Introduction

**SYSTEM STUDY**

Identify the Problem (Aim & Objectives) Problem description

Scope of the

Problem

Motivation

Identify the existing system and its Limitations, Feasibility study Proposed system to overcome limitations

**SYSTEM DESIGN**

Prepare Input / Output Design, Prepare Form Design

Prepare software design

(UML Diagram, Data Dictionary, Use case, Activity diagram, E-R diagram)

**SYSTEM DEVELOPMENT**

System Development and Implementation the project

**SYSTEM TESTING**

System testing

methods **SYSTEM**

**MAINTENANCE**

System maintenance of the project

**CONCLUSION**

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- a) Summary of question posed
- b) Summary of findings
- c) Summary of main limitations of the study at hand
- d) Details of possibilities for related future research

**REFERENCES**

**APPENDIX**

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Sample Source Code

Reports/Screen

Layouts

**Reference Books and text books:**

1. Ali Bahrami (2008), *Object Oriented System Development*, Tata McGraw Hill Edition.
2. Elias, M Award (2010), *System analysis and design*, second edition, Galgotia Publications Pvt Ltd.
3. Grady Booch, Robert A.Maksimchuk et.al (2009), *Object Oriented Analysis and Design with applications*, 3rd Edition, Pearson Education.
4. Ivar Jacobson(2004), *Object Oriented Software Engineering: A Use Case Driven Approach*, Addison wesley.
5. James Rumbaugh et.al (2006), *Object Oriented Modeling and Design*, Addison Wesley.
6. Larman (2003), *Applying UML & Patterns, An Introduction to Object Oriented Analysis and Design*, 2<sup>nd</sup> Edition, Pearson Education.
7. Martin Fowler, Kendall Scott (2004), *UML, Distilled* Addison Wesley.

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