

10 YEARS
OF UNIVERSITY
RECOGNITION
20 YEARS OF
ACADEMIC
EXCELLENCE



REVA
UNIVERSITY

Bengaluru, India

School of CSA

**Master of
Computer Applications
(MCA)**

HANDBOOK
2016-2017

Rukmini Knowledge Park
Kattigenahalli, Yelahanka, Bengaluru – 560064
www.reva.edu.in



SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS

Master of Computer Applications (MCA)

HANDBOOK

2017

Rukmini Knowledge Park,
Kattigenahalli, Yelahanka, Bangalore - 560 064
Phone No: +91-080-66226622, Fax: 080-28478539

CONTENTS

Sl. No.	Particulars	Page No.
1	Message from the Hon'ble Chancellor	03
2	Message from the Vice- Chancellor	04
3	Message from Director	06
4	Rukmini Educational Charitable Trust	08
5	About REVA University Vision, Mission, Objectives	09
6	About School of Computer Science and Applications - Vision - Mission - Advisory Board	14
7	Programme Overview Programme Educational Objectives Programme Outcomes Programme Specific Outcomes	17 - 19
8	Curriculum- Master of Computer Applications (MCA)	20
9	Programme Regulations	138
10	List of Faculty Members	151

Chancellor's Message

"Education is the most powerful weapon which you can use to change the world."

- Nelson Mandela.

There was a time when survival depended on just the realization of physiological needs. We are indeed privileged to exist in a time when 'intellectual gratification' has become indispensable. Information is easily attainable for the soul that is curious enough to go look for it. Technological boons enable information availability anywhere anytime. The difference, however, lies between those who look for information and those who look for knowledge.

It is deemed virtuous to serve seekers of knowledge and as educators it is in the ethos at REVA University to empower every learner who chooses to enter our portals. Driven by our founding philosophy of 'Knowledge is power', we believe in building a community of perpetual learners by enabling them to look beyond their abilities and achieve what they assumed impossible.

India has always been beheld as a brewing pot of unbelievable talent, acute intellect and immense potential. All it takes to turn those qualities into power is a spark of opportunity. Being at a University is an exciting and rewarding experience with opportunities to nurture abilities, challenge cognizance and gain competence.

For any University, the structure of excellence lies in the transitional abilities of its faculty and its facility. I'm always in awe of the efforts that our academic board puts in to develop the team of subject matter experts at REVA. My faculty colleagues understand our core vision of empowering our future generation to be ethically, morally and intellectually elite. They practice the art of teaching with a student-centered and transformational approach. The excellent infrastructure at the University, both educational and extra-curricular, magnificently demonstrates the importance of ambience in facilitating focused learning for our students.

A famous British politician and author from the 19th century - Benjamin Disraeli, once said 'A University should be a place of light, of liberty and of learning'. Centuries later this dictum still inspires me and I believe, it takes team-work to build successful institutions. I welcome you to REVA University to join hands in laying the foundation of your future with values, wisdom and knowledge.



Dr. P. Shyama Raju

The Founder and Hon'ble Chancellor, REVA University

Vice-Chancellor's Message

The last two decades have seen a remarkable growth in higher education in India and across the globe. The move towards inter-disciplinary studies and interactive learning have opened up several options as well as created multiple challenges. India is at a juncture where a huge population of young crowd is opting for higher education. With the tremendous growth of privatization of education in India, the major focus is on creating a platform for quality in knowledge enhancement and bridging the gap between academia and industry.



A strong believer and practitioner of the dictum “Knowledge is Power”, REVA University has been on the path of delivering quality education by developing the young human resources on the foundation of ethical and moral values, while boosting their leadership qualities, research culture and innovative skills. Built on a sprawling 45 acres of green campus, this ‘temple of learning’ has excellent and state-of-the-art infrastructure facilities conducive to higher teaching-learning environment and research. The main objective of the University is to provide higher education of global standards and hence, all the programs are designed to meet international standards. Highly experienced and qualified faculty members, continuously engaged in the maintenance and enhancement of student-centric learning environment through innovative pedagogy, form the backbone of the University.

All the programs offered by REVA University follow the Choice Based Credit System (CBCS) with Outcome Based Approach. The flexibility in the curriculum has been designed with industry-specific goals in mind and the educator enjoys complete freedom to appropriate the syllabus by incorporating the latest knowledge and stimulating the creative minds of the students. Bench marked with the course of studies of various institutions of repute, our curriculum is extremely contemporary and is a culmination of efforts of great think-tanks - a large number of faculty members, experts from industries and research level organizations. The evaluation mechanism employs continuous assessment with grade point averages. We believe sincerely that it will meet the aspirations of all stakeholders – students, parents and the employers of the graduates and postgraduates of Reva University.

At REVA University, research, consultancy and innovation are regarded as our pillars of success. Most of the faculty members of the University are involved in research by attracting funded projects from various research level organizations like DST, VGST, DBT, DRDO, AICTE and industries. The outcome of

the research is passed on to students through live projects from industries. The entrepreneurial zeal of the students is encouraged and nurtured through EDPs and EACs.

REVA University has entered into collaboration with many prominent industries to bridge the gap between industry and University. Regular visits to industries and mandatory internship with industries have helped our students become skilled with relevant to industry requirements. Structured training programs on soft-skills and preparatory training for competitive exams are offered here to make students more employable. 100% placement of eligible students speaks the effectiveness of these programs. The entrepreneurship development activities and establishment of “Technology Incubation Centers” in the University extend full support to the budding entrepreneurs to nurture their ideas and establish an enterprise.

With firm faith in the saying, “Intelligence plus character –that is the goal of education” (Martin Luther King, Jr.), I strongly believe REVA University is marching ahead in the right direction, providing a holistic education to the future generation and playing a positive role in nation building. We reiterate our endeavor to provide premium quality education accessible to all and an environment for the growth of over-all personality development leading to generating “GLOBAL PROFESSIONALS”.

Welcome to the portals of REVA University!

Dr. S. Y. Kulkarni
Vice-Chancellor, REVA University

Director –Message

Welcome note to students

It's my pleasure to welcome you to the School of Computer Science and Applications. Computer, being considered as most significant and revolutionary invention of mankind has metamorphosed the planet earth completely. Predominantly School of Computer Science and Applications have acquired the control of the modern life in a myriad way.



The MCA program is designed keeping in view the current situation and possible future developments, both at national and global levels. This program is designed to give greater emphasis on computer applications. There are ample number of courses providing knowledge in specialized areas of network security, python programming and cloud computing etc. facilitating students to choose specialized areas of their interest. Adequate attention is given to provide students the basic concepts in computer applications.

The program is designed to expose students to various subjects having applications in computers, IT and electronics related industries through outcome based teaching and learning process which emphasizes practical exposure rather than memorization. A variety of activities such as mini projects, seminars, interaction with industries, cultural activities and social activities are in place to shape the all-round development of students.

The benefits of choosing MCA program are:

- Flexibility to choose various fields upon graduation.
- Opportunity to work on live problems.
- Opportunity to work on environmental related technologies.
- Opportunity for programmers to develop software for varied applications in different sectors.

Students after successful completion of MCA program:

- Can start-up their career in either government sector or private sector since there are ample employment opportunities in these sectors.
- Can also start their career as software programmers / engineers, testing engineers, data base administrators, system and network administrators, multimedia / web programmers, web designers etc.,
- Can seek placements in diversified fields like banking, e-commerce, insurance, entertainment, and such others.
- The computer application trained graduates are sought after by varied firms for their software based skills.
- Can opt for higher studies in computer applications, IT, business management and so on.

The curriculum caters to and has relevance to local, regional, national and global development needs. All courses are focussed on building skill, employability and entrepreneurship of students. Maximum number of courses are integrated with cross cutting issues with relevant to professional ethics, gender, human values, environment and sustainability.

I am sure the students choosing MCA in REVA University will enjoy the curriculum, teaching and learning environment, the vast infrastructure and the experienced teachers involvement and guidance. We will strive to provide all needed comfort and congenial environment for their studies. I wish all students pleasant stay in REVA and grand success in their career.

Dr. S. Senthil
Director – School of Computer Science and Applications

RUKMINI EDUCATIONAL CHARITABLE TRUST

It was the dream of late Smt. Rukmini Shyama Raju to impart education to millions of underprivileged children as she knew the importance of education in the contemporary society. The dream of Smt. Rukmini Shyama Raju came true with the establishment of Rukmini Educational Charitable Trust (RECT), in the year 2002. **Rukmini Educational Charitable Trust (RECT)** is a Public Charitable Trust, set up in 2002 with the objective of promoting, establishing and conducting academic activities in the fields of Arts, Architecture, Commerce, Education, Engineering, Environmental Science, Legal Studies, Management and Science & Technology, among others. In furtherance of these objectives, the Trust has set up the REVA Group of Educational Institutions comprising of REVA Institute of Technology & Management (RITM), REVA Institute of Science and Management (RISM), REVA Institute of Management Studies (RIMS), REVA Institute of Education (RIE), REVA First Grade College (RFGC), REVA Independent PU College at Kattigenahalli, Ganganagar and Sanjaynagar and now REVA University. Through these institutions, the Trust seeks to fulfill its vision of providing world class education and create abundant opportunities for the youth of this nation to excel in the areas of Arts, Architecture, Commerce, Education, Engineering, Environmental Science, Legal Studies, Management and Science & Technology.

Every great human enterprise is powered by the vision of one or more extraordinary individuals and is sustained by the people who derive their motivation from the founders. The Chairman of the Trust is Dr. P. Shyama Raju, a developer and builder of repute, a captain of the industry in his own right and the Chairman and Managing Director of the DivyaSree Group of companies. The idea of creating these top notched educational institutions was born of the philanthropic instincts of Dr. P. Shyama Raju to do public good, quite in keeping with his support to other socially relevant charities such as maintaining the Richmond road park, building and donating a police station, gifting assets to organizations providing accident and trauma care, to name a few.

The Rukmini Educational Charitable Trust drives with the main aim to help students who are in pursuit of quality education for life. REVA is today a family of ten institutions providing education from PU to Post Graduation and Research leading to PhD degrees. REVA has well qualified experienced teaching faculty of whom majority are doctorates. The faculty is supported by committed administrative and technical staff. Over 13,000 students study various courses across REVA's three campuses equipped with exemplary state-of-the-art infrastructure and conducive environment for the knowledge driven community.

ABOUT REVA UNIVERSITY

REVA University has been established under the REVA University Act, 2012 of Government of Karnataka and notified in Karnataka State Gazette No. 80 dated 27thFebruary, 2013. The University is empowered by UGC to award degrees any branch of knowledge under Sec.22 of the UGC Act. The University is a Member of Association of Indian Universities, New Delhi. The main objective of the University is to prepare students with knowledge, wisdom and patriotism to face the global challenges and become the top leaders of the country and the globe in different fields.

REVA University located in between Kempegowda International Airport and Bangalore city, has a sprawling green campus spread over 45 acres of land and equipped with state-of-the-art infrastructure that provide conducive environment for higher learning and research. The REVA campus has well equipped laboratories, custom-built teaching facilities, fully air-conditioned library and central computer centre, the well planned sports facility with cricket ground, running track & variety of indoor and outdoor sports activities, facilities for cultural programs. The unique feature of REVA campus is the largest residential facility for students, faculty members and supportive staff.

The University is presently offering 23 Post Graduate Degree programs, 20 Degree and PG Degree programs in various branches of studies and has 12000+ students studying in various branches of knowledge at graduate and post graduate level and 302 Scholars pursuing research leading to PhD in 18 disciplines. It has 800+ well qualified, experienced and committed faculty members of whom majority are doctorates in their respective areas and most of them are guiding students pursuing research leading to PhD.

The programs being offered by the REVA University are well planned and designed after detailed study with emphasis with knowledge assimilation, applications, global job market and their social relevance. Highly qualified, experienced faculty and scholars from reputed universities / institutions, experts from industries and business sectors have contributed in preparing the scheme of instruction and detailed curricula for this program. Greater emphasis on practice in respective areas and skill development to suit to respective job environment has been given while designing the curricula. The Choice Based Credit System and Continuous Assessment Graded Pattern (CBCS – CAGP) of education has been introduced in all programs to facilitate students to opt for subjects of their choice in addition to the core subjects of the study and prepare them with needed skills. The system also allows students to move forward under the fast track for those who have the capabilities to surpass others. These programs are taught by well experienced qualified faculty supported by

the experts from industries, business sectors and such other organizations. REVA University has also initiated many supportive measures such as bridge courses, special coaching, remedial classes, etc., for slow learners so as to give them the needed input and build in them confidence and courage to move forward and accomplish success in their career. The University has also entered into MOUs with many industries, business firms and other institutions seeking their help in imparting quality education through practice, internship and also assisting students' placements.

REVA University recognizing the fact that research, development and innovation are the important functions of any university has established an independent Research and Innovation division headed by a senior professor as Dean of Research and Innovation. This division facilitates all faculty members and research scholars to undertake innovative research projects in engineering, science & technology and other areas of study. The interdisciplinary-multidisciplinary research is given the top most priority. The division continuously liaisons between various funding agencies, R&D Institutions, Industries and faculty members of REVA University to facilitate undertaking innovative projects. It encourages student research projects by forming different research groups under the guidance of senior faculty members. Some of the core areas of research wherein our young faculty members are working include Data Mining, Cloud Computing, Image Processing, Network Security, VLSI and Embedded Systems, Wireless Sensor Networks, Computer Networks, IOT, MEMS, Nano- Electronics, Wireless Communications, Bio-fuels, Nano-technology for coatings, Composites, Vibration Energies, Electric Vehicles, Multilevel Inverter Application, Battery Management System, LED Lightings, Renewable Energy Sources and Active Filter, Innovative Concrete Reinforcement, Electro Chemical Synthesis, Energy Conversion Devices, Nano-structural Materials, Photo-electrochemical Hydrogen generation, Pesticide Residue Analysis, Nano materials, Photonics, Nano Tribology, Fuel Mechanics, Operation Research, Graph theory, Strategic Leadership and Innovative Entrepreneurship, Functional Development Management, Resource Management and Sustainable Development, Cyber Security, General Studies, Feminism, Computer Assisted Language Teaching, Culture Studies etc.

The REVA University has also given utmost importance to develop the much required skills through variety of training programs, industrial practice, case studies and such other activities that induce the said skills among all students. A full-fledged Career Development and Placement (CDC) department with world class infrastructure, headed by a dynamic experienced Professor & Dean, and supported by well experienced Trainers, Counselors and Placement Officers.

The University also has University-Industry Interaction and Skill Development Centre headed by a Senior Professor & Director facilitating skill related training to REVA students and other unemployed students. The University has been recognised as a Centre of Skill Development and Training by NSDC (National Skill Development Corporation) under Pradhan Mantri Kaushal Vikas Yojana. The Centre conducts several add-on courses in challenging areas of development. It is always active in facilitating student's variety of Skill Development Training programs.

The University has collaborations with Industries, universities abroad, research institutions, corporate training organizations, and Government agencies such as Florida International University, Oklahoma State University, Western Connecticut University, University of Alabama, Huntsville, Oracle India Ltd, Texas Instruments, Nokia University Relations, EMC², VMware, SAP, Apollo etc, to facilitate student exchange and teacher-scholar exchange programs and conduct training programs. These collaborations with foreign universities also facilitates students to study some of the programs partly in REVA University and partly in foreign university, viz, M.S in Computer Science one year in REVA University and the next year in the University of Alabama, Huntsville, USA.

The University has also given greater importance to quality in education, research, administration and all activities of the university. Therefore, it has established an independent Internal Quality division headed by a senior professor as Dean of Internal Quality. The division works on planning, designing and developing different quality tools, implementing them and monitoring the implementation of these quality tools. It concentrates on training entire faculty to adopt the new tools and implement their use. The division further works on introducing various examination and administrative reforms.

To motivate the youth and transform them to become innovative entrepreneurs, successful leaders of tomorrow and committed citizens of the country, REVA organizes interaction between students and successful industrialists, entrepreneurs, scientists and such others from time to time. As a part of this exercise great personalities such as Bharat Ratna Prof. C. N. R. Rao, a renowned Scientist, Dr. N R Narayana Murthy, Founder and Chairman and Mentor of Infosys, Dr. K Kasturirangan, Former Chairman ISRO, Member of Planning Commission, Government of India, Dr. Balaram, Former Director IISc., and noted Scientist, Dr. V S Ramamurthy, Former Secretary, DST, Government of India, Dr. V K Aatre, noted Scientist and former head of the DRDO and Scientific Advisor to the Ministry of Defence Dr. Sathish Reddy, Scientific Advisor, Ministry of Defence, New Delhi and many others have accepted our invitation and blessed our students and faculty members by their inspiring addresses and interaction.

As a part of our effort in motivating and inspiring youth of today, REVA University also has instituted awards and prizes to recognize the services of teachers, researchers, scientists, entrepreneurs, social workers and such others who have contributed richly for the development of the society and progress of the country. One of such award instituted by REVA University is 'Life Time Achievement Award' to be awarded to successful personalities who have made mark in their field of work. This award is presented on occasion of the "Founders' Day Celebration" of REVA University in presence of dignitaries, faculty members and students gathering and the first "REVA Life Time Achievement Award" for the year 2015 has been awarded to Shri. Kiran Kumar, Chairman ISRO on the occasion of Founder's Day Celebration, 6th January, 2016 and the second "REVA Life Time Achievement Award" for the year 2016 has been awarded to Shri. Shekhar Gupta, Renowned Journalist on the occasion of Founder's Day Celebration, 6th January, 2017.

REVA organises various cultural programs to promote culture, tradition, ethical and moral values to our students. During such cultural events the students are given opportunities to unfold their hidden talents and motivate them to contribute innovative ideas for the progress of the society. One of such cultural events is REVAMP conducted every year. The event not only gives opportunities to students of REVA but also students of other Universities and Colleges. During three days of this mega event students participate in debates, Quizzes, Group discussion, Seminars, exhibitions and variety of cultural events. Another important event is Shubha Vidaaya, - Graduation Day for the final year students of all the programs, wherein, the outgoing students are felicitated and are addressed by eminent personalities to take their future career in a right spirit, to be the good citizens and dedicate themselves to serve the society and make a mark in their respective spheres of activities. During this occasion, the students who have achieved top ranks and won medals and prizes in academic, cultural and sports activities are also recognised by distributing awards and prizes. The founders have also instituted medals and prizes for sports achievers every year. The physical education department conducts regular yoga classes everyday to students, faculty members, administrative staff and their family members and organizes yoga camps for villagers around.

Recognizing the fast growth of the university and its quality in imparting higher education, the BERG (Business Excellence and Research Group), Singapore has awarded BERG Education Award 2015 to REVA University under Private Universities category. The University has also been honoured with many more such honors and recognitions.

REVA University Vision

“REVA University aspires to become an innovative university by developing excellent human resources with leadership qualities, ethical and moral values, research culture and innovative skills through higher education of global standards”.

Mission

- To create excellent infrastructure facilities and state-of-the-art laboratories and incubation centers
- To provide student-centric learning environment through innovative pedagogy and education reforms
- To encourage research and entrepreneurship through collaborations and extension activities
- To promote industry-institute partnerships and share knowledge for innovation and development
- To organize society development programs for knowledge enhancement in thrust areas
- To enhance leadership qualities among the youth and enrich personality traits, promote patriotism and moral values.

Objectives

- Creation, preservation and dissemination of knowledge and attainment of excellence in different disciplines
- Smooth transition from teacher - centric focus to learner - centric processes and activities
- Performing all the functions of interest to its major constituents like faculty, staff, students and the society to reach leadership position
- Developing a sense of ethics in the University and Community, making it conscious of its obligations to the society and the nation
- Accepting the challenges of globalization to offer high quality education and other services in a competitive manner

ABOUT SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS

The School of Computer Science and Applications is shouldered by well qualified, experienced and highly committed faculty. The state-of-the-art infrastructure digital classrooms, well equipped advanced computer laboratory, conference rooms and the serene academic atmosphere at REVA University will enhance the transfer as well as creation of knowledge. The School offers BCA, B. Sc. (Honors) in Computer Science with specialization in Cloud Computing and Big Data, MCA and MS (Computer Science) programs. The School also has research program leading to doctoral degree. The curriculum of both graduate and post graduate degree programs have been designed to bridge the gap between industry – academia and hence they are industry oriented. These programs provide ample scope to enter into a wide range of business opportunities, entrepreneurship ventures and as well as job opportunities in different sectors. This is reflected in various core subjects / courses offered within the program. Further the school provides an interactive, collaborative peer tutoring environment that encourages students to break down complex problems and develop strategies for finding solutions across a variety of situations and disciplines. The school aims to develop a learning community of critical thinkers who serve as models of innovative problems solving in the university environment to enrich their academic and professional careers.

VISION

To transform students into good human beings, responsible citizens and competent professionals, focusing on assimilation, generation and dissemination of knowledge in the area of Computer Applications

MISSION

- To impart quality education to meet the needs of profession and society, and achieve excellence in teaching-learning and research in the area of Computer Applications;
- To attract and develop talented and committed human resource, and provide an environment conducive to innovation, creativity, team-spirit and entrepreneurial leadership in Computing field;
- To facilitate effective interactions among faculty and students of the School of Computer Applications, and foster networking with alumni, industries, institutions and other stake-holders; and
- To practice and promote high standards of professional ethics, transparency and accountability.

OBJECTIVES

- To impart programs at graduate, post-graduate and doctoral levels in the field of computer applications;
- To adopt innovative methods of teaching and promote student centric learning process;
- To create infrastructure of international standard and facilitate and create conducive environment for teaching, learning and research;
- To promote faculty development and encourage faculty members and students to organize and participate in national and international level conferences, seminars, symposia and such others;
- To encourage teachers and students to take-up interdisciplinary studies and research;
- To promote students participation in co-curricular and extension activities and develop their personality traits and team spirit

ADVISORY BOARD

Sl. No	Name and Affiliation
1	Dr. Anand Kumar Professor and Dean-Academics, MCA Department, M.S Engineering College
2	Dr. Muralidhar B.L Professor and Coordinator, MCA Programme, Bangalore University
3	Dr. Dharani Dhamre Professor, Dept of MCA, RVCE
4	Mr. Manikantan Mohanavelu Head Training Tower-India, HP
5	Mr. Madusudan R Practice Lead, Engagement & System Operations-IBM
6	Mr. Dharshan Maheshbhai Project Lead- Cognizant Technology Pvt Ltd
7	Mr. Ashish Tanwar, University Relations Manager-India, Dell

MASTER OF COMPUTER APPLICATIONS (MCA) PROGRAM

Program Overview

Computers have become ubiquitous part of modern life, and new applications are introduced every day. The use of computer technologies is also commonplace in all types of organizations, in academia, research, industry, government, private and business organizations. As computers become even more pervasive, the potential for computer-related careers will continue to grow and the career paths in computer-related fields will become more diverse. Since 2001, global information and communication technologies (ICTs) have become more powerful, more accessible, and more widespread. They are now pivotal in enhancing competitiveness, enabling development, and bringing progress to all levels of society.

The career opportunities for master of computer applications graduates are plenty and growing. Programming and software development, information systems operation and management, telecommunications and networking, computer science research, web and Internet, graphics and multimedia, training and support, and computer industry specialists are some of the opportunities the graduates find.

The School of Computer Science and Applications at REVA UNIVERSITY is offering Master of Computer Application (MCA) programme to create motivated, innovative, creative thinking post - graduates to fill the roles of software Engineers who can conceptualize, design, analyze and develop computer software to meet the modern day industry requirements.

The programme is designed to meet the growing demand for qualified professionals in the field of Computer Applications. The MCA programme is inclined more toward application development and thus has more emphasis on latest programming languages and tools to develop better and faster applications. It covers various aspects of computational theory, network and database management, mobile technologies, electronics, mathematics, probability, statistics etc. The programme also deals with operation research, user interface design, M-commerce, e-commerce, internet of things, mobile computing, software testing and quality assurance, big data analytics, and many such areas intended to meet IT industry requirements.

Program Educational Objectives (PEO's)

The aim of the programme is to produce postgraduates with advanced knowledge and understanding of Computer Science and Applications with higher order critical, analytical, problem solving and transferable skills; with ability to think rigorously and independently to meet higher level expectations of ICT industry, academics, and research establishments or take up venture.

The Programme Educational Objectives are to prepare the students to:

Graduates from REVA University after 2 years of completion or the programme shall:

The Programme Educational Objectives are to prepare the students to:

PEO1	Be skilled Computer Application Developers, Algorithm developers, Computer Programmers and to operate various commercial software tools to solve scientific and business problems,
PEO2	be software engineers who can design, code, test and implement computer programs and adopt lifelong learning philosophy for continuous improvement and acquire higher degrees so as to work in colleges/ universities as professors or as scientists in research establishments
PEO3	To work as a member of a team as well as lead a team and communicate effectively across team members, to be equipped to be competent in the field of computer science and be further trained to become an entrepreneur or act as administrators in public, private and government organisations
PEO4	be aware of environmental, legal, cultural, social, ethical, public safety issues work along with engineering, medical, ICT professionals and scientists to assist them in their research and development work

Program Outcomes (POs)

1. **Computational Knowledge:** Apply knowledge of computing fundamentals, computing specialisation, mathematics, and domain knowledge appropriate for the computing specialisation to the abstraction and conceptualisation of computing models from defined problems and requirements.
2. **Problem Analysis:** Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
3. **Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4. **Conduct investigations of complex Computing problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
6. **Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.
7. **Life-long Learning:** Recognise the need, and have the ability, to engage in independent learning for continual development as a computing professional.

8. **Project management and finance:** Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
9. **Communication Efficacy:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
10. **Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.
11. **Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
12. **Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

Programme Specific Outcomes (PSO)

After successful completion of the programme, the graduates will be able to

1. Demonstrate practical skills in a wide Variety of programming languages and software platforms.
2. Deliver intensive software solutions for real world applications with the help of advanced computational tools and techniques
3. Instill life-long learning skills through the development of a research environment and higher educational opportunities.

REVA UNIVERSITY
SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS
MCA PROGRAMME
SCHEME & SYLLABUS

First Semester

Sl. No	Code	Title	HC /SC /FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F1100	Mathematical Foundation For Computer Science	HC	3	1	0	4	5
2	MPAL16F1200	Computer Fundamentals and Organization	HC	2	1	1	4	6
3	MPAL16F1300	Fundamentals of Programming using C	HC	2	1	1	4	6
4	MPAL16F1400	Introduction to Web Technologies	HC	2	1	1	4	6
5	MPAL16F1500	Communicative English and Professional Ethics	FC	3	1	0	4	5
6	MPAL16F1600	Management Information System	HC	3	1	0	4	5
Total Credits				15	6	3	24	33

Second Semester

Sl. No	Code	Title	HC/ SC /FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F2100	Data Structures and its Applications	HC	2	1	1	4	6
2	MPAL16F2200	Object oriented programming using C++	HC	2	1	1	4	6
3	MPAL16F2300	Database Management Systems	HC	2	1	1	4	6
4	MPAL16F2400	System Software and Operating Systems	HC	3	1	0	4	5
5	MPAL16F2500	System Analysis and Design	HC	3	1	0	4	5
6	MPAL16F2600	Operations Research	HC	3	1	0	4	5
Total Credits				15	6	3	24	33

Third Semester

Sl. No	Code	Title	HC/S C/ OE	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F3100	Java Programming	HC	2	1	1	4	6
2	MPAL16F3200	Software Engineering	HC	3	1	0	4	5
3	MPAL16F3300	Computer Graphics and Multimedia	HC	2	1	1	4	6
4	MPAL16F3400	Data Communication and Computer Networks	HC	2	1	1	4	6
5	MPAL16F3510	Advanced Database Systems	SC	3	0	1	4	5
	MPAL16F3520	Business Data Processing using COBOL						
	MPAL16F3530	Linux Programming						
6	MPAL16F3610	Principles of User Interface Design	SC	3	1	0	4	5
	MPAL16F3620	Data Warehousing and Data Mining						
	MPAL16F3630	Enterprise Resource Planning						
Total Credits				15	5	4	24	33

Open Elective offered by MCA Department

Sl. No	Code	Title	HC/SC/ OE	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F3710	Basics of Web Designing	OE	4	0	0	4	4
	MPAL16F3720	PC-Hardware Training						
Total Credits				4	0	0	4	4

* **Note:** Students must acquire minimum of 4 credits by registering the course offered by other schools of the University in any ODD depending on their interest and convenience as open elective.

Fourth Semester

Sl. No	Code	Title	HC/ SC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F4100	Analysis and Design of algorithms	HC	2	1	1	4	6
2	MPAL16F4200	.NET frame work and Applications	HC	2	1	1	4	6
3	MPAL16F4300	Advanced Web Technologies	HC	2	1	1	4	6
	MPAL16F4400	Cloud Computing and Applications	HC	4	0	0	4	4
4	MPAL16F4500	Minor Project-1	HC	1	1	4	6	11
5	MPAL16F4610	NoSQL	SC	3	0	1	4	5
	MPAL16F4620	Advanced Java Programming						
	MPAL16F4630	Data Science and Big Data Analytics						
6	MPAL16F4710	Software testing and Quality Assurance	SC	4	0	0	4	4
	MPAL16F4720	Internet of Things						
	MPAL16F4730	Wireless Communication and Mobile Computing						
Total Credits				18	4	8	30	42

FIFTH SEMESTER

Sl. No	Code	Title	HC/SC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F5100	Object Oriented Modelling and Design	HC	2	1	1	4	6
2	MPAL16F5200	Software Project Management	HC	2	1	1	4	6
3	MPAL16F5300	Minor Project-II	HC	0	2	4	6	12
4	MPAL16F5410	System Simulation and Modelling	SC	3	1	0	4	5
	MPAL16F5420	E-Business using Agile Methodology						
	MPAL16F5430	Enterprise Application Integration						
5	MPAL16F5510	MVC Architecture with ASP.NET	SC	3	0	1	4	5
	MPAL16F5520	IBM Mainframes						
	MPAL16F5530	Information and Network Security						
6	OPEN ELECTIVE		OE	4	0	0	4	4
Total Credits				14	5	7	26	38

SIXTH SEMESTER

Sl No	Course Code	Title of the Course	Examination					Credit Pattern L:T:P	Credits
			C1	C2	Dissertation	Viva	Total		
1	MPAL16F6100	Project work (Real time)	25	25	75	75	200	0:2:14	16

Credit Summary

Semester	Credits
First	24
Second	24
Third	24
Fourth	30
Fifth	26
Sixth	16
Total	144

Credit Distribution

Semester	Hard Core (HC)	Fundamental Core(FC)	Soft Core(SC)	Open Elective(OE)	Total Credits
I	20	04	-		24
II	24	-	-		24
III	16	-	08		24
IV	22	-	08		30
V	14	-	08	04	26
VI	16	-	-		16
Total Credits for MCA Programme					144

REVA UNIVERSITY
MASTER OF COMPUTER APPLICATIONS
Scheme of Teaching, Examination and Credits
FIRST SEMESTER MCA
Scheme & Syllabus

Sl. No	Code	Title	HC /SC /FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F1100	Mathematical Foundation For Computer Science	HC	3	1	0	4	5
2	MPAL16F1200	Computer Fundamentals and Organization	HC	2	1	1	4	6
3	MPAL16F1300	Fundamentals of Programming using C	HC	2	1	1	4	6
4	MPAL16F1400	Introduction to Web Technologies	HC	2	1	1	4	6
5	MPAL16F1500	Communicative English and Professional Ethics	FC	3	1	0	4	5
6	MPAL16F1600	Management Information System	HC	3	1	0	4	5
Total Credits				15	6	3	24	33

MPAL16F1100	Mathematical Foundation for Computer Science	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

COURSE OBJECTIVES:

- To reflect on the concepts and operations of mathematical logic needed for computer science.
- To Examine and apply the class of functions which transform a finite set into another finite set which relates to input output functions in computer science.
- To interpret discrete knowledge in Computer Science through graph theory and its applications.

Discrete Mathematics course serves as a gateway for a number of subjects in computer science and engineering. With these motivations, here, we initiate a detailed discussion on some of the topics: These include Basic set theory, Counting techniques, Formal Logic and Predicate calculus, Relations and functions in CSE, Order relations, Graphs and Coding etc.

UNIT I Fundamentals of Logic

12 Hours

Basic Connectives and Truth Tables, Logic Equivalence: The laws of Logic, Logical Implications: Rules of Inference, The use of Quantifiers, Quantifier Definitions, and Proofs of Theorems.

UNIT II Set Theory Properties of Integers and Recurrence

18 Hours

Sets and its different types of sets, Set Operations and the Laws of Set Theory, Counting and Venn Diagrams, Principles of Inclusion and Exclusion, Permutations and Combinations with repetition. Mathematical Induction, Recursive definitions, The Greatest Common Divisor Euclidian Algorithms, The first order Linear recurrence relation.

UNIT III Relations and Functions

15 Hours

Cartesian products and Relations, Properties of Relations, Computer recognition, Zero One Matrices and Directed Graphs, Posets and Hasse Diagrams. Functions, Plain and One-to-One, Onto Functions, Stirling Numbers and the Second Kind, Special functions, The Pigeon-hole principle, Function composition and inverse functions.

UNIT IV Graph Theory and Tree

15 Hours

Terminology, Definitions, Properties and Examples, Connectivity and Adjacency, Euler and Hamilton, Representation and Isomorphism, Planarity and Chromatic Number, Directed Graphs and Weighted Graphs, Trees, different type trees and its properties.

COURSE OUTCOMES:

After completion of these course students will be able to:

- Acquire the basic knowledge of set theory, functions and relations concepts needed for designing and solving problems.
- Acquire the knowledge of logical operations and predicate calculus needed for computing skill.
- Able to design and solve Boolean functions for defined problems.
- Apply the acquired knowledge of graph theory, design discrete problems to solve by computers.

Text Books:

1. Ralph P Grimaldi, B. V. Ramana, "Discrete & Combinatorial Mathematics, An Applied Introduction" 5th Edition, Pearson Education, 2004 (Chapter 1: 1.1-1.4, Chapter 2: 2.1- 2.5, Chapter 3: 3.1-3.4, Chapter 4: 4.1-4.2,4.4, Chapter 5:5.1-5.6, Chapter 7:7.1-, 7.4,7.6, Chapter 10:10.1, Chapter 12: 12.1-12.4)
2. Eric Gosset "Discrete Mathematics with Proof" Wiley India, 2nd Edition, (Chapter 10:10.1-10.6) 2010.

Reference Books:

1. Kenneth H Rosen, "Discrete Mathematics & its Applications" 7th edition, McGraw-Hill, 2010
2. Tremblay and Manohar R, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill, New Delhi, 2003.
3. Y N Singh "Discrete Mathematical Structures" Wiley India, 1st edition, 2010
4. Jayant Ganguly: A Treatise on Discrete Mathematical Structures" Pearson, 2010
5. D.S. Malik & M.K Sen: Discrete Mathematical Structures: Theory & Applications, Cengage Learning, 2004.
6. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, PHI Learning Pvt.Ltd., 2004.
7. Thomas Koshy: Discrete Mathematics with Applications, Elsevier, 2005, Reprint 2008.

Case Study: Any one of the following (database) applications include 1) problems of Computer Technology, 2) cryptology, 3) Clustering the Big data, 4) optimization of shortest path etc., development (Oracle\SQL Server\VB ect.,)

* Instructions for Students' Assignments: Each candidate will submit a journal which will have case studies on problems of Computer Technology, cryptology and Clustering.

MPAL16F1200	Computer Fundamentals and Organization	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

The objectives of this course are to:

- Provide a strong knowledge of digital electronics,
- Give a foundation of building blocks used in digital design,
- Introduce the methods for simplifying Boolean expressions,
- Outline the formal procedures for the analysis and design of combinational and sequential circuits.
- Provide the knowledge of Basic computer structure, Performance measurement and basic concept of Machine Instruction ,
- Introduce the concept of Input and Output Device Access, Controlling device request and Interface Circuits,
- Provide the Knowledge of various Memory Devices used in computers,
- Enforce Arithmetic Data Processing of Signed and Unsigned numbers with Processing Circuits,

UNIT I Digital Fundamentals

15 Hours

Number Systems and Conversions, Boolean Algebra and Simplification, Minimization of Boolean Functions, Karnaugh Map, Digital Logic Gates, NAND and NOR Implementation.

UNIT II Combinational And Sequential Circuit

15 Hours

Design of combinational Circuits, Adder / Subtractor , Encoder , Decoder , Multiplexers / De-Multiplexers Comparators, Flip Flops : Triggering , Master - Slave Flip Flop. State Diagram and Minimization, Counters, Registers.

UNIT III Basic Structure Of Computers

18 Hours

Functional units, Basic operational concepts, Bus structures, Performance and Metrics, Instruction and instruction sequencing, Addressing modes, ALU design, Fixed point and Floating point operation. Memory hierarchy, Main memory :RAM, ROM chips, Memory address map, memory contention to CPU, Associative Memory, Hardware logic, match, read and write logic, Cache Memory, Associative mapping, Direct mapping.

UNIT IV Input -Output Organization

12 Hours

Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Direct Memory Access (DMA).

COURSE OUTCOMES:

On successful completion of this course, the student is expected to be able to:

- Construct the K-map from a Boolean expression and to find the minimal SOP/POS forms,
- Design combinational and sequential digital logic circuits,
- Solve real-world problems using Boolean relation between inputs and output,
- Implement various types of flip-flops in creating sequential circuits and their uses in synchronous and asynchronous counters,
- Apply the knowledge of basic computer structure to evaluate system performance,
- Compare Different Input Output Organization Schemes,
- Summarize Bus structures used in computer,
- Describe the structure of memory devices used in computer,
- Explain different stages of a complete instruction execution in computer,

Text Books:

1. Morris Mano, "Digital Design", Prentice Hall of India, Fifth Edition ,February-2012.
2. William Stallings, Computer Organization and Architecture, Fourth Edition, Prentice Hall of India, March 2011.

References Books:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, VIth Edition, McGraw Hill 2011.
2. Sivarama P.Dandamudi, Fundamentals of Computer Organization and Design, Springer Int. Edition, April 25, 2013.
3. John P. Hayes, Computer Architecture and Organization,3rd edition, McGraw-Hill, 1998

Case Study:

Unit1: Design of BCD to 7 segment display controller

Unit 2: Design of a switch bouncer using FlipFlop

Unit 3: Booth's Algorithm for Multiplication

Unit 4:IA-32 processor (*Intel Architecture, 32-bit*)

COMPUTER SKILLS AND DIGITAL ELECTRONICS LABORATORY

PART-A

1. A. Create a resume
B. Create a company letter head
2. Create a cover page of a project report
3. Create a simple presentation to list simple DOS Commands, UNIX commands, Hardware and Software with varying Slide Transitions.
4. Design a report to print the result sheet and marks card for the result.
5. Create a simple bar chart to highlight the sales of a company for 3 different periods

PART-B

1. Study of Logic Gates–AND, OR, NOT, NAND, NOR, XOR (Using respective ICs).
2. Realization of AND, OR and NOT gates using Universal Gates
3. Design and Realization of Half Adder / Subtractor using NAND Gates.
4. Design and Realization of Full Adder using Logic Gates.
5. Design and Realization of 4 bit Adder / Subtractor using IC 7483.
6. Realizations of J-K flip flop using IC 7400 and 7410.

PART-C

1. Identification of PC Components, Assembling the PC and Power Supply (SMPS-Switch Mode Power Supply).
2. Installation of Operating Systems.
3. Connecting input/output devices and installation of their driver software.
4. Configuration of Audio and Video.
5. Installation of Software Packages .
6. Virus removal and disc scan.

MPAL16F1300	Fundamentals of Programming using C	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- Introduce the concept of algorithms and flow charts to understand and analyze the problem to write optimized algorithm for given problem statements.
- Provide detailed understanding of basic concepts of C.
- Provide detailed understanding of control statements, function and arrays.
- Provide the knowledge of structures and unions.
- Introduce the concepts of Files for application data maintenance

UNIT I Basics of C Programming

15 Hours

Introduction, The Problem Solving aspect, Classification of Programming Language, Structured Programming Concept, Flow charts, Algorithm. C Fundamentals: The C Character Set, Identifiers and Keywords, Data Types, Constants, Variables, Declarations, Expressions, Statements, Symbolic Constants.

UNIT II Operators, Control Statements & Arrays

15 Hours

Operators and its types, Evaluation of arithmetic expressions. Control Statements: Branching, Looping, Nested Control Structures, switch, break, continue, goto Statement. Arrays and Strings.

UNIT III User-defined Functions

15 Hours

Functions: Categories of Function, Function components, Passing Arguments to a Function, Recursion, Storage Classes. Passing Arrays and Strings to Functions.

UNIT IV Structures, Pointers, Files & DMA

15 Hours

Structures & Unions: Passing Structures to Functions, Self Referential Structures. Pointers: Arrays, Structures, Functions, Operations on Pointers, Arrays of Pointers. Files & Preprocessor Directives: Dynamic Memory Allocation.

Application to be carried out throughout the syllabus:

Develop an employee file based on the menu-driven program for elementary database management employs all the basic technique of file handling in C. It consists of following features

1. Writing the data in binary file
2. Reading the data from binary file
3. Modify the record
4. Delete the record

COURSE OUTCOMES:

After completing this course, the student is able to

- Write an algorithm and draw flowchart for the given problem.
- Develop a program with the use of control statements, function and arrays.
- Construct a program to show the usage of details by implementing structures, unions and pointers.
- Develop an application by using files as data base.

Text Books :

1. Byron S. Gottfried, "Theory and Problems of Programming With C", Second Edition, Tata McGraw Hill, 1996.
2. Yashwant Kanetkar, "Let us C ",BPB Publications,8th Revised edition (1 January 2008)

Reference Books:

1. Deitel and Deitel, "C How to Program", Pearson Education.6th edition,2010
2. Dennis M Ritchie, Brian W Kernighan, "The C Programming Language" , PHI, 2nd Edition, April 1,1988.
3. Balaguruswamy. E, "Programming in ANSI C",McGraw Hill Education (India) Private Limited, 6th Edition, May 2012.
4. Yashwant Kanetkar, "Understanding Pointers in C", BPB Publications, 4th Edition, March 2007.
5. Dr. Venugopal, "Mastering C", Tata McGraw-Hill Education, July 2006.

Exercises:

Unit 1:Analyzing the problem statements given above by writing simple algorithm steps.

Unit 2: Develop a program that shows the usage of all the operators and data types in C

Unit 3: Write the menu driven program which can be implemented in employee record maintenance system application.

Unit 4: Build the application by using structures, functions, pointers and use files for data maintenanc

C Programming Laboratory

PART- A

UNIT II

1. Implementation of the various Data Types with modifiers and type conversion in C.

Ex: Create a calculator program which takes two values as input and implement addition, subtraction, multiplication and division by using all possible data types.

UNIT III

2. Demonstration of nested if and switch... case structure.

Ex: Create a menu driven implementation for program1 using switch or nested if.

3. Implementation of various Control structures in C

Ex:

1) Use do while and modify program2 to repeat the menus as a choice for user to run the code until exit choice given.

2) Create a program to print first N Natural numbers.

4. Implementation of single dimensional array, multidimensional arrays

Ex:

1) Create a program to sort first N numbers.

2) Create a program to add two matrices.

5. Implementation of functions: call by value, call by reference, passing of arrays, Recursion

Ex:

1) Create a program to find factorial of a number using functions and return the value of factorial to the calling function.

2) Create a program to find factorial of a number using recursion.

6. Demonstration of various user defined string operations

Ex:

1) Create a program which reads a string and convert it in to upper case and read another string from the user to concatenate with previously string ex: String-1: REVA String 2: MCA result REVA MCA

UNIT IV

7. Demonstration of pointer operations.

Ex: Create a program to read N integers and store them in an array, find the sum of all these elements using pointer. Output the given array and the computed sum with suitable heading.

8. Implementation of structures and array of structures

Ex:

Define a student structure having the name, USN (university seat number), marks in five subjects, total and percentage of marks as its members. Marks of all the subjects are to be stored in an array. Develop a program to list the names of all the students who have failed.

9. Implement Unions.

Ex: Define a union student having the name, subject and percentage, assign values to 1st union variable and then display it and assign values to second union variable and display it, also show the differences in accession values of union.

10. Implementation of pointers to structures.

Ex: Create a structure called complex and add two complex numbers using a structure pointer.

11. Demonstration of dynamic allocation of memory

Ex: Create a dynamic array using dynamic memory allocation functions and find the sum of N numbers.

12. Demonstration of various Text file operations.

Ex:

- 1) Create a program to Create and count number of characters in a file
- 2) Create a program to handle files with mixed data type

PART-B

Develop an employee record system using files.

MPAL16F1400	Introduction to Web Technologies	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- Learn core technical skills necessary for a complete understanding of front-end web development, including HTML 5 and CSS, JavaScript, DOM.
- Understand rich internet applications that use most recent client-side programming technologies.
- Understand client-side validations using Java Script.

UNIT I Fundamentals

14 Hours

Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox, Internet Applications, TCP/IP, Higher Level Protocols, Important Components of the Web, Cascading Style Sheets.

UNIT II HTML 5

17 Hours

Detecting HTML 5 features – Canvas, video, local storage, web workers, offline applications, geolocation, placeholders, and input types. What does it all mean – doctype, root, headers, articles, dates and times, navigation and footers. Simple shapes, canvas, Paths, texts, gradients and images. A Form of madness – place holders, autofocus fields, email, and numbers as spin boxes and sliders.

UNIT III The Basics of JavaScript

15 Hours

Object orientation and JavaScript, Syntax, Primitives, operations and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, and Pattern matching. The DOM, Elements Access, Event Handling- Body tag, Text Box and Password elements. Element’s Positioning, Visibility, Stacking.

UNIT IV Introduction to XML

14 Hours

Document structure, DTDs, Namespaces, XML schemas, Displaying XML documents with CSS, XSLT style sheets, XML processors, Displaying raw XML documents, web services

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

- Gain knowledge on HTML(5)+CSS programming skills.
- Develop basic HTML, CSS and Java script programming.
- To design and implement web pages.
- To create a site that has a consistent outlook and its functionalities work on different platforms.

Textbooks:

1. Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson education, 2012.
2. HTML 5 Up and Running – Mark Pilgrim, O'REILLY| GOOGLE Press, 2010.
3. M. Srinivasan: Web Technology Theory and Practice, Pearson Education, 2012

Reference Books:

1. Jeffrey C. Jackson: Web Technologies- A Computer Science Perspective, Pearson Education, Eleventh Impression, 2012.
2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2009.
3. Internet Technology and Web Design, Instructional Software Research and Development (ISRD) Group, Tata McGraw Hill, 2011.

Exercises:

Unit 1: Develop a web application using XHTML tags and CSS.

Unit 2: Develop a user registration form using HTML5 Controls and CSS.

Unit 3: Expand the above registration form and add validations using JS.

Unit 4: To the above registration form, read the form data and display it on the next page.

Web Technologies Laboratory

PART-A

1. Create an HTML5 page to demonstrate the usage of
 - a. Text Formatting tags
 - b. Links
 - c. Images
 - d. Tables
2. Develop and demonstrate the usage of inline and external style Sheet using CSS.
3. Write a Program using JavaScript to display a table of the numbers from 5 to 15 and their squares and cubes using alert.
4. Develop and demonstrate using Java script, a XHTML document that display random numbers (integers).
5. Program to demonstrate various event handlers when an image is moved from the top stacking position, it returns to its original position using JavaScript.
6. Develop using Java script, an XHTML document that use of on load and on focus events.
7. Program on xml to read Employee details and display the details using CSS.
8. Develop a web form to display the student details using XML and XSLT style sheets.

PART-B

1. Build a client-side web application in the following areas:
 - a. Educational Institutions.
 - b. Online shopping.
 - c. Hospital Management System.
 - d. Real Estate.
 - e. Reservation System.

MPAL16F1500	Communicative English and Professional Ethics	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

COURSE OBJECTIVES:

- Communicative English Syllabus addresses the needs of Post graduate students to enable them to use the English language effectively as day to day technical/business communication tool.
- To understand and use spoken English to develop proficiency in theory and communicative skills.
- To communicate orally in English and its usage in formal, semi-formal and official situations.
- To read, write and comprehend texts.
- To understand and use effective writing skills to express ideas and present information.
- To expand the use of English grammar in a stimulating and professional manner.
- To familiarize about adapting their listening, reading and writing for various audiences and contexts they might encounter professionally.
- To understand the basics of Professional Ethics.

UNIT I Basics of Technical Communication

15 Hours

Process of Communication, Language as a Tool, levels of Communication, Communication networks, flow of Communication, importance of technical Communication, Barriers to Communication, Reading skill: Intensive and extensive reading, skimming and scanning. **Grammar:** Prepositions, reference words, Wh-questions, Tenses (Simple, present), **Vocabulary:** word formation and expansion (root words/etymology).

UNIT II Active Listening and Technology in Communication

15 Hours

Active Listening: Difference between listening and hearing, Types of listening, traits of a good listener. Technology in communication: Software for creating messages, software for writing documents, software for presenting documents. **Grammar:** use of imperatives, tenses (Past), use of sequence words, Adjectives, **Vocabulary:** Different forms and uses of words.

Professional Ethics: Meaning, Definition, Evolution, Need of ethics, Ethical TheoriAristotlean Ethics, Professional Ethics, Personal Ethics and Business Ethics, Ethical Standards, Duties of Employers and Employees.

UNIT III Effective Presentation Strategies

12 Hours

Introduction, Defining purpose, analyzing audience and locale, organizing contents, preparing outline, Visual Aids, understanding nuances of delivery, Kinesics, Proxemics, Paralinguistic's, Chronemics, sample speech,

Group Discussion and seminar presentation. **Grammar:** Adverbs, Tenses (future time reference), **Vocabulary:** Single word substitutes, use of abbreviations and acronyms.

UNIT IV Constituents of Technical Written Communication

18 Hours

Writing Skill: Basic rules, introductory grammar, common errors, Reports: Types, significance, structure, Technical proposals: Parts, types, significance, writing of proposal, writing CVs, cover letters, types of letters, circular, agenda, notice, press release, Technical paper, Project Dissertation and Thesis (only Structure). **Grammar:** Accuracy and fluency focused activities- Fillers, Turn taking, Pauses, Phatic. **Vocabulary:** Lexical item(Fixed/Semi Fixed Expression).

COURSE OUTCOMES:

On completion of this course, students will be able to:

- Understand the importance of Communication.
- Demonstrate a decent command of English and its linguistic structures.
- Analyze rhetorical aspects of audience, purpose, and context to communicate
- Analyze the structure and evolution of English words and texts from the point of view of Phonology, Grammar, Syntax and Semantics.
- Tailor communication to, and engage in persuasive communication with, specific Audience and media.
- Produce and deliver Technical information effectively in written, oral, and visual Forms.
- Able to Understand Professional Ethics.

Text Books:

1. Technical Communication – Principles and Practices by Meenakshi Raman and Sangeeta Sharma: Oxford University Press, 2007.
2. Improve Your Writing ed. V. N. Arora and Laxmi Chandra, Oxford University Press, 2001, New Delhi.
3. Technical Communication – A Practical Approach by Madhu Rani and Seema Verma, Acme Learning 2011, New Delhi.

Reference Books:

1. English language Laboratories: A Comprehensive Manual by Nira Konar, PHI
2. Words at Work by David Honer, Peter Strutt, CUP
3. Business Correspondence and Report Writing by R. C. Sharma, Krishna Mohan, Tata McGraw Hill.
4. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt.Ltd,2011, New Delhi.

5. Business Correspondence and Report Writing by Prof. R.C.Sharma & Krishna Mohan, Tata McGraw Hill & Co.Ltd.,2001, New Delhi.
 6. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. &Distributors, 2009, New Delhi.
 7. Developing Communication Skills by Krishna Mohan, Mecra Bannerji- Macmillan India Ltd. 1990, Delhi.
 8. Manual of Practical Communication by L.U.B.Pandey: A.I.T.B.S. Publications India Ltd., Krishan Nagar, 2013, Delhi.
 9. Spoken English- A manual of Speech and Phonetics by R.K.Bansal & J.B.Harrison, Orient Blackswan, 2013, New Delhi.
 10. English Grammar and Usage by R.P.Sinha, Oxford University Press, 2005, New Delhi.
 11. Business English by Ken Taylor, Orient Blackswan, 2011, New Delhi.
- Suggested Extensive Readers:**
1. Wise and Otherwise by Sudha Murthy, Penguin Books India, 2006.
 2. Business @ the Speed of Thought – Succeeding in the Digital Economy by Bill Gates and Collins Hemingway, Warner Business Books, New York, 2000.

Website Resources:

1. BBC learning English, www.bbc.co.uk/worldservice/learningenglish
2. English Listening Lounge, www.englishlistening.com
3. Learning through listening, www.learningthroughlistening.org
4. www.uefap.com
5. www.eslcafe.com
6. www.listen-to-english.com
7. www.owl.english.purdue.edu
8. www.chompchomp.com

Exercise/Activities at the end of Unit-1

Listening	Listen to an introductory model speech (audio and video)
Speaking	Speak about one's Place, important Festivals, Introducing oneself, one's family/friend.
Reading	Skimming a reading Passage, Scanning for specific information, read at least one Autobiographical writing. Note-making.
Writing	Free writing on any given topic (My favorite Place/ Hobbies/ School life, etc.).

Exercise/Activities at the end of Unit-2

Listening	Listening and responding to video lectures/talks.
Speaking	Describing a simple process (filling of form, etc.), Asking and Answering questions.
Reading	Critical reading – finding key information in a given text (sifting facts from opinions).
Writing	Biographical writing (Place, People etc.), lab descriptions (general/specific description of laboratory experiments).

Exercise/Activities at the end of Unit-3

Listening	Listening to specific task-focused audio tracks
Speaking	Role-Play – Simulation, group interaction, speaking in formal situations(Teachers, Officials, Foreigners)
Reading	Reading and interpreting visual Ad materials
Writing	Jumbled Sentences-coherence and Cohesion in writing, Channel conversion (flowchart, line graphs, pie chart etc. into text format)

Exercise/Activities at the end of Unit- 4

Listening	Watching Videos/Documentaries and responding to questions based on them
Speaking	Responding to questions – attending different forms of mock interviews (Technical, GD & HR)
Reading	Making inference from the reading passage, predicting the content of a reading passage
Writing	At least 2 official letters, CV writing and Essay writing

MPAL16F1600	Management Information System	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

COURSE OBJECTIVES:

- Provide the foundations for Information systems in Business.
- Enforce ability to understand the different types of Information systems.
- Impose control and strategic Planning at various levels of an organisation.
- Introduce MIS Structure and E-business applications.

UNIT I Foundation of Information Systems

15 Hours

Information, Classification of information, General model of a human as information Processor. Introduction to Information System: Types of Information system. Effectiveness and efficiency criteria in information system.

UNIT II An overview of Management Information Systems

15 Hours

MIS: Concept, Definition, Role and impact of MIS, Structure of a Management information system. Decision making concept & process, MIS and the role of Decision Support System.

UNIT III Concepts of planning & control

15 Hours

Concept of corporate planning, Essentiality of strategic planning, Types of Planning, Tools of Planning, Characteristics of control process, the nature of control in an organization.

Note: Suggest a manual process to be done for the completing the order of the customer if you are not satisfied with process suggested in case study. Identify the difficulties to be faced for practical implementation of the order processing module. Describe your ideas with in 1 page document not exceeding more that 1000 word

UNIT IV Business applications of information technology:

15 Hours

Internet , Intranet & Extranet. Electronic commerce - Applications (B2C,B2B,C2B, C2C). Real time case studies on various business applications.

COURSE OUTCOMES:

1. Gain knowledge of information systems in Business.
2. Know the attributes of information quality and decides the applicability of the attributes to the given information system.
3. Plan a system that meet the real time challenges of E-business enterprises

4. Suggest a best MIS structure to be followed

Case Study:

A waiter takes an order at a table, and then enters it online via one of the six terminals located in the restaurant dining room. The order is routed to a printer in the appropriate preparation area: the cold item printer if it is a salad, the hot-item printer if it is a hot sandwich or the bar printer if it is a drink. A customer's meal check-listing (bill) the items ordered and the respective prices are automatically generated. This ordering system eliminates the old three-carbon-copy guest check system as well as any problems caused by a waiter's handwriting. When the kitchen runs out of a food item, the cooks send out an 'out of stock' message, which will be displayed on the dining room terminals when waiters try to order that item. This gives the waiters faster feedback, enabling them to give better service to the customers. Other system features aid management in the planning and control of their restaurant business. The system provides up-to-the-minute information on the food items ordered and breaks out percentages showing sales of each item versus total sales. This helps management plan menus according to customers' tastes. The system also compares the weekly sales totals versus food costs, allowing planning for tighter cost controls. In addition, whenever an order is voided, the reasons for the void are keyed in. This may help later in management decisions, especially if the voids consistently related to food or service. Acceptance of the system by the users is exceptionally high since the waiters and waitresses were involved in the selection and design process. All potential users were asked to give their impressions and ideas about the various systems available before one was chosen.

Tasks to be performed for the case study:

1. In the light of the system, describe the decisions to be made in the area of strategic planning, managerial control and operational control? What information would you require to make such decisions?
2. What would make the system a more complete MIS rather than just doing transaction processing?
3. Explain the probable effects that making the system more formal would have on the customers and the management.

Text Books:

1. James A O' Brien, George M Marakas, Ramesh Behl "Management Information System", 9th edition, McGrawHill, 2013
2. Jawadekar, "Management Information System", TMH, 5th edition, 2013
3. Gordon B. Davis & Margrethe H. Olson, "Management Information System", TMH, 3rd edition.

Reference Books:

1. O Brian, "In
2. troduction to Information System", MCGRAW HILL.
3. Davis & Olson , " Management Information Systems", 2nd Edition, TMH

Exercises:

Unit 1: Decide which information system will be applicable for the case study listed below and justify your choice with a 1 page document not exceeding more than 500 words

Unit 2: Identify the structure of MIS, which is best suitable for the given case study and justify your choice with a 1 page document not exceeding more than 500 words

Unit 4: Suggest whether to go for mobile app or web application or stand alone system. List pros and cons of your choice and justify your ideas with in 1 page document not exceeding more than 1000 words

MASTER OF COMPUTER APPLICATIONS
Scheme of Teaching, Examination and Credits
SECOND SEMESTER MCA
Scheme & Syllabus

Sl. No	Code	Title	HC/SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F2100	Data Structures and its Applications	HC	2	1	1	4	6
2	MPAL16F2200	Object oriented programming using C++	HC	2	1	1	4	6
3	MPAL16F2300	Database Management Systems	HC	2	1	1	4	6
4	MPAL16F2400	System Software and Operating Systems	HC	3	1	0	4	5
5	MPAL16F2500	System Analysis and Design	HC	3	1	0	4	5
6	MPAL16F2600	Operations Research	HC	3	1	0	4	5
Total Credits				15	6	3	24	33

MPAL16F2100	Data Structures and its Applications	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- Provide the students with solid foundations in the basic concepts of programming: data structures
- Familiarize the concept of Abstract Data Types (ADT),
- Provide depth knowledge on structure, arrays, Pointers.
- Introduce the concept of Linear and Non- Linear Data Structures like Stacks, Queues ,List, Trees and Graphs.

UNIT I Basics of Data Structures

15 Hours

Introduction to Data Structures, Abstract Data Types (ADT) Arrays, Recursion, Structures and Pointers.

UNIT II Linear Data Structures

15 Hours

Stack: Applications of stack, Infix to postfix conversion, evaluation of expression. Queue: types of Queues, Applications of Queues. Linked List: Types of Linked lists, Applications of linked list.

UNIT III Sorting Methods

15 Hours

Insertion, Selection , Bubble , Quick, Merge, Heap , Radix. Searching: Linear and Binary Search, Hashing Method , Hashing Function.

UNIT IV Non Linear Data Structures

15 Hours

Need for non-linear structures, Trees and its representation, Binary Tree, Types of Binary Trees, Binary tree traversals , applications of trees , Binary Search Tree, Threaded Binary Tree. Balancing TREE, AVL trees, B-Trees. Introduction to Graph, Graph Traversal Techniques.

COURSE OUTCOMES:

On successful completion of this course, the student is expected to be able to:

- Design or select an appropriate data structures for a particular problem,
- Package a set of data structures and algorithms as an abstract data type,
- Apply their knowledge of data structures in writing more efficient programs in a programming language,
- Understands the importance of Data structures.
- Develop Applications using Linear and Non-Linear Data Structures.

Text Books:

1. Ashok N Kamthane, "Introduction to Data Structures in C", Pearson Education (S) Pvt Ltd., New Delhi: 2005.
2. Yedidyah Langsam and Moshe J. Augenstein and Aaron M Tenanbanum, "Data Structures Using C and C++", 2nd Edition, Pearson Education Asia, 2002.
3. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan (2008), Fundamentals of Data Structure in C, 2nd Edition, University Press, India.

Reference Books:

1. Jean-Paul Tremblay and Paul G Sorenson, "An Introduction to Data Structures with Applications", Second Edition, Tata McGraw-Hill Publishing Company Lt., New Delhi: 1995.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education.

Data Structures Laboratory

PART-A

1. Implement Stack Applications, Like
 - a. Converting Given expression format to other formats(infix-postfix)
 - b. Evaluating expressions.
 - c. Using Recursion, find GCD, LCM & Tower of Honai

Student can execute any one application and justify how stack efficiently used to complete the above mentioned process.

2. Simulate the working of Stack.
3. Simulate the working of linear queue and Circular Queue.
4. Simulate the working of a dequeue using Linked List.
5. Simulate the working of a double linked list to implement stack and queue
6. Implement a. Quick Sort b. Merge Sort c. Heap Sort.
7. Create a binary tree and implement the tree traversal techniques of in order, pre order and post order.
8. Write C programs for the implementation of BFS and DFS for a given graph.

PART- B

Case Study:

Develop a C application for a reservation system for train by considering the following criteria's.

Problem Statement:

A train will have 10 compartments (bogies). Which in-turn divided into eight sections, each section will have 08 berths (02 lower, 02 Middle, 02 upper, 01 side lower & 01 side upper). A reservation should be constructed and it should accept NAME, AGE of the passenger and preferred berth. The reservation can be done only if the preferred berth is available but reservation checking should start from first to last.

If requested berth is available, follow the bellow constraints to complete the process.

- I) If his/her age is greater than 55, try to allocate side lower or lower berth
- II) If his/her age is greater than 35 and below 55 , try to allocate middle berth
- III) If his/her age less than 35, try to allocate upper side or upper berth.

COURSE OBJECTIVES:

MPAL16F2200	Object Oriented Programming Using C++	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

- Provide details understanding about OOP concept so as to make the learner understand the.
- Presents the concept of Inheritance so that learner understands the need of inheritance.
- Introduce and implement the concept of data hiding.
- Provides detailed understanding of function overloading and operator overloading and implementation of these concepts.
- Introduce classes, objects and there uses.
- Provide a detailed understanding of polymorphism.

UNIT I Fundamentals of OOP**17 Hours**

Features of C++, Structure in C and C++ Reference variables, Inline functions. Class and class members, Creating Objects of Class, Access specifiers. Scope Resolution Operator, Nested Classes, Local Classes. Friend Functions and Classes, passing objects to functions, returning objects, Static Members and functions, this pointer. Default Constructors, Constructor Overloading, Copy Constructor.

UNIT II Polymorphism**16 Hours**

Function Overloading: Functions with different sets of parameters, default and constant parameters. Operator Overloading, Creating prefix and postfix forms of the increment and decrement Operators, operator Overloading using a Friend Function, Overloading new, delete, [],(),→, the comma operator.

UNIT III Inheritance and Virtual Functions

14 Hours

Types of Inheritance, Derived classes, protected access specifies in base class , public, private & protected inheritance ,constructors and destructors in derived classes, Ambiguity in multiple inheritance, function overriding, Virtual base class and virtual destructor. Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract classes.

UNIT IV I/O Streams and Exception Handling

13 Hours

IO Stream basics, output operator <>, additional I/O operators, overloading the output operator <>, file input & output, manipulators. Exception handling fundamentals.

COURSE OUTCOMES:

At the end of the course, the learner is expected to be able to:

- 1) Explain how object-oriented software engineering enhances the software development process.
- 2) Identify the major elements in an object-oriented programming language.
- 3) Implement the concepts of data abstraction and encapsulation in the creation of abstract data types.

Text Books:

1. Deitel & Deitel, C++ How to program, Pearson Education Asia, 6th Edition, 2010.
2. Bhushan Trivedi, “Programming with ANSI C++”, Oxford Press, Second Edition, 2012.

Reference Books:

1. Schildt Herbert, The Complete Reference C++, Tata McGraw Hill, 4th Edition, 23rd reprint, 2009.
2. M T Somashekar, D S Guru, Object Oriented Programming with C++, PHI, 2nd Edition , 2012.
3. E Balagurusamy, “Object oriented Programming with C++”, 3 edition, 2006, Tata McGraw Hill.

C++ Laboratory

PART-A:

1. Program to Implement Classes and Objects.
2. Program to Implement Constructors and Destructors with array of Objects.
 - i) Define a STUDENT class with USN, Name, and Marks in 3 tests of a subject. Declare an array of 10 STUDENT objects. Using appropriate functions, find the average of the two better marks for each student. Print the USN, Name and the average marks of all the students.
3. Program to Implement Passing and returning parameters as objects by reference.
 - i) Write a program to swap two numbers defined in a Class.
4. Program to demonstrate Function Overloading.
 - i) Program to create a class called COMPLEX and implement the following overloading functions ADD that return a complex number.
 - (a) ADD(a,s2)- where 'a' is an integer(real part) and s2 is complex number.
 - (b) ADD(s1,s2)-where s1 and s2 are complex numbers.
5. Program to overload different operators.
 - i) Write a C++ program for scalar multiplication of two vectors using operator overloading.
 - ii) Write a Program to create a class called STACK using an array of integers. Implement the following operations by overloading the operators '+' and '-'
 - (i) $s1 = s1 + \text{elements}$, where s1 is an object of the class STACK and element is an integer to be pushed on the top of the stack.
 - (ii) $s1 = --s1$, where s1 is an object of the class STACK '-' operator pops the elements. Handle the STACK empty and full conditions also display the contents of the stack after each operation, by overloading the << operator.
6. Program to demonstrate friend functions and friend classes.
 - i) Write a C++ program to create a class called OCTAL which has the characteristics of an octal number. Implement the following operations by writing an appropriate constructor and an overloaded operator +.
 - (i) OCTAL h = x, where x is an integer.
 - (ii) $\text{int } y = h + k$, where h is an OCTAL object and k is an integer. Display the OCTAL result by overloading the operator <<. Also display the values of h and y.

7. Program to implement different types of inheritance.

- i) Write a C++ program to create a class called STUDENT with data members USN, Name and Age. Using inheritance, create the classes UGSTUDENT and PGSTUDENT having fields as Semester, Fees and Stipend. Enter the data for at least 5 students. Find the semester wise average age for all UG and PG students separately.

8. Program to demonstrate the use of Virtual Functions.

- i) Define a base class STACK1 which performs only push, pop, display operations. Override the above operations through a derived class STACK2 which takes care of STACK FULL & STACK EMPTY situations. Show how the objects of these classes use the above functions in a main function.

9. Program to create function Templates

- i) Write a C++ program to create a template function for Bubble Sort and demonstrate sorting of integers and doubles.

PART-B:

Design a small project using C++ including above all mentioned concepts.

A waiter takes an order at a table, and then enters it online via one of the six terminals located in the restaurant dining room. The order is routed to a printer in the appropriate preparation area: the cold item printer if it is a *salad*, the hot-item printer if it is a hot *sandwich* or the bar printer if it is *adrink*. A customer's meal check-listing (bill) the items ordered and the respective prices are automatically generated. This ordering system eliminates the old three-carbon-copy guest check system as well as any problems caused by a waiter's handwriting. When the kitchen runs out of a food item, the cooks send out an 'out of stock' message, which will be displayed on the dining room terminals when waiters try to order that item. This gives the waiters faster feedback, enabling them to give better service to the customers. Other system features aid management in the planning and control of their restaurant business. The system provides up-to-the-minute information on the food items ordered and breaks out percentages showing sales of each item versus total sales. This helps management plan menus according to customers' tastes. The system also compares the weekly sales totals versus food costs, allowing planning for tighter cost controls. In addition, whenever an order is voided, the reasons for the void are keyed in. This may help later in management decisions, especially if the voids consistently related to food or service. Acceptance of the system by the users is exceptionally high since the waiters and waitresses were involved in the selection and design process. All potential users were asked to give their impressions and ideas about the various systems available before one was chosen.

MPAL16F2300	Database Management Systems	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- To understand the fundamentals of data models and conceptualize and depict a database system using ER diagram.
- To understand creation of relational database design using SQL.
- To know about data storage techniques for a query processing.
- To impart knowledge in transaction processing, concurrency control techniques.

UNIT I Database System Concepts and Architecture

12 Hours

Database System Vs File System, Database Users, characteristics of database approach, advantages of using DBMS. Data Models, different types of data models, Three Schema architecture and Data Independence, Database Languages and Interfaces, Centralized and Client/Server Architecture for DBMS.

UNIT II Entity-Relational Model and relational algebra

16 Hours

High-Level Conceptual Data Models for Database Design, Entity Types, Sets, Attributes and Keys, Relationships, Roles and Structural Constraints, ER Diagrams, Naming Conventions and Design Issues. Unary, Binary Relational algebra Operations, Additional Relational algebra Operations.

UNIT III Relational Model & SQL

16 Hours

Codd's rules, Constraints and Relational Database Schemas, constraint violations, Relational Database Design Using ER- to-Relational Mapping. Introduction to SQL, SQL data types, Types of SQL commands, SQL operators and their precedence, Tables, Views and indexes, Queries, sub queries and nested sub queries, joins, Aggregate functions, Set operators, Stored procedures.

UNIT IV Normalization and Transaction Management

16 Hours

Informal guide lines for relational schemas, functional dependencies, First, second, third and BOYCE-CODD Normal Form.

Transaction Management:

Acid Properties, Concurrent Execution of Transactions, Lock-based concurrency control, Performance of Locking, Transaction support in SQL, Introduction to crash recovery.2PL, Serializability and Recoverability, Dealing with Dead Locks, specialized Locking Techniques,ARIES.

COURSE OUTCOMES:

Students successfully completing this course should be able to:

- List basic functions of DBMS & RDBMS.
- Suggest database architecture to be followed for a given system.
- Create the E-R diagram for the given application.
- Analyze database models & entity relationship models.
- Justify the database system to be used for implementation of ER.
- Synthesize the views required to extract the required data from multiple tables.

Text Books:

1. Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Pearson Education, 2016.
2. Ivan Bayross, "SQL,PL/SQL The programming language of ORACLE",BPB publication.
3. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, 3rd edition, Mc-Graw Hill, 2003.

Reference Books:

1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database System Concepts", Sixth Edition, McGraw Hill, 2010.
2. C. J. Date, "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004

Case Study:

A waiter takes an order at a table, and then enters it online via one of the six terminals located in the restaurant dining room. The order is routed to a printer in the appropriate preparation area: the cold item printer if it is a salad, the hot-item printer if it is a hot sandwich or the bar printer if it is a drink. A customer's meal check-listing (bill) the items ordered and the respective prices are automatically generated. When the kitchen runs out of a food item, the cooks send out an 'out of stock' message, which will be displayed on the dining room terminals when waiters try to order that item. Customer provides a feedback that will help to improve their business further.

Tasks to be performed for the case study:

Identify the entities and construct the ER Diagram.

1. Normalized your database design up to third Normal form.
2. Design a complete database for above case study using sql by applying listed constraints.
3. Create the following views.
 - Total billed amount
 - List of cancelled items.
 - List of customers visited more than 1 time in a month.
 - More profitable items list.
 - Most frequently ordered items.

Exercise:

Unit 1: Which kind of the architecture would be better for above case study whether centralized or client/Server justify your answer.

Unit 2: Identify the entities and Relations.

Unit 3: Identify the relations ,required views and need of indexes.

Unit 4: Identify the possibilities of concurrent transactions and its effect.

DBMS Laboratory

PART-A

1. Execute a single line and group functions for a table.
2. Working with sequences.
3. Execute DCL and TCL Commands.
4. Create views for a particular Database.
5. Working with Joins.
6. Working with subqueries, nested subqueries.

PART-B

1. Designing a Database for any application Using Normalization.

Typical Applications are:

- Banking
- Library
- Hospital
- Insurance company
- Inventory system

MPAL16F2400	System Software and Operating Systems	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

COURSE OBJECTIVES:

- To understand the relationship between system software and machine architecture.
- To understand the services provided by and the design of an operating system.
- To understand what a process is and how processes are synchronized and scheduled.
- To justify the need of memory management.
- To apply the concepts of operating systems in implementation.

UNIT I Overview of System Software

15 Hours

Basics of system software: Definition, Machine architecture, Hypothetical machine architecture , SIC & SIC/XE, SIC & SIC/XE Programming examples.

Assemblers: Introduction to Assemblers, A simple SIC Assembler, Algorithms for one pass assembler& two pass assembler.

UNIT II Compilers

12 Hours

Definition, History, Structure of compiler, Phases of Compiler, Lexical analyzer-Definition, Role, Regular expression & Transition diagram, Parsing-Definition, Role of Parser , Types of parsing, Techniques.

UNIT III Process Management

18 Hours

Basics of Operating Systems: Definition –Types of Operating Systems, OS Service, System Calls, OS structure, Virtual Machine.Process & Threads: process concept, creation of processes, Concurrent processes, Process management, Context switching, Interaction between processes and OS, Multithreading ,CPU Scheduling -Scheduling Concept, Algorithms, Comparing & Evaluation of Algorithms , Concurrency Control & Deadlock-Concurrency and Race Conditions, Mutual exclusion requirements Software and hardware solutions, Semaphores , Monitors , Classical IPC problems and solutions, Deadlock- Characterization, Detection, Recovery, Avoidance and Prevention .

UNIT IV Basics of Memory Management

15 Hours

Definition, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition , Internal and External fragmentation and Compaction, Paging: Principle of operation , Page allocation ,Hardware support for paging ,Protection and sharing , Disadvantages of paging, Segmentation ,Segmentation with paging, Virtual Memory: Basics of Virtual Memory ,Hardware and control

structures ,Locality of reference, Page fault , Working Set , Dirty page/Dirty bit , Demand paging, Page Replacement policies ,Allocation of frames , Thrashing.

COURSE OUTCOMES:

- Able to trace the path of a source code to object code and to executable file.
- Understand and identify the relationship between system software architecture and machine.
- Analyze the functions of assembler, compiler.
- Describe, contrast and compare differing structures for operating systems.
- Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical memory, scheduling.

Text Books:

1. Leland L. Beck , “System Software- An Introduction to Systems Programming”, 3rd Edition, Addison Wesley, Reprint,2002
2. Compiler design – by Gajendra Sharma
3. Andrew S. Tanenbaum, “Modern Operating Systems”, Pearson Education, 2004.
4. Silberschatz, Galvin, and Gagne, “Operating System Concepts”, Sixth Edition, Wiley India Pvt Ltd, 2003.

Reference Books:

1. D. M. Dhamdhare System Programming & Operating Systems, Second revised edition, Tata McGraw Hill.
2. Gary Nutt, “Operating Systems”, Third Edition, Pearson Education, 2004.
3. Harvey M. Deital, “Operating Systems”, Third Edition, Pearson Education, 2004.
4. William Stallings, Operating Systems, Prentice Hall.
5. Harvey M. Deitel, An introduction to operating systems. Addison-Wesley..Andrew Tanenbaum & Albert Woodhull, Operating Systems: Design and Implementation. Prentice-Hall.
6. Douglas Comer, Operating System Design - The XINU Approach. Prentice-Hall.
7. A.M. Lister, Fundamentals of Operating Systems. Macmillan (1979).
8. Principles of Compiler Design, by Alfred Aho and Jeffrey Ullman, is a classic textbook on compilers for computer programming languages

Exercise:

Unit –1

1. Write Simple programs in SIC to do the following
 - i) Add two numbers
 - ii) $A=B+C-5$
2. Convert the above SIC programs to machine language.

Unit – 2

1. Prepare a list of regular expressions for

- i) Valid email
- ii) Phone numbers for any 5 countries (Mobile and Land line)
- iii) PAN number
- iv) Passport number
- v) student ID/USN
- vi) pincode
- vii) IP address
- viii) MAC address
- ix) Name of a person
- x) Decimal number rounded with 2 decimals

Unit – 3

For the Restaurant ordering system, Design a hypothetical operating system, which will do the following?

i) Decide on the need and level of concurrency control policy to be implemented and identify the possibilities of deadlock.

- i) What are the resources available, suggest a scheduling algorithm to allocate the resources such that deadlock and starvation will not occur.
- ii) Decide the need of multi-threading and recovery policies. Justify your suggestion.

Unit – 4

Imagine that the above system is implemented as multi-tasking, multi-user and should work with very limited memory.

- i) Decide page replacement policies.
- ii) Suggest the need and duration of defragmentation module to be executed.

MPAL16F2500	System Analysis and Design	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

COURSE OBJECTIVES:

- To get the knowledge on common system concepts.
- To know the importance of system analysis.
- To understand the various types of organizational structures.
- To know the phases in designing a good information system for any organization.

UNIT I System Concept and System Environment

10 Hours

Introduction, Concept of System, Characteristics of a System, Elements of a System, System Environment And Boundary, Types of a System, Management Information System, Decision Support system, ERP System, System models.

UNIT II Information Gathering

17 Hours

Data Vs Information, Characteristics of Useful information, Data Processing, Need for Data Processing, Types of Data Processing, Data Management, Introduction, Nature of Information, Sources of Information, Information Gathering Technique, Samples of Existing Documents, Forms and Databases, Research and Site Inspection, Site Observation, Questionnaires, Interviews, Types of Interviews, Conducting an Interview.

UNIT III System Development Life Cycle

15 Hours

Introduction, System development Life cycle, Different Phases of System Development Life Cycle, Considerations for candidate systems, Procedure for Hardware/Software Selection, Prototyping.

UNIT IV Structured Analysis, system Planning and Design

18 Hours

Data Flow Diagrams, Data Dictionary, Decision Trees, Structured English. System Planning, Strategic MIS Planning, Managerial and Operational MIS Planning, Determining the User's Requirements. Design Process, Phases of Design, Methodologies of Designing, Structured Design, Functional Decomposition, Module Coupling and Cohesion, Joint Application Development, Rapid Application Development, Object Oriented Design.

Case Study:

1. ERP: Company X had periodic new product releases and there was a need for an efficient tool to predict demand for new products. Company X also wanted to provide a single platform for supply chain planning across product categories, and enable system-driven accounting and booking from sub-ledgers to general ledger globally. They also sought to migrate to a cost-effective Linux operating system from the existing HP UNIX platform. Company X already had Oracle ERP Release 11.0.3

Inventory and Planning Modules for its supply chain operations and Oracle ERP Release 11i financial modules of GL, AP and FA, implemented by Infosys earlier. Company X partnered with Infosys for implementing Oracle Applications R11.5.9.

2. Home Health, or Home Care, is the portion of health care that is carried out at the patient's home or residence. It is a participatory arrangement that eliminates the need for constant trips to the hospital for routine procedures. For example, patients take their own blood pressure (or heart rate, glucose level, etc.) using a device hooked up near their bed at home. The results are transmitted to the hospital (or in this case, the Home Health facility near General Hospital) electronically and are immediately processed, inspected, and monitored by attending staff. Company X had been asked by hospital administration to investigate the acquisition, and eventual purchase, of software to facilitate and help coordinate the Home Health care portion of their business. After an initial meeting to offer help and familiarize ourselves with the task at hand, we met with staff (i.e., both management and the end-users) at the Home Health facility to begin our research.

Note: Upon completion of each Unit, the student can incorporate the concepts for the case study mentioned below.

COURSE OUTCOMES:

On completion of this course students will be able to:

- Describe the different phases of systems development life cycle.
- Describe the different fact-finding techniques in system analysis and design.
- Explain different methodologies of analysis and design of information systems.
- Describe the concepts and theories of systems approach.
- Design appropriate information systems
- Manage implementation and maintenance of information systems.

Text Books:

1. Systems analysis and design, Author: Elias .M.Awad, Publisher: Homewood, III R.D Irwin,1985, 2nd edition
2. James A. Senn, Analysis and Design of Information Systems, Tata McGraw- Hill, Third Edition,2009.

Reference Books:

1. Sheely Cashman Rosenblatt, Systems Analysis and Design, Galgotia , Third Edition, 1999.
Yourdon E. and Constantine L. L, "Structured Analysis and Design", Yourdon Press, New York.
2. Systems Analysis & Design, Author: Thomas Tharakan, First Edition.

Exercises:

Unit 1: Understand the different components asked for in the case study

Unit 2: Understand the Requirements and use techniques to gather the case study requirements and document it.

Unit 3: Construct the design document containing functional and non functional components.

Unit 4: Provide the models to represent the system diagrammatically and come up with a development strategy and plan for execution.

COURSE OBJECTIVES:

MPAL16F2600	Operations Research	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

- To provide the concept and an understanding of basic concepts in Operations Research Techniques for Analysis and Modeling in Computer Applications.
- To understand , develop and solve mathematical model of linear programming problems
- To understand , develop and solve mathematical model of Transport and assignment problems
- To understand network modeling for planning and scheduling the project activities.

Operations research methodology is applied to a broad range of problems in both the public and private sectors. Many problems deal with the allocation of scarce human resources, money, materials, equipment or facilities.

UNIT I Introduction to Linear Programming and Overview of the OR Modeling 12 Hours

The origin of OR, the nature of OR, the impact of OR, defining the problem and gathering data, Formulating a mathematical model, deriving solutions from the model, testing the model, preparing to apply the model, implementation.

Formulation of linear programming problem (LPP), examples, Graphical solution, the LP Model, Special cases of Graphical method, assumptions of Linear Programming (LP), additional example.

UNIT II Solving LPP - The Simplex Method 18 Hours

The essence of the simplex method, setting up the simplex method, algebra of the simplex method, the simplex method in tabular form, special cases in the simplex method, tie breaking in the simplex method, adopting to

other model forms (Two Phase method, Big-M method), post optimality analysis. The essence of duality theory, economic interpretation of duality, primal dual relationship, adapting to other primal forms.

UNIT III Transportation and Assignment Problems

15 Hours

The transportation problem, a stream line simplex method for the transportation problem, Least Corner Method, Matrix Minima Method, Vogel's Approximation Method for finding basic feasible solution and its optimal (U V Method) solution problem, the assignment problem, a special algorithm for the assignment problem.

UNIT IV Game Theory

15 Hours

The formulation of two persons, zero sum games, solving simple games- a prototype example, games with mixed strategies, graphical solution procedure, solving by linear programming, extensions.

COURSE OUTCOMES:

- Understand and apply linear, integer programming to solve operational problem with constraints
- Apply transportation and assignment models to find optimal solution in warehousing and Travelling
- To prepare project scheduling using PERT and CPM
- Able to use optimization concepts in real world problems.

Text books:

1. Frederick S.Hillier & Gerald J.Lieberman: Introduction to Operations Research, 8th Edition, Tata McGraw Hill, 2006.
2. Hamdy A Taha: Operations Research - An Introduction, 7th Edition, Pearson Education 2007

Reference books:

1. A Wayne L. Winston: Operations Research Applications and Algorithms, 4th Edition, Thomson Course Technology, 2003.
2. Theory and Problems of Operations Research, Richard Bronson and Govindasami Naadimuthu, Schaum's Outline, Tata McGraw Hill, 2nd Edition, 1997.
3. Operations Research Problems & Solutions, V K Kapoor, Sultan Chand & Sons Educational Publishers, 2003.

Case Study: Any one of the following (database) applications include 1) university course scheduling, 2) design of experiments, 3) stock portfolio optimization, 4) warehouse location, 5) vehicle routing, 6) product distribution, 7) staff scheduling, 8) quality control, 9) traffic light phasing, 10) police patrolling, 11) preventive maintenance scheduling, 12) economic forecasting, 13) power plant fuel allocation, 14) cost effective environmental protection, and 15) inventory control development (Oracle\SQL Server\VB etc.)

*** Instructions for Students' Assignments:** Each candidate will submit a journal which will have case studies on Decision Theory and Replacement theory.

MASTER OF COMPUTER APPLICATIONS

MPAL16F3100	JAVA Programming	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

Scheme of Teaching, Examination and Credits

Sl. No	Code	Title	HC/S C/ OE	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F3100	Java Programming	HC	2	1	1	4	6
2	MPAL16F3200	Software Engineering	HC	3	1	0	4	5
3	MPAL16F3300	Computer Graphics and Multimedia	HC	2	1	1	4	6
4	MPAL16F3400	Data Communication and Computer Networks	HC	2	1	1	4	6
5	MPAL16F3510	Advanced Database Systems	SC	3	0	1	4	5
	MPAL16F3520	Business Data Processing using COBOL						
	MPAL16F3530	Linux Programming						
6	MPAL16F3610	Principles of User Interface Design	SC	3	1	0	4	5
	MPAL16F3620	Data Warehousing and Data Mining						
	MPAL16F3630	Enterprise Resource Planning						
Total Credits				15	5	4	24	33

THIRD SEMESTER MCA

Scheme & Syllabus

Open Electives offered in MCA Department

Sl. No	Code	Title	HC/S C/ OE	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F3710	Basics of Web Designing	OE	4	0	0	4	4
	MPAL16F3720	PC-Hardware Training						
Total Credits				4	0	0	4	4

* **Note:** Students must acquire minimum of 4 credits by registering the course offered by other schools of the University in any ODD depending on their interest and convenience as open elective.

COURSE OBJECTIVES:

- Understand fundamentals of object-oriented programming in Java, including defining Classes, invoking methods, using class libraries, exception handling etc.
- To solve problems using object-oriented paradigm
- To develop applications using threads and applet programming.
- To understand Java Database Connectivity.

UNIT I Introduction to JAVA Programming

15 Hours

An overview of Java, Internal Details of JVM, Difference between JDK, JRE and JVM, Data types, variables, type conversion, casting, arrays, operators, arithmetic, bitwise, relational, Boolean, precedence, Control Statements.

UNIT II Introduction to classes in java and members of the class

15 Hours

Classes, methods, constructors, Java static Method, this, Super and final keyword, overloading, inheritance, Packages, interfaces, String handling.

UNIT III AWT and Applets

15 Hours

Exception handling - Input/output Java streams - Threads - Abstract Windowing Toolkit - Overview, working with Windows, Graphics, Text, Images - AWT Controls - Applets - Scripts - Exploring Java.

UNIT IV Swings and JDBC

15 Hours

Laying out components - Introducing Java Foundation Classes - Swing Packages – Swing – Introduction to JDBC- Type of Drivers- connecting and performing different operation on database .

COURSE OUTCOMES:

- To implement Java classes from specifications.
- To effectively create and use objects from predefined class libraries.
- To use interfaces, inheritance, and polymorphism as programming techniques.
- To use exceptions and multithreading.
- To use applets and GUI based controls.

Text Books:

Patrick Naughton and Herbert Schildt, “Java: The Complete Reference”, Tata McGraw-Hill, New Delhi, 1997.

Reference Books:

1. Aaron Walsh and John Fronckowick, “Java Bible, Programming Version 2”, IDG Books Worldwide, Inc. 2000.
2. Balagurusamy E, “Programming with JAVA”, TMG, 2007
3. Deitel H.M, Deital P.J,”Java How to program”, Sixth Edition, Prentice Hall India, 2005.
ISBN: 0131483986

JAVA PROGRAMMING LAB

Part A

1. Demonstrate various I/O streams in java.
2. Demonstrate the Reader/Writer classes in java.
3. Demonstrate the multithreading concept by implementing Runnable interface.
4. Demonstrate the multithreading concept by extending Thread class.
5. Write an applet program and using paint function make some graphics.
6. Write a program to demonstrate the usage of different Layouts in java.
7. Write a java program to demonstrate various GUI components in java (AWT / SWING) with appropriate Event Handling.
8. Creating simple JDBC application

Part – B

Design a simple windows application using swings and MYSQL by following the constraints listed below

- Should be a team project with max of two
- All the layouts should be used in the entire project
- All the validations are must
- Packages, interfaces, inheritance and Exception handling concepts must be used

MPAL16F3200	Software Engineering	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

COURSE OBJECTIVES:

- To provide an insight into the processes of software development
- To understand and practice analysis, design, development, testing of Software Engg.
- To develop skills to construct software of high quality with high reliability

UNIT I Introduction

14 Hours

Introduction to Software Engineering: Defining the Discipline, Software Process, software engineering practice, software development myths. The Changing nature of Software, **Software Process structure:** Generic process model, defining a framework activity. **Process models:** Perspective and specialized process models, the unified process.

UNIT II Requirement Analysis and Design - Traditional / WEB / Mobile applications

18 Hours

Understanding Requirements, Functional and Non-functional requirements, Requirements Modeling (Scenario-based & Class-based methods), Design Concepts, Architectural design (Webapp Design, Mobileapp Design), Software Configuration Management Process.

UNIT III Agile Implementation and Managing Change

18 Hours

AGILE development, Implementing AGILE process, Technology Directions, Project Management Concepts, Project Estimation and Scheduling, Risk Management, Maintenance and Re-engineering.

UNIT IV Software Quality Management Process, Security, Process Improvement

10 Hours

Quality Concepts, Software Quality Assurance, Testing Strategies, Application Testing, Security Engineering, Verification Models, Software Process Improvement, The SPI Process, Trends and Return of Investment

COURSE OUTCOMES:

- Get an insight into the processes of software development
- Able to understand the problem domain for developing SRS and various models.
- Able to Model software projects into high level design using DFD,UML diagrams
- Able to Measure the product and process performance using various metrics
- Able to Evaluate the system with various testing techniques and strategies

Text Books:

1. Software Engineering A practitioner's Approach, 8th edition, Roger S Pressman, Bruce R. Maxim. McGraw Hill Education, 2015.

Reference Books:

1. Software Engineering, Ian Somerville, 9th edition, Pearson education.
2. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007.

MPAL16F3300	Computer Graphics and Multimedia	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- To understand computational development of graphics with mathematics
- To provide in-depth knowledge of display systems, image synthesis, shape modeling of 3D application.
- To Understand basic concepts related to Multimedia including data standards, algorithms and software
- To Experience development of multimedia software by utilizing existing libraries and descriptions of algorithms.

UNIT I Graphics Output Primitives**12 Hours**

Introduction, Line drawing algorithms, Circle generation algorithms, Ellipse generation algorithms, OpenGL point function, OpenGL line functions.

UNIT II 2-D,3-D Transformation and 2D viewing and clipping**12 Hours**

Two dimensional transformations, Three-Dimensional Object Representations, Three- Dimensional Geometric and Modeling Transformations, OpenGL transformation functions, Color models. Window to viewport transformations, point clipping,cohen sutherland, Liang Barsky line clipping algorithms,Sutherland hodgeman polygon clipping algorithm, Text clipping

UNIT III Multimedia System Design**18 Hours**

Multimedia- Introduction, Definition and classification of media. Multimedia applications, Multimedia System Architecture, Evolving technologies for Multimedia, Defining objects for Multimedia systems.

Representation of Image on computers- Capturing Graphics and Images Computer Assisted Graphics and Image Processing, Graphics and Image Output Options Representation of Audio on computers - Digital voice and audio. Representation of Digital Video on Computers- Full motion video, Storage and retrieval

Technologies. Basics of animation-**Design of animation sequences, Traditional animation techniques.**
Methods of Controlling Animation, Display of Animation.

UNIT IV Multimedia File Handling and Hypermedia

18 Hours

Data Compression: Storage Space, Coding Requirements, Source, Entropy, and Hybrid Coding, Basic Compression Techniques, Video compression- JPEG,H.261 (Px64) Audio Compression - MPEG:
Hypermedia: Multimedia Authoring & User Interface – Hypermedia messaging - Mobile Messaging –
Hypermedia message component – Creating Hypermedia message – Integrated multimedia message standards
– Integrated Document management – Distributed Multimedia Systems.

COURSE OUTCOMES:

- Enhance the perspective of modern computer system with modeling, analysis and interpretation of 2D and 3D visual information.
- Gain the knowledge of different media streams in multimedia transmission
- Able to understand different realizations of multimedia tools
- Able to develop interactive animations using multimedia tools

Text Books:

1.Donald Hearn, M.Pauline Baker, Computer Graphics with Open GL, Pearson (Indian Edition), Third Edition.

2.Ralf Steinmetz, Klara Narstedt: Multimedia Fundamentals: Vol 1-Media Coding and Content Processing, 2nd Edition, Pearson Education, 2003.

Reference Books:

1. Parag Havaldar and Gerard Medioni, “Multimedia Systems-Algorithms, Standards and Industry Practices”, Course Technology, Cengage Learning, 2010.

2. Ralf Steinmetz and Klara “Multimedia Computing, Communications and Applications”, Pearson Education,2004.

COMPUTER GRAPHICS AND MULTIMEDIA LABORATORY

Part-A

1. Write program to create two dimensional objects such as lines, circle, ellipse.
2. Write simple programs to apply simple transformations like Translation, Scaling, Rotation.
3. Write programs to create simple three dimensional objects like cube.
4. Write simple program for three dimensional Translation.
5. Edit an image using the following:
 - i) Image enhancement
 - ii) Image transformation from color to gray scale and vice versa
 - iii) Image manipulation and Image optimization for web
 - iv) Usage of editing tools, layers, filters, special effects and color modes.
 - v) Creation of simple Gif animated images with textual illustrations, Image Compression.
6. Apply video cutting and editing for a given video.
7. Apply Audio editing for a given audio and do audio conversion from one format to another.
8. Animate objects using any one of Multimedia APIs: Java3D, DirectX, or OpenGL

Part-B

1. Develop different chart options with the given inputs by applying DDA algorithm
2. Develop different circular patterns using midpoint circle generation algorithm
3. Create a Globe with Longitude and Latitudes and Animate with given attributes
4. Develop a screen saver with curves with given attributes
5. Photoshop an image and morph it.
6. Develop a screen saver with 2D objects
7. Develop a screen saver with bouncing of 3D objects
8. Develop creative natural scenery.
9. Create an animated video.
10. Develop a short video using the details given in question-6 in part-A.

Students Should Complete all Programs from Part-A and Any Two Programs from Part – B Using Open GL. Consider all types attributes like color, thickness, styles, font, background, speed etc while doing Part - B. In the examination each student picks one question from Part – A and demonstrate any program from Part-B

MPAL16F3400	Data Communication and Computer Networks	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- To analyze the functions and design strategies of various layers.
- To understand network architectures and components required for data communication.
- To understand networking concepts and basic communication model.
- To gain knowledge of various application protocol standard developed for internet Layer.

UNIT I Network Concepts:

15 Hours

Goals and applications of Computer Networks; Topologies; Categories of Networks - LAN, MAN, WAN, point-to-point and broadcast networks; Introduction to SMDS, X.25 Networks, ISDN, frame relay and ATM networks. **Network Architecture:** Concept of protocols & services; OSI model and functions of its layers; TCP/IP reference model.

UNIT II Data communication concepts:

15 Hours

Components of a data communication system; transmission modes; transmission media - guided and wireless media; introduction to switching (circuit, message and packet) and multiplexing (frequency division and time division); concept of Modems.

Framing and Error control: Framing techniques; Error control - error detection & correction.

UNIT III Data Link Control:

15 Hours

Acknowledgments; Sliding Window protocols. Medium Access Control and LANs : Multiple Access protocols of MAC sub layer - ALOHA, 1- persistent, p-persistent and non-persistent CSMA, CSMA/CD, Collision free protocols, Limited contention protocols, Wavelength Division Multiple Access, GSM, CDMA; IEEE Standard 802 for LANs and MANs - Ethernet, token bus, token ring.

UNIT IV Routing:

15 Hours

Deterministic and Adaptive routing; Centralized and distributed routing; shortest - path; flooding; flow based; optimal; distance vector, link - state, hierarchical; routing for mobile hosts; broadcast and multicast routing;

Congestion control: Principles of congestion control; Traffic shaping; choke packets; load shedding; RSVP. Transmission control protocol (TCP); user datagram protocol (UDP); Internet protocol (IP).

COURSE OUTCOMES:

After completion this course students will be able to

- To trace the flow of information from one node to another node in the network.
- To identify the components required to build different types of networks.
- To estimate the functionalities needed for data communication into layers
- To choose the required functionality at each layer for given application
- To understand the working principles of various application protocols
- To identify the security issues and services available.

Text Books:

1. Computer Networks - Andrew s. Tanenbaum, Pearson Educations.
2. Introduction to Data communications and Networking - Behrouz, Forouzan, Tata Mc -Graw Hill.
3. Data and Computer Communications, William Stallings, Pearson education

Reference Books:

1. W. Tomasi: Introduction to Data Communications and Networking, Pearson Education.
2. P.C. Gupta: Data Communications and Computer Networks, Prentice-Hall of India.

COMPUTER NETWORKS LAB

Part – A

1. Create a small network by connecting two systems using
 - i) Straight Cabling
 - ii) Cross Cabling
2. Create a Simple Star Topological LAN in windows and provide provision for sharing the files
3. By using NS2 simulator setup a star topology with 7 nodes (n1 to n7) with n1 as source and n7 as destination n1 should be connected to router n2 and n7 is connected to network router n6 except n1 and n7 all remaining nodes are connected to n4.
4. Set up network using NS2 with source n1 connected to n4 through n2 and n3. Create an application with TCP as transport layer and calculate amount of time spent in retransmissions.
5. Create a network as like program 3 and measure number of packet dropped at n4 because of congestion.
6. Capture the traffic from any website using wire shark and tcpdump and list out all the protocols involved in transmission of packet from source to destination
7. Capture the traffic of your LAN and identify the IP Address of your default router

Part – B

1. Create a messenger application by using the socket programming which should establish communication between two systems
2. Create a FTP application to transfer the file from one application to other application in different system
3. Create a SMTP application to send the mail to any mail server in other system.

MPAL16F3510	Advanced Database Systems	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	0	1	4	5

COURSE OBJECTIVES:

- To provide an overview of PL/SQL.
- Present different indexing techniques to learn how different data structures are used to store and faster accessing of data
- Provides an overview of query evaluation techniques to understand how an optimizer analyses a query.
- Provides an overview of Distributed databases and understanding distributed recovery and distributed query evaluation.

UNIT I PL/SQL

15 Hours

PL/SQL conditions, Loops, String, Arrays, Stored Procedures, Functions, Cursors, triggers.

UNIT II Indexing

15 Hours

Indexing, Tree structures indexing, ISAM, B+ Trees, Hash Based Indexing, Linear Hashing, Extendible Hashing.

UNIT III Overview of Query Evaluation, External Sorting

15 Hours

The system catalog, operator evaluation, Algorithm for relational operations, query optimization, Alternative plans for Query evaluation.

UNIT IV Distributed Databases

15 Hours

Introduction to Distributed Databases, Distributed DBMS Architectures, Storing Data in a Distributed DBMS, Distributed Catalog Management, Distributed Query Processing, Updating Distributed Data, Distributed Concurrency Control, Distributed Recovery.

COURSE OUTCOMES:

- Implement PL/SQL programs.
- Able to implement indexing techniques and create indexes using Tree and Hash based indexing.
- Able to evaluate queries.
- Illustrate Distributed databases and explain the procedure of distributed recovery and distributed query evaluation.

Text Books:

1. Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill, 2003.
2. Donald J. Bales, Beginning PL/SQL From Novice to Professional (Expert's Voice in Oracle), Kindle Edition, APress.

Reference Books:

1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan “Database System Concepts”, Sixth Edition, McGraw Hill, 2010.
2. C.J. Date, “An Introduction to Database Systems”, Eight Edition, Pearson Education Delhi, 2003
3. Ramez Elamassri and Shankant B-Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education Delhi, 2010.
4. Alexis Leao, Mathews Leon, Database Management System, (leon press)
5. Scott Urman , ORACLE PL/SQL Programming

Advanced and Distributed Databases Laboratory

1. write a PL/SQL block for IF Condition
2. write a PL/SQL block for IF and else condition
3. write a PL/SQL block for IF AND ELSEIF
4. write a PL/SQL block for LOOP
5. write a PL/SQL Procedure for cursor implementation
6. write a PL/SQL Procedure for explicit cursors implementation
7. write a PL/SQL Procedure for implicit cursors implementation
8. write a PL/SQL block to implementation function
9. write a PL/SQL function to search for an item from the given database
10. write a Trigger to pop-up the DML operations
11. write a Trigger Using Message Alert.
12. Create a Trigger for Raise appropriate error code and error message.
13. Create a Trigger for a table it will update another table while inserting values.

COURSE OBJECTIVES:

- Understand why files are maintained.

MPAL16F3520	Business Data Processing with COBOL	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	0	1	4	5

- Analyzing basic operations and control structures of the COBOL programming language

UNIT I Introduction**12Hours**

Coding Format for COBOL Programs, Structure of a COBOL Program, Character Set, COBOL words, Data Names and Identifiers, Literal, Figurative Constants, Continuation of lines and notations .

UNIT II Identification, Environment and Data Division**18Hours**

General Formats, Configuration Section, Input-Output Section, Level Structure, Data Description entries, Picture Clause, Value Clause, File Section, Working-storage Section, Editing characters, Procedure Division, Data Movement Verb, Arithmetic Verbs, Sequence Control Verbs, Input and Output Verbs, Conditional Verb.

UNIT III Different Types of Clauses and other Verbs**15Hours**

Clauses, Elementary and Group Moves, Corresponding Options, Rounded Option, On Size Error Option, Compute Verb, Conditions, If Statements, Alter Statement, Perform Statements, Exit Statement, Array Processing and Table Handling, Set Verb, Search Verb.

UNIT IV Sequential File Processing, Sorting and Merging of Files**15Hours**

File Characteristics, File Control Entries, File Description, Sequential Files, I-O Control Paragraph, Sort Verb, Merge Verb, Relative Files, Indexed Sequential Files, COBOL Subroutine.

COURSE OUTCOMES:

- Able to design small cobol programs using various divisions and control statements.
- Able to design various types of files (sequential,Random,Indexed-sequential)
- Design COBOL report programs.

Text Books:

1. M K Roy and D Ghosh Dastidar: COBOL Programming Including MS COBOL and COBOL-85, 2nd Edition, Tata McGraw Hill, 2001. (Chapters: 3.1 to 3.10, 4.1, 4.2, 5.1 to 5.7, 6.1 to 6.7, 8.1 to 8.7, 9.1 to 9.5, 10.1 to 10.6, 11.1 to 11.10, 13.1 to 13.4, 13.6, 14.1 to 14.7, 16.1, 16.2, 18.1 to 18.7, 19.1 to 19.6)
2. Nancy Stern and Robert A Stern: Structured COBOL Programming, 11th Edition, Willey Publications, 2006. (Chapters: 1, 6, and 7)

Reference Books:

1. Shelly Cashman Foreman: Structural COBOL Programming, 2nd Edition, Thomson Course Technology.
2. David M. Collopy: Introduction to COBOL, A Guide to Modular Structured Programming, Pearson Education, 2000

COBOL LABORATORY**PART-A:**

1. Program using various picture clause.
2. Program on various arithmetic verbs.
3. Program on Sequential file.
4. Program on Relative file.
5. Program on Indexed-sequential file.
6. Program on sort and merge verbs.

PART-B:

Develop small project using files and report concepts.

MPAL16F3530	Linux Programming	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	0	1	4	5

COURSE OBJECTIVES:

- Understand the history of Unix and Linux.
- Understand the Unix/Linux file system.
- Issue essential commands from the command line.
- Understand file access permissions.
- Learn to write shell scripts.

UNIT I Linux Operating System

12 Hours

Linux history, Linux features, Linux distributions, Linux’s relationship to Unix, Overview of Linux architecture, Installation, Start up scripts, Linux Security, User Management: using the command line & GUI tools.

UNIT II Resource Management in Linux

12 Hours

File and directory management, system calls for files Process Management, Signals, IPC: Pipes, FIFOs, System V IPC, Memory Management, library and system calls for memory.

UNIT III Shell Programming

18 Hours

Available shells under Linux (viz. Bash, TCSH, Korn or so on), different Shell features, editors, shell commands, shell meta characters, file name substitution, shell variables, command substitution, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, Filters- The grep family, advanced filters-sed and awk.

UNIT IV Files and Directories

18 Hours

Files and Directories, File Concept, File types, File System Structure, system calls for file I/O operations, file status information, file permissions, file ownership, links-soft links and hard links, Handling Directories.

Linux Process: Process concept, Kernel support for process, process attributes, process hierarchy, process states, process control, system call interface for process management system, I/O redirection, Differences between threads and processes.

COURSE OUTCOMES:

- Describe the directory layout of a typical Linux system, and maintain and secure Linux directories and files
- Use basic Linux commands.
- Use Linux pipes and file redirection efficiently to manipulate data.
- Form simple regular expressions to define patterns with various - Linux commands.
- Describe and use the LINUX operating system.
- Describe and use the fundamental LINUX system tools and utilities.
- Describe and write shell scripts in order to perform basic shell programming.
- Describe and understand the LINUX file system.

Text Books:

1. Arnold Robbins, “Linux Programming by Examples The Fundamentals”, Pearson Education, 2nd Ed., 2008.
2. Cox K, “Red Hat Linux Administrator’s Guide”, PHI, 2009.
3. R. Stevens, “UNIX Network Programming”, PHI, 3rd Ed., 2008.
4. Sumitabha Das, “Unix Concepts and Applications”, TMH, 4th Ed., 2009.

Reference Books:

1. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, O’Reilly Media, 6th Ed., 2009.
2. Neil Matthew, Richard Stones, Alan Cox, “Beginning Linux Programming”, 3rd Ed., 2004.
3. Robert Love, “Linux System Programming” ,O’Reilly Media, 2nd Ed., 2007.
4. Evi Nemeth, Garth Snyder, Trent R. Hein, “Linux Administrator Handbook”, Pearson, 2nd Ed., 2007.
5. Mark G. Sobell, “A Practical Guide to Ubuntu Linux”, Pearson, 2nd Ed., 2008.
6. Cox K, “Red Hat Linux Administrator’s Guide”, PHI, 2001.

LINUX PROGRAMMING LABORATORY

Note: Use Bash for Shell scripts.

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
5. Write a shell script to find factorial of a given integer.
6. Write an awk script to count the number of lines in a file that do not contain vowels.

MPAL16F3610	Principles of User Interface Design	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

COURSE OBJECTIVES:

- To understand the basics of User Interface Design.
- To design the user interface, design, menu creation and windows creation
- To understand the concept of menus, windows, interfaces, business functions, various problems in windows design with color, text, Non-anthropomorphic Design.
- To understand the design process and evaluations.

UNIT I Interactive Software and Interaction Device

18 Hours

Human-Computer Interface, Characteristics of Graphics Interface, Direct Manipulation Graphical System Web User Interface, Popularity, Characteristic & Principles. HUMAN COMPUTER INTERACTION: User Interface Design Process, Obstacles, Usability, Human Characteristics In Design, Human Interaction Speed, Business Functions, Requirement Analysis, Direct- Indirect Methods, Basic Business Functions, Design Standards, General Design Principles, Conceptual Model Design, Conceptual Model Mock-Ups.

UNIT II Windows

16 Hours

Characteristics, Components, Presentation Styles, Types, Managements, Organizations, Operations, Web Systems, System Timings, Device-Based Controls Characteristics, Screen- Based Controls, Human

Consideration In Screen Design, Structures of Menus, Functions of Menus, Contents of Menu, Formatting, Phrasing The Menu, Selecting Menu Choice, Navigating Menus, Graphical Menus, Operate Control, Text Boxes, Selection Control, Combination Control, Custom Control, Presentation Control.

UNIT III Multimedia

12 Hours

Text for Web Pages, Effective Feedback, Guidance & Assistance, Internationalization, Accessibility, Icons, Image, Multimedia, Coloring.

UNIT IV Design Process and Evaluation

14 Hours

User Interface Design Process, Usability Testing, Usability Requirements and Specification procedures and techniques, User Interface Design Evaluation.

COURSE OUTCOMES:

- Knowledge on development methodologies, evaluation techniques and user interface building tools
- Explore a representative range of design guidelines
- Gain experience in applying design guidelines to user interface design tasks.
- Ability to design their own Human Computer

Text Books:

1. Ben Shneiderman, Designing the User Interface, Pearson Education, 5th Edition, 2010
2. Wilber O Galitz, An Introduction to GUI Design Principles and Techniques, John- Wiley & Sons, 2007

Reference Books:

1. Jeff Johnson, Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules , Morgan Kaufmann, 1st Edition, 2010.
2. Alan J Dix et al, Human-Computer Interaction, Pearson,2009.

Case Study:

Unit 1: Identify and draw the various screens in Automated Teller Machine (ATM) for doing a transaction.

Unit 2: Identify the screens available in windows office tools like MS Word, MS Excel, MS Power point etc.

Unit 3: i)Task: Design of the interface of a mobile tracking application for an Operating System.

Tools: Pencil sketching, Adobe Photoshop, Adobe After Effects. (Any other tool can be used for designing)

ii)Addressing usability in E- Commerce sites

Unit 4:Designing any E- Commerce sites.

COURSE OBJECTIVES:

MPAL16F3620	Data Warehousing and Data Mining	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

- To expose the students to the concepts of data warehousing architecture and OLAP
- To understand data mining principles and techniques and introduce DM applications
- To understand the basic concepts and algorithms of association analysis.
- To understand the concept of classification for the retrieval purposes.

UNIT I Data Warehousing**15 Hours**

Introduction, Operational Data Stores (ODS), Extraction Transformation Loading (ETL), Data Warehouses Design Issues, Guidelines for Data Warehouse Implementation, Data Warehouse Metadata Online Analytical Processing (OLAP): Characteristics of OLAP systems, Multidimensional view and Data cube, Data Cube Implementations, Data Cube operations, Implementation of OLAP and overview on OLAP Software's.

UNIT II Data Mining**15 Hours**

Challenges, Data Mining Tasks, Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity, Data Mining Applications.

UNIT III Association Analysis: Basic Concepts and Algorithms**15 Hours**

Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Item sets, Alternative methods for generating Frequent Item sets, FP Growth Algorithm, Evaluation of Association Patterns

UNIT IV Classification and Clustering**15 Hours**

Basics, General approach to solve classification problem, Decision Trees, Rule Based Classifiers, and Nearest Neighbor Classifiers. Bayesian Classifiers, Estimating Predictive accuracy of classification methods, improving accuracy of clarification methods.

Clustering : Methods, Partitional Methods, Hierarchical Methods, Density Based Methods, Features of Cluster Analysis.

COURSE OUTCOMES:

- To be able to illustrate the issues surrounding the Integration of theory and practice
- To be able to evaluate new and emerging technologies in terms of their suitability for BI and DW software development purposes.
- To be able to apply the association rules for mining the data
- Design and deploy appropriate classification techniques .

Text Books:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Addison Wesley, 2005.
2. G. K. Gupta: Introduction to Data Mining with Case Studies, 3rd Edition, PHI, New Delhi, 2009.

Reference Books:

1. Data Mining and Data Warehousing, Bharat Bhushan Agarwal, Sumit Prakahs Tayal, University Science Press, First Edition 2009, New Delhi.
2. Alex Berson and Stephen J. Smith: Data Warehousing, Data Mining, and OLAP Computing Mc GrawHill Publisher, 1997.
3. Arun K Pujari: Data Mining Techniques University Press, 2nd Edition, 2009.

COURSE OBJECTIVES:

- Understand the basic concepts of ERP systems and the principles of ERP systems.

MPAL16F3630	Enterprise Resource Planning	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

- Know the ERP related technologies.
- Knowledge of major ERP components.

UNIT I Introduction to ERP and Its Technologies**15 Hours**

An Overview- Basic ERP concepts-Risks of ERP- Benefits of ERP- ERP and Related Technologies – Business Intelligence – Business Process Reengineering – Data Warehousing – Data Mining – OLAP – Product life cycle Management – Supply Chain Management – Customer Relationship Management – Advanced Technology and ERP Security. (PART I & II)

UNIT II ERP Implementation & Business Modules**15 Hours**

Implementation Life Cycle - Implementation Methodology - Project Management and Monitoring – Measuring the Performance of the ERP System - Business Modules of an ERP Package – Finance- Manufacturing – Quality Management – Marketing – Sales, Distribution and Service. (PART III, IV & V)

UNIT III ERP Market**15 Hours**

ERP Marketplace and Marketplace Dynamics – SAP AG – Oracle Corporation – PeopleSoft – JD Edwards – QAD Inc. – SSA Global – Lawson Software – Epicor – Intuitive. (PART VI)

UNIT IV ERP Present and Future:**15 Hours**

Turbo Charge the ERP System – EAI – ERP & E- Business- ERP II – Future directions and Trends in ERP. (PART VII)

COURSE OUTCOMES:

- Enterprise Resource Planning provides information about how to develop an enterprise by integrating functional areas like marketing, finance, production, procurement, sales to bring a successful ERP system different from traditional approach.
- Deals with the difficulties faced by the organization in implementing a successful ERP system by coordinating people, resources and technology with the concept of redesigning, re-training and re-tooling the business process.

- Provides enough idea and helps the student in developing an enterprise and to follow successful business practices in implementing any new software package in the organization.

Text Book:

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, 1999.

Reference Books:

1. Joseph A. Brady, Ellen F. Monk, Bret J. Wangner, “Concepts in Enterprise Resource Planning”, Thomson Learning, 2001.
2. Vinod Kumar Garg and N.K .Venkata Krishnan, “Enterprise Resource Planning - concepts and Planning”, Prentice Hall, 1998.
3. Jose Antonio Fernandz, “ The SAP R /3 Hand book”, Tata McGraw Hill

Open Elective

COURSE OBJECTIVES:

- Define the principle of Web page design
- Define the basics in web design

MPAL16F3710	Basics of Web Designing	L	T	P	C	Hrs/Wk
Duration :16 Wks		4	0	0	4	4

- Visualize the basic concept of HTML.
- Recognize the elements of HTML.
- Introduce basics concept of CSS.
- Develop the concept of web publishing
- To study about the Basic web concept and Internet protocols
- To learn about the XHTML Forms, Frames and Tables

UNIT I Web Foundation

12 Hours

The Evolution of web , Internet Application ,W3C guidelines, WWW, Network , TCP/TP ,Higher level protocols Important components of the web , The web Programmer Tool Box Web servers, Web browsers , URL, MIME ,security.

UNIT II Introduction to HTML

15 Hours

SGML Framework , Html File structure ,Basic Syntax, Basic Text Markup : <p>,
, <pre>,<h1>, Block quotations, Font styles and sizes ,Images ,Hypertext Links ,Lists ,Tables Forms ,Frames, Introduction to XHTML -Syntactic Differences between HTML and XHTML.

UNIT III CSS and Basic of JavaScript

17 Hours

Introduction, Levels of style sheet, selector forms, Font properties, List properties, color Alignment of Text, The Box Model, Back ground Images, The and <div> Tags .Introduction of JavaScript, organization of the language, Data types, String operations, Date objects , Control statements pattern Matching using regular expressions

UNIT IV Java Script

16 Hours

Java script execution environment, Arrays, Constructors, variables and Functions, Document object model, Elements Access, Events and event handling, positioning Elements, Changing color and Fonts

COURSE OUTCOMES:

- Create an Information Architecture document for a web site.
- Construct a web site that conforms to the web standards of today and includes e-commerce and web marketing
- Publish the website to a remote server using FTP.
- Perform regular web site maintenance (test, repair and change).

Text Books:

1. Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson education, 2012.
- 2 . M. Srinivasan: Web Technology Theory and Practice, Pearson Education, 2012

Reference Books:

1. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2009.
2. Internet Technology and Web Design, Instructional Software Research and Development (ISR D) Group, Tata McGraw Hill, 2011.

Basics of Web Designing Laboratory

1. Write a HTML Program to illustrate text formatting tags
2. Write a Program to demonstrate Order List tag
3. Create an HTML demonstrate usage of Table tag .
4. Explain HTML Program how to implement Frame tag
5. Design an HTML document to store information about user using different form tags
6. Develop and demonstrate the usage of inline and external style sheet using CSS
7. Develop and demonstrate a XHTML file that includes JavaScript script for the following problems
Input: A number n obtained using prompt → Output: The first n Fibonacci numbers
8. Develop and demonstrate a XHTML file that includes JavaScript script for the following problems
Input: A number n obtained using prompt → Output: A table of numbers from 1 to n and their squares using alert.

MPAL16F3720	PC-Hardware Training	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	0	1	4	5

COURSE OBJECTIVES:

- To understand the basic structure and operations of a digital computer.
- To understand the operations of the peripheral devices in the digital computer.
- To understand the different ways to communicate with I/O devices and standard I/O Interfaces in a digital computer.
- To understand the basics of assembling, CMOS setup and trouble shooting of the digital computer.

UNIT I

10 Hours

Fundamentals of Computer:Block diagram and brief introduction of each block. Types of computers.

UNIT II

20 Hours

Personal/ Micro Computers: PC, Main Parts: CPU Box, Monitor, & Peripherals [Keyboard, Mouse, and Speaker]. Inside CPU Box: Motherboard, I/O Cards, Cables, Floppy Drivers, HDD, CD-Drive.

Mother Board in Detail: Nomenclature, technology, standards AMD CPUs, Cyrix CPUs. CPUs: CPU over clocking, troubleshooting, CPU problems. Chip Sets: AMD chip sets, Intel chip sets, VIA chip sets SIS. Chip sets, OPTI chipsets, Legacy and support ICS.

UNIT III

15 Hours

Memory: Basic Concept - Types of Memory - RAM and ROM

Memory Chips: RAM and ROM EPROM. Memory Modules and packaging, Logical and Physical organization of memory in computer. Cache Memory - LX and LZ, EDO. Various terms used in computer memory.

UNIT IV

15 Hours

PC-Assembly and CMOS Setup and Troubleshooting: Observation of all parts of Floppy drives, HDD, CD, and SMPS. Identification of cables and computers. Mounting Motherboard in cabinet Installation of cards, devices and then connecting cables. Fitting of cabinet. CMOS – Setup Troubleshooting.

COURSE OUTCOMES:

Students will have knowledge about

- Basic structure of a digital computer
- Understanding the Communications between all the peripherals.
- Memory and Memory chips.
- Assembling and Trouble shooting of the computer system.

Text Books:

1. Winn L Rosch, Hardware bible, Techmedia publications.
2. Stephon J Bigelow, Trouble shooting, maintaining and repairing PCs, Tata McGraw Hill Publication.
3. Manohar Lotia, Pradeep, Nair, Bijal Lotia, Modern All about printers, BPB publications.

PC-Hardware Training Laboratory

1. Identification of PC Components, Assembling the PC and Power Supply (SMPS-Switch Mode Power Supply).
2. Installation of Operating Systems.
3. Installation of Software Packages .
5. Replacing and fitting of Hard Disk and Removable Disk Drives on PC .
6. Disc Managers and it's use.

7. Virus removal and disc scan.
8. Backup and Restoration utility.
9. Connecting input/output devices and installation of their driver software.
10. Configuration of Audio and Video.
11. Trouble shooting of the PC.

REVA UNIVERSITY
MASTER OF COMPUTER APPLICATIONS
Scheme of Teaching, Examination and Credits
FOURTH SEMESTER MCA
Scheme & Syllabus

Sl. No	Code	Title	HC/ SC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL16F4100	Analysis and Design of algorithms	HC	2	1	1	4	6
2	MPAL16F4200	.NET frame work and Applications	HC	2	1	1	4	6
3	MPAL16F4300	Advanced Web Technologies	HC	2	1	1	4	6
	MPAL16F4400	Cloud Computing and Applications	HC	4	0	0	4	4
4	MPAL16F4500	Minor Project-1	HC	1	1	4	6	11
5	MPAL16F4610	NoSQL	SC	3	0	1	4	5
	MPAL16F4620	Advanced Java Programming						
	MPAL16F4630	Data Science and Big Data Analytics						
6	MPAL16F4710	Software testing and Quality Assurance	SC	4	0	0	4	4
	MPAL16F4720	Internet of Things						
	MPAL16F4730	Wireless Communication and Mobile Computing						
Total Credits				18	4	8	30	42

MPAL16F4100	Analysis and Design of Algorithms	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- To Provide the knowledge on the Analysis of Algorithms
- To understand and apply different design techniques available for designing and algorithms.
- To judge which design technique is suitable for a given problem.
- To understand the complexities involved in the design of parallel algorithms.

UNIT I Introduction & Brute Force

15 Hours

Notation of Algorithms, Asymptotic Notations and Basic Efficiency Classes , Mathematical Analysis of Recursive and Non Recursive Algorithms with Examples, Brute Force: Selection Sort , Bubble Sort, Sequential Search, String Matching and Knapsack Problem

UNIT II Divide and Conquer & Decrease and Conquer

12 Hours

Divide and Conquer: Merge Sort, Quick Sort and Binary Search

Decrease and Conquer: Insertion Sort, Depth First and Breadth First search and Topological Ordering

Transform and Conquer: Heap Sort.

UNIT III Dynamic Programming & Greedy Technique

15 Hours

Dynamic Programming: Warshall's and Floyd's Algorithm, 0/1 Knapsack Problem with memory Functions, Greedy Technique: Introduction, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Fractional Knapsack Time and Space Tradeoff: Input Enhancement in string matching .

UNIT IV Limitations, Back Tracking & Approximation Algorithms

18 Hours

Limitations of Algorithm power: Lower bound Arguments, Decision Trees, P, NP and NP Complete Problems

Back Tracking: Introduction, N- Queens Problem, Branch and Bound: Introduction, Knapsack Problem,

Approximation Algorithms: Introduction, Knapsack Problem, Randomized Algorithms

COURSE OUTCOMES:

- Able to design and analyze the algorithms for different problems.
- Able design one algorithm for any problem in all design techniques.
- Able to identify simple approximation algorithms to different combinational problems.
- Able to identify the problem which can't be parallelized.

- Able to realize that it is difficult to design algorithms to combinational problems for larger input.

Text Books:

1. Anany Levitin: Introduction to the Design and Analysis of Algorithms, Pearson Education, 2nd Edition
2. Horowitz E., Sahani S., Rajasekharan S.: Computer Algorithms, Galgotia Publication 2007

Reference Books:

1. Michael T Goodrich and Roberto Tamassia : Algorithm Design, Wiley India
2. R C T Lee, S S Tseng, R C Chang, Y T Tsai : Introduction to Design and Analysis of Algorithms: A Strategic Approach, Tata McGraw Hill.
3. Cormen T.H., Leiserson C.E., and Rivest R.L.: Introduction to Algorithms, PHI 1998.

DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY

Part – A

1. Design a program to find the minimum spanning tree from a weighted connected graph using kruskals and prims algorithm
2. Obtain the topological ordering of graph by using Source removal process and DFS
3. Design solution to 0/1 Knapsack by using dynamic programming and an approximation algorithm. calculate approximation ratio for the problem
4. To find the single source shortest path design a program by using Dijkstras and Belmanford Algorithm and calculate the time taken by both of them.
5. Design a parallelized Warshals algorithm and computer the speed up achieved

Part - B

Design an application in any known programming language to compute the time taken by the following algorthims

- Insertion Sort
- Count Sort
- Heap Sort
- Quick Sort
- Merge Sort
- Radix Sort
- Shell Sort

For the different kinds of inputs like

- a) Random input
- b) 100 % Sorted
- c) 95 % Sorted
- d) 75% Sorted
- e) 25% Sorted
- f) 10% Sorted

Plot a graph for each case between number of inputs and time taken. Suggest best suitable algorithm for different situations.

Note: size of input should start from 1 lack and should extend up to 10 millions

Prepare a dissertation report which should include few changes to the algorithm so that it have better performance such as Changing data structure, Parallel Programming, Changing a logic, Designing an algorithm by using one or more algorithms etc..,

MPAL16F4200	.Net Framework and Applications	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- To learn the basic concepts of .NET Framework
- To learn the concepts of object oriented programming using C#.NET
- To get the knowledge on the windows programming using C#.NET
- To get the knowledge on the ADO.NET
- To get knowledge on the basic concept of ASP.NET

UNIT I .NET Framework 4.0

15 Hours

Introduction to the .NET Platform , Common Language Runtime(CLR) , The Common Type Specification(CTS) , The Common Language Specifications (CLS) ,Interoperability, Assemblies , Shared Assemblies, Private Assembles, GAC .NET Base Classes , CLR Debugger, Deployment of .net applications, Hallo world console application using c#, Visual studio IDE, Introduction to C# , Data Type, Operators, Flow Control and Iteration , Arrays and Strings, Basics of C# Classes, Members of the Class, Reference Types and Value Types, Boxing and Unboxing, Reflection, The Preprocessors, Name Spaces.

UNIT II Object Oriented Programming in C#

15 Hours

Object-Oriented Programming in C#, Encapsulation, Inheritance , and Polymorphism, Interfaces, Introduction to .NET Collections (including Custom Collections) ,Generic Programming, Custom Indexers, Exception Handling, Garbage Collection , Input and Output (Directories ,Files, and Streams) Delegates and Events-Type Reflection and Attributes, Operator Overloading ,Expression and operations: using the?? (Null Coalescing) Operator, using the :(scope resolution) operator and using the is and as operator.

UNIT III Data Access with ADO.NET

15 Hours

Windows Programming: Windows Forms, Handling Events on Tools(buttons, Textboxes, Radio buttons, combo boxes, Grid and List Views, Date Picker, List box, etc...). ADO.NET: Connected and Disconnected Data modal, Creating Table from Application, Inserting, Deleting and Updating Database, Executing Stored Procedures.

UNIT IV Web Applications Using ASP.NET

15Hours

Web Application: Creating web page with navigations using Site map and menu strip, Creating and Applying Master page, understanding of state management by using sessions, cookies, view state and application object. Validates, Deployment of an ASP.NET webpage in IIS7.

COURSE OUTCOMES:

- Able to design a simple console application with basic concepts of C#.NET
- Able to apply the concepts of Object Oriented Programming using C#.NET
- Able to design an application which connects with databases
- Able to design a website ASP.NET

Text Books:

1. C# 2012 Programming, Covers .Net 4.5, Black Book: Kogent Learning Solutions
2. Pro C# 5.0 and the .NET 4.5 Framework (Expert's Voice in .NET), Andrew Troelsen, Sixth Edition, Apress publishers.

Reference Books:

Professional C# 5.0 And .Net 4.5.1 by Christian Nagel , Jay Glynn, Morgan Skinner

.NET FRAMEWORK AND APPLICATIONS LABORATORY

Part – A

1. Design and develop a C# program following constrains

- Room class with 1 abstract method and 1 Virtual Method in it
- Class-Room and Lab classes should inherit Room Class
- Class-Room should override both abstract and virtual method from Room Class
- Lab class Should override only abstract class

Display proper messages in the main class

2. Design and develop a C# program which should create a class ‘ArithmeticOperations’ which should have methods sum, sub, mul and div with two integer arguments and no return type. Access these methods by creating delegate. Perform all this operations on the same input and display the results.

3. Design and develop a C# program which creates an event named file_created. This event should fire as soon as a file is created. Inside the event handling method open the file in write mode and insert a text “DATA INSERTED SUCCESSFULLY” in to the file. Display that content in the main function

4. Design and develop a C# Program which should create a table in SQL SERVER database and insert some content in to that table and display that content in the console.

5. Design and develop a windows form for student and accept his

usn(in Text box, should have 10 characters only),

name(in textbox, should not have numbers in it),

address(in multiline textbox) ,

Course(in combo box),

Sem(in combo box with 1 to 6 sems)

Section(in combo box with minimum three sections for each course) ,

Year of Joing(in combo box with years staring from 2007 to till year should increase the year based on current year)

Accept these details with proper validation and insert them in Oracle Database table

PART – B

Design an ASP.Net website using C# by following the constraints listed below

- Should be a team project with max of two members
- Should use any version control software for version management
- Database with stored procedures is must
- Should have minimum of 3 reports

Following concepts are must

- i) Different Master pages for Different Users
- ii) Sessions
- iii) Login Screen
- iv) GridView, ListView
- v) Crystal Reports
- vi) DLL for all the database processing
- vii) DLL for all the validations
- viii) Disconnected data modal for filling comboboxs and gridviews

MPAL16F4300	Advanced Web Technologies	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- To get the knowledge on the perl scripting
- To learn the concepts of server programming by using PHP
- To understand the use of AJAX objects over normal HTML objects
- To understand the need of architectures like SOAP

UNIT I Programming in Perl

12 Hours

Origins and uses of Perl, Scalars and their operations, Assignment statements and simple input and output, Control statements, Fundamentals of arrays, Hashes, References, Functions, Pattern matching, File input and output, Examples. CGI Scripting, Developing CGI Applications, Processing CGI, CGI.pm, CGI.pm methods, An Example, Adding Robustness, Carp, Cookies

UNIT II Introduction to PHP**15 Hours**

Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Building Web applications with PHP Tracking users, cookies, sessions, Using Databases, Handling XML.

UNIT III Ajax – II**18 Hours**

Introduction to Web 2.0 and Web 3.0 and Rich Internet Applications, Overview of Ajax, Examples of usage of Ajax: Updating web page text, Chatting in real time, Dragging and dropping, Downloading images. Creating Ajax Applications: An example, Creating the JavaScript, Creating and opening the XMLHttpRequest object, Connecting to the server, Adding Server-side programming, Sending data to the server uses GET and POST, Using Ajax together with XML. Using inner functions, HTML header request and Ajax, Validating input from the user, DOM, Appending new elements to a web page using the DOM and Ajax Replacing elements using the DOM, Handling timeouts in Ajax .

UNIT IV Reverse AJAX and Web services**15 Hours**

COMET: HTTP streaming – request delays, file modification example, using Iframes, browser specific approaches, server-sent DOM events, connection management and server-side support. Introduction to Web Services., Combining protocols to build Web services – clarifying web services, REST Services, WS- * Web services using SOAP and WSDL, REST vs WS-* services. Web Ontology Language.

COURSE OUTCOMES

- Able design server webpage by using perl scripting
- Able to design a server side webpage by using PHP
- Able to use AJAX objects over normal HTML objects
- Able to design a server side scripting by using SOAP architecture

Text Books:

1. Professional AJAX 2nd Edition, Nicholas C Zakas et al, Wrox publications, 2007.
2. SOA: Concepts, Technology and Design – Thomas Erl, Pearson, 2005

Reference Books:

1. Chris Bates: Web Programming Building Internet Applications 3rd edition Willey india
2. Robert W. Sebesta: Programming the World Wide Web, 4th edition Pearson Education

ADVANCED WEB TECHNOLOGIES LABORATORY

Part - A

1. Write a Perl Script which counts the word in a given file
2. Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.
3. Create a registration form using PHP which contains fields name, Roll No, Gender and a submit button All the details should be displayed in other server page when the user clicks the submit button.
4. Create a PHP programs necessary to implement the ticket reservation system using MYSQL Database.
5. Write an AJAX program for parsing a JSON file and formatting the output
6. Develop a web application for Airline Reservation System using PHP & AJAX

Part – B

Design a simple server side webpage using PHP and MYSQL by following the constraints listed below

- Should be a team project with max of two
- Most of the controls should be used from AJAX
- Java script should be used for client scripting

MPAL16F4400	Cloud Computing and Applications	L	T	P	C	Hrs/Wk
Duration :16 Wks		4	0	0	4	4

COURSE OBJECTIVES:

- To introduce the broad perceptive of cloud architecture and model
- To understand the concept of Virtualization and design of cloud Services
- To be familiar with the lead players in cloud.
- To understand the features of cloud simulator
- To apply different cloud programming model as per need.
- To learn to design the trusted cloud Computing system

UNIT Fundamentals of Cloud Computing

15 Hours

Cloud computing at a glance, The vision of cloud computing, Defining a cloud, A closer look, Historical developments, Building cloud computing environments Application development, Computing platforms and

technologies Principles of Parallel and Distributed Computing, Elements of parallel computing, Elements of distributed computing, Technologies for distributed computing-, Scaling and types of scaling, Service-oriented computing.

UNIT II Fundamental concept and Models

15 Hours

Basics of Virtualization, Characteristics of virtualized environments, Taxonomy of virtualization techniques, - Types of Virtualization, Virtualization and cloud computing, Technology examples, Xen: par virtualization, VMware: full virtualization –Just introduction.

UNIT III Cloud Infrastructure Mechanisms and Architecture

18 Hours

The cloud reference model, Cloud Delivery Models: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), Comparing Cloud Delivery Models, Cloud Deployment Models: Public Clouds, Community Clouds, Private Clouds, Hybrid Clouds, Fundamentals of Cloud Architecture, Introduction to Cloud Software Environments , Architecture of Eucalyptus, Open Nebula, OpenStack, Aneka.

UNIT IV Cloud Applications

12 Hours

Scientific applications, Healthcare: ECG analysis in the cloud, Biology: protein structure prediction, Geoscience: satellite image processing, Business and consumer applications, CRM and ERP, Social networking, media applications. Programming Models : Parallel and Distributed Programming Paradigms , MapReduce and cloud storage concepts , Deploying applications in the cloud, open cloud platforms AWS, GAE.

COURSE OUTCOMES:

- Compare the strengths and limitations of cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing
- Apply suitable virtualization concept.
- Choose the appropriate cloud player, Programming Models and approach.
- Address the core issues of cloud computing such as security, privacy and interoperability
- Design Cloud Services and Set a private cloud

Text Books:

1. Rajkumar Buyya, Christian Vechiolla, Thamarai Selvi, “Mastering Cloud Computing , Elsevier publications, 2013, USA
2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, “Cloud Computing: Principles and Paradigms”, Wiley, India .
3. Kai Hwang, Geoffrey C Fox, Jack G Dungaree, “Distributed and Cloud Computing, From ParallelProcessing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.

4. Thomas Erl, Zaigham, Mahmood, Ricardo Puttini, “ Cloud Computing: Concepts, Technology & Architecture”, Prentice Hall/Pearson.

Reference Books:

1. John W. Rittinghouse and James F. Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2010.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009.
3. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud”, O'Reilly.

MPAL16F4500	Minor Project-I	L	T	P	C	Hrs/Wk
Duration :16 Wks		1	1	4	6	11

Minor Project Evaluation System and Guide Lines

- Minor Project is evaluated for 30 Marks
- Evaluation is done for individual not for team
- Modules should be clearly explained along with the connectivity with other modules
- A report should be created with minimum of 25 pages, inclusive of

- a) Abstract
- b) Introduction
- c) Fundamental Diagrams to explain the project
- d) Database and stored procedure design
- e) Screen shots
- f) Conclusion
- g) Bibliography

MPAL16F4610	NoSQL	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	0	1	4	5

COURSE OBJECTIVES:

- To learn the latest trends in databases.
- To acquire knowledge in parallel, distributed databases and its applications.
- To understand the usage of advanced data models.
- To learn emerging databases like MongoDB, Cassandra, HBase etc.
- To understand the principles behind Map reduce.

UNIT I Introduction to NOSQL

16 Hours

Introduction to NoSQL Definition of NOSQL-Challenges in traditional RDBMS- Need for NOSQL- History of NOSQL and Different NOSQL products aggregate data models Need for schema less databases -Types of NOSQL Data bases- key-value Column store and document data models NOSQL Storage Architecture Key-value stores-Redis-Column Family Databases-internals, Cassandra storage architecture, Document Databases internals-MongoDB storage architecture-Horizontal Scaling through sharding.

UNIT II Key-Value Stores and Column stores

14 Hours

Introduction to Key-value stores- Exploring Redis Redis data model Storing Data in and Accessing Data from Apache Redis –Querying in Redis using examples Redis use cases. Introduction to Column stores- Exploring HBASE – HBASE data model Storing Data CRUD operations in HBASE.

UNIT III Document stores and its applications

15 Hours

Introduction to Document stores, Exploring MongoDB, MongoDB data model, Storing Data in and Accessing Data from MongoDB, Querying in MongoDB using examples, Interact with MongoDB using any one Language Binding (Java/Python/PHP). MongoDB use cases.

UNIT IV Advanced NOSQL

15 Hours

Big Data processing with MongoDB, Import and Export commands in MongoDB, MongoDB Database Administration, MongoDB Indexing.

COURSE OUTCOMES:

- Able to understand the latest trends in databases
- Able to distinguish between the types of NOSQL databases.
- Able to understand the data models in these databases.
- Able to design and write queries in NOSQL Databases.

Text Books:

1. Eelco Plugge, Peter Membrey and Tim Hawkins: The Definitive guide to MongoDB, The NoSQL Database for Cloud and Desktop Computing, Apress publication 2010.
2. Lars George : HBase: A definitive Guide, O'Reilly publications, 2011.
3. Josiah L. Carlson : Redis in Action, Manning Publications, 2013.
4. Dan Sullivan : NoSQL for mere Mortals, Addison-Wesley, 2016.

Reference Books:

1. "Professional NOSQL" by Shashank Tiwari, 2011, WROX Press
2. Kristina Chodorow, MongoDB: The Definitive Guide, 2nd Edition, O'Reilly publications, 2013

Reference Websites:

1. www.mongodb.org
2. www.redis.io
3. www.hbase.apache.org

NoSQL Laboratory

1. NoSQL Lab CRUD operations in Key-value stores Redis
2. CRUD operations using Column family stores HBASE.
3. CRUD- Operations using MongoDB
4. Connecting MongoDB using PHP
5. Import and Export Big Data using MongoDB
6. Indexing in MongoDB
7. Indexing in MongoDB

MPAL16F4620	Advanced Java Programming	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	0	1	4	5

COURSE OBJECTIVES:

- To provide an overview of working principles of web related functionalities in Java
- To understand and apply the fundamentals core java, packages, database connectivity for Computing
- To enhance the knowledge to server side programming
- To provide knowledge on advanced features like JavaBeans, Sockets.

UNIT I Java Beans

15 Hours

Java Beans - Java Beans component model – Creating a Java Bean class – Exploring Java Bean property types- Adding custom Event types – Creating Java Bean class with events – Using the BeanInfo classes.

UNIT II JDBC and RMI

15 Hours

Network Programming – Working with URLs – Working with sockets-Remote method invocation
Using Relational Databases – JDBC Drivers for RDBM systems – SQL to Java Type Mappings –Using Java. SQL API.

UNIT III Servlets and JSP

15 Hours

Building web Applications - J2EE web application packaging – Servlets – The Servlet API – Java server pages – JSP tags and API –Java coding in JSPs

UNIT IV EJB

15 Hours

Enterprise javabeans: Introduction – enterprise programming – session EJBs – EJB clients – entity EJBs – message driven beans.

COURSE OUTCOMES:

- Able to understand the internet standards and recent web technologies like Conferencing, newsgroup etc.
- 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

- Able to understand the components and patterns that constitute a suitable architecture for a web application using java servlets
- Able to demonstrate systematic knowledge of backend and front end by developing an appropriate application.

Text Books:

1. Joe Wigglesworth and Paula McMillan, Java Programming : Advanced Topics Thomson Learning Inc - 2007. (Chapters 8,9,11,13)

Reference Books:

1. Keyur shah, Gateway to Java Programmer Sun Certification , Tata Mc Graw Hill,2002.
- 2.Deitel & Deitel, Java How to Program, Prentice Hall,1999.
3. Phil Kanna, The Complete Reference JSP 2.0 , Tata McGrawHill publishing Company Ltd,2003.
4. Jim Keogh, The Complete Reference J2EE , Tata McGrawHill Publishing Company Ltd,2002.
5. D.S. Malik, Robert P. Burton, Programming with Java- Guided Learning with Early objects, Cengage Learning India Private India – New Delhi – 2009

Advanced Java Programming Laboratory

1. Implement java beans and insert into different tools.
2. Simple Application using JDBC API.
3. Develop the application using Servlets and Jsp .
4. EJB Applications which Demonstrate Session Bean, MDB and Persistence.

MPAL16F4630	Data Science and Big Data Analytics	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	0	1	4	5

COURSE OBJECTIVES:

- To explore the fundamental concepts of big data analytics
- To understand the applications using Map Reduce Concepts.
- To learn to use various techniques for mining data stream.
- To understand the various search methods and visualization techniques.

UNIT I Understanding Big Data

15 Hours

Data Storage and Analysis, Comparison with Other Systems, Rational Database Management System, Grid Computing, Volunteer Computing, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.

UNIT II Big Data Analytics

15 Hours

Introduction to Data analytics, Data Analytics Lifecycle , Challenges of Conventional Systems, Intelligent data analysis, Data Preparation, Analytic Processes and Tools, Nature of Data, Data Exploration, Model Planning, Model Building, sharing results, Analysis Vs Reporting, Modern Data Analytic Tools.

UNIT III Data Analytics process and Hadoop Related Tools

15 Hours

Advanced clustering: K means, Regression models, Linear regression, Logistic Regression, Text Analysis. Technologies and tools: Analytics for Unstructured data, MapReduce and Hadoop, Hadoop eco system. Data Visualization: data Visualization techniques and methods, problems and Case Studies.

UNIT IV R Programming and Data Analytics

15 Hours

Using R for analytics: Introduction to R, Analyzing and exploring data, methods for model building and Evaluation.

COURSE OUTCOMES:

The students will be able to:

- Work with big data platform
- Analyze the HADOOP and Map Reduce technologies associated with big data analytics
- Design efficient algorithms for mining the data from large volumes.

- Analyze the big data analytic techniques for useful business applications.
- Explore on Big Data applications Using Pig and Hive
- Understand the fundamentals of various bigdata analysis techniques

Text Books:

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
3. Eric Sammer, "Hadoop Operations", O'Reilley, 2012..

Reference Books:

1. Chris Eaton, Dirk Deroos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics For Enterprise Class Hadoop And Streaming Data”, Mcgrawhill Publishing, 2012
2. Niël J le Roux , **Sugnet Lubbe**, Step-by-Step R Tutorial An introduction into R applications and programming, bookboon.com, 2015.
3. Anand Rajaraman And Jeffrey David Ullman, “Mining Of Massive Datasets”, Cambridge University Press, 2012.
4. Bill Franks, “Taming The Big Data Tidal Wave: Finding OpportUnities In Huge Data Streams With Advanced Analytics”, John Wiley & Sons, 2012.
5. Glenn J. Myatt, “Making Sense Of Data”, John Wiley & Sons, 2007
6. Pete Warden, “Big Data Glossary”, O’Reilly, 2011.

Data Science and Big Data Analytics Laboratory

1. Practice on R commands – Basics
2. Data Exploration in R
3. Graphics
4. Data Preprocessing
5. Linear Regression
6. Logistic Regression

MPAL16F4710	Software Testing and Quality Assurance	L	T	P	C	Hrs/Wk
Duration :16 Wks		4	0	0	4	4

COURSE OBJECTIVES:

- Understand the fundamental concepts and theory of Software testing and Software quality Management
- Implement process that ensures the Software is developed with good quality standards
- Apply quality management methods to effectively organize staff and lead a successful development of the Software product
- To discuss various software testing issues and solutions in software Unit test, integration, regression, and system testing.
- To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
- To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

UNIT I Testing Fundamentals:

15 Hours

Introduction, Basics of Software Testing, Testing Principles, Goals, Testing Life Cycle, Phases of testing, Defects, Defect Life Cycle, Defect Report, Test Plan(IEEE format), Importance of testing in software production cycle.

Types of testing, White box testing, Black box testing, Integration Testing ,System and acceptance testing, Performance testing, Regression testing. Insights from a Venn diagram, Boundary Value Analysis, Decision table-based testing.

UNIT II Test Management And Automation:

12 Hours

Introduction , Test Planning, Test Management, Software test automation, Scope of automation, Test automation tools, Generic requirement for test tool/framework, Selecting a test tool, Challenges in automation, Testing in Agile environment.

UNIT III Software Quality Metrics:

15 Hours

Software quality, Quality attribute, Quality Assurance, Quality control & assurance, Methods of quality management, Cost of quality, Quality management, Quality factor, Quality management & project management. Software Measurement and Metrics, Measurement Theory , Software quality metrics, Product quality metrics, Software maintenance metrics, Collecting software engineering data.

UNIT IV Software Quality Assurance:**18 Hours**

Software quality in business context, Planning for software quality assurance, Product quality and process quality , Software process models, ISO, Capability Maturity Model, CMMi People, CMM, Test Maturity Model.

Managing Testing projects and groups, Legal consequences of defective software, Managing a testing group, Role of testing group.

Text Books:

1. Gopalswamy Ramesh and Srinivasan Desikan, “Software Testing: Principles and Practices”, Pearson Education, New Delhi, 2006.
2. Nina S Godbole, “Software Quality Assurance: Principles and Practice”, Narosa Publishers, New Delhi, 2004.
3. Glenford J Myers, Corey Sandler, Tom Badgett and Todd M Thomas, “The Art of Software Testing”, Wiley, USA, 2004.
4. Ilene Burnstein, “Practical Software Testing”, Springer – Verlag, New Delhi, 2003.
5. Software Testing, Second Edition By: Ron Patton, Pearson Education ISBN-13: 978-0-672-32798-8
6. Software Testing Principles and Tools By M.G. Limaye TMG Hill Publication, ISBN 13:978-0-07-013990-9

Reference Books:

1. John D McGregor and David A Sykes, “A Practical Guide to Testing Object-Oriented Software”, Addison-Wesley Professional, USA, 2001.
2. Stephen H Kan, “Metrics and Models in Software Quality Engineering”, Pearson Education, New Delhi, 2002.
3. William E Perry, “Effective Methods for Software Testing”, Wiley, New York, 2000.
4. Metric and Model in Software Quality Engineering, By Stephen H Kan, Pearson Education ISBN 81-297-0175-8
5. Effective methods for software testing by William Perry , Willey Publication, ISBN 81-265-0893-0
6. Foundation of software testing by Dorothy Graham, Erik Van Veenendaal. CENGAGE learning , ISBN 978-81-315-0218-1

Software Testing and Quality Assurance Lab component is included along with the syllabus.

Case Study:

Unit 1: Develop test cases for Boundary Value Analysis and Decision Table-based testing.

Unit 2: Any one testing Tool (like Winrunner, Loadrunner, selenium or QTP)

MPAL16F4720	Internet of Things	L	T	P	C	Hrs/Wk
Duration :16 Wks		4	0	0	4	4

COURSE OBJECTIVES:

- To understand the basics of “Internet of Things” (IoT).
- To understand the need for IoT
- The elements in IoT.
- RFID as the core technologies enabling IoT.
- Sensor and sensor network as the core technologies enabling IoT.
- The key areas that can apply IoT.
- The different application solutions that are available in the market.
- The different practical considerations in evolving an IoT project.

UNIT I Introduction to Internet of Things

12 Hours

Definition & Characteristics of IoT, Physical Design of IoT, Things in IoT, IoT Protocols, Logical Design of IoT, IoT Functional Blocks , Communication Models , IoT Communication APIs, IoT Enabling Technologies, Wireless Sensor Networks, Cloud Computing , Big Data Analytics, Communication Protocols , RFID Basics, Embedded Systems, IoT Levels & Deployment Templates.

UNIT II Domain Specific IoTs

12 Hours

Introduction, Home Automation, Smart Lighting, Smart Appliances , Intrusion Detection, Smoke/Gas Detectors, Cities, Smart Parking, Smart Lighting, Smart Roads, Structural Health Monitoring, Surveillance, Emergency Response, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Lifestyle.

UNIT III Developing Internet Of Things

18 Hours

IoT Design Methodology, Step 1: Purpose & Requirements Specification, Step 2: Process Specification , Step 3: Domain Model Specification , Step 4: Information Model Specification , Step 5: Service Specifications , Step 6: IoT Level Specification, Step 7: Functional View Specification, Step 8: Operational View Specification , Step 9: Device & Component Integration, Step 10: Application Development. Case Study on IoT System for Weather Monitoring, Motivation for Using Python.

UNIT IV Advanced topics in IoT

18 Hours

Logical Design of IOT using Python, Introduction to Python, Basics of Programming with Raspberry PI with PYTHON, IOT Physical devices and end points. Python Packages of Interest for IoT-JSON. IoT Physical Servers & Endpoints, Introduction to cloud storage Models for IOT.

COURSE OUTCOMES:

- Able to understand the basics of IoT.
- Able to understand the technologies that help IoT become reality.
- Able to understand the key application domains of IoT
- Able to understand the programming part in IoT.
- Able to understand the intricacies involved in an IoT project.

Text Books:

1. Internet of Things-An Hands on Approach- Vijay Madiseti (Author), Arshdeep Bahga, 2014.

Reference Books:

- 1.Cuno Pfister Getting Started with the Internet of Things, OReilly, 2011.
- 2.Francis DaCosta, Rethinking Internet of things, Apress Open Edition, 2013
- 3.Adrian McEwen, Hakim Cassimally, Design of Internet of Things, 2014 John Wiley and Sons, Ltd.

COURSE OBJECTIVES:

MPAL16F4730	Wireless Communication and Mobile Computing	L	T	P	C	Hrs/Wk
Duration :16 Wks		4	0	0	4	4

- To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture.
- To have an exposure about wireless protocols -WLN, Bluetooth, WAP, ZigBee **issues**.
- To Know the Network, Transport Functionalities of Mobile communication
- To understand the concepts of Adhoc and wireless sensor networks.
- To impart knowledge about Mobile Application Development

UNIT I Wireless Communication Fundamentals, Architecture**15 Hours**

Frequencies Spectrum- Radio Channels-Path-loss, slow-fading, fast-fading, delay spread and coherence bandwidth, flat fading and frequency selective fading

Spread spectrum-GSM vs CDMA - 3G Mobile Wireless Services -Comparison of 2G and 3 G - GSM Architecture-Entities-Call Routing-PLMN interfaces-Address and identifiers- Network Aspects-Mobility Management-Frequency Allocation-Authentication and Security-SMS Architecture-Value Added Service through SMS-GPRS-GPRS and Packet Data Network-Architecture.

UNIT II Mobile Wireless Short Range Networks**15 Hours**

Introduction-WLAN Equipment-WLAN Topologies-WLAN Technologies-IEEE 802.11 Architecture-WLAN MAC- Security of WLAN, Power Management-Standards- WAP Architecture- WAP 2.0-Bluetooth enabled Devices Network-Layers in Bluetooth Protocol-Security in Bluetooth- IrDA- ZigBee.

MOBILE IP NETWORK LAYER: IP and Mobile IP Network Layer- Packet delivery and Handover Management-Location Management- Registration- Tunneling and Encapsulation-Route Optimization-Dynamic Host Configuration Protocol- VoIP -IPsec

UNIT III Adhoc And Sensor Network**15 Hours**

AD-HOC NETWORKS: Introduction to Mobile Ad hoc Network- MANET-Routing and Routing Algorithm-AODV,DSR-Security- Distributed Network and Characteristics-Communication Coverage and connectivity

Sensor Network: Introduction, Sensory Transducers, Ad-hoc vs. Sensor Network, Challenges and issues of WSN, Applications-Deterministic and NonDeterministic Deployment- MAC Scheduling- Energy Efficient Routing Protocols- SPIN, LEACH, PIGASIS- Localization and Time Synchronization

UNIT IV Mobile Application Development**15 Hours**

Mobile Applications Development -Application Development Overflow-Techniques for Composing Applications - Understanding the Android Software Stack – Android Application Architecture – Developing for Android – The Android Application Life Cycle – The Activity Life Cycle – Creating Your First Android Activity – Creating Applications and Activities – Creating User Interfaces – Intents – Broadcast Receivers – Adapters – Data Storage, Retrieval, and Sharing.-Geo services- creating mobile applications like game, Clock, calendar, Convertor, phone book, Text Editor

COURSE OUTCOMES:

- Gain the knowledge about various types of Wireless Data Networks and Wireless Voice Networks.
- understand the architectures, the challenges and the Solutions of Wireless Communication those are in use.

- realize the role of Wireless Protocols in shaping the future Internet.
- know about different types of Wireless Communication Networks and their functionalities.
- Able to develop simple Mobile Application Using Android

Text Books:

1. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal “Mobile Computing”, Tata McGraw Hill Pub ,Aug – 2010
2. Raj Kamal “Mobile Computing” Oxford Higher Education, Second Edition, 2012

Reference Books:

1. Pei Zheng, Larry L. Peterson, Bruce S. Davie, Adrian Farrell “Wireless Networking Complete” Morgan Kaufmann Series in Networking , 2009(introduction, WLAN MAC)
2. Vijay K Garg “Wireless Communications & Networking” Morgan Kaufmann Series, 2010
3. Jochen Schillar “Mobile Communications” Pearson Education second Edition
4. Donn Felker ,’Android Application Development For Dummies,Wiley, 2010
5. Reto Meier, Professional Android 2 Application Development, Wrox’s Programmer to programmer series
6. Ed Burnette, ’Hello, Android: Introducing Google’s Mobile Development Platform’ third edition’ Pragmatic Programmers, 2012
7. Jerome (J.F) DiMarzio “Android A programmer’s Guide” Tata McGraw-Hill 2010 Edition

REVA UNIVERSITY
MASTER OF COMPUTER APPLICATIONS
Scheme of Teaching, Examination and Credits
FIFTH SEMESTER MCA
Scheme & Syllabus

Sl. No	Code	Title	HC/SC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	MPAL1575100	Object Oriented Modelling and Design	HC	2	1	1	4	6
3	MPAL16F5200	Software Project Management	HC	2	1	1	4	6
3	MPAL16F5300	Minor Project-II	HC	0	2	4	6	12
4	MPAL16F5410	System Simulation and Modelling	SC	3	1	0	4	5
	MPAL16F5420	E-Business using Agile Methodology						
	MPAL16F5430	Enterprise Application Integration						
5	MPAL16F5510	MVC Architecture with ASP.NET	SC	3	0	1	4	5
	MPAL16F5520	IBM Mainframes						
	MPAL16F5530	Information and Network Security						
6	OPEN ELECTIVE		OE	4	0	0	4	4
Total Credits				14	5	7	26	38

MPAL16F5100	Object Oriented Modeling and Design	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- To provide a brief hands on overview of object-oriented analysis in software process
- To discuss Case studies based project specifications to develop object-oriented models and identify implementation strategies.
- To demonstrate and apply basic object oriented techniques to create and modify object oriented analysis and design models.
- To Understand various UML Diagrams.
- Exposure to hands-on using IBM –Rational SEED

UNIT I Introduction

12 Hours

Object basics, Object state and properties, Behavior, Methods, Messages, Information hiding, Class hierarchy, Relationships, Associations, Aggregations, Identity, Dynamic binding, Persistence, Meta-classes, Object oriented system development life cycle.

Methodology: Introduction to Methodology, Surveymethods:Rumbugh, Booch, Jacobson; Patterns, Creational, and Factory.

UNIT II UML and Object Oriented Analysis

18 Hours

Behavioral, Momento, Mediator, Structural, Decorator, Facade, Concurrency Patterns, Scheduler, Frameworks, Unified approach, Unified modeling language, Static and Dynamic models, UML diagrams, Model organization, Extensibility. Identifying Usecase, Business object analysis, Use case driven object oriented analysis, relationships, attributes, methods,. A part of relationships Identifying attributes and methods.

UNIT III Object Oriented Design

15 Hours

Design process and benchmarking, Axioms, Corollaries, Designing classes, Class visibility, Refining attributes, Methods and protocols, Object storage and object interoperability, Databases, Object relational systems. The purpose of a view layer interface.

UNIT IV Patterns and Design Patterns

15 Hours

What is a pattern and what makes a pattern? Pattern categories; Relationships between patterns; Pattern description. Introduction to Design Pattern, Model View Controller; Communication Patterns; Forwarder-Receiver; Client-Dispatcher-Server; Publisher-Subscriber; Management Patterns; Command Processor; Whole Part, Master Slave.

COURSE OUTCOMES:

- Able to implement the basic concepts to identify state & behavior of real world objects.
- Able to implement various object oriented methodologies and choose the appropriate one for solving the problem with the help of various case studies.
- Able to apply the concept of analysis and design to develop a document for a given project.
- Able to implement analysis and design phases in developing a software project.

Text Books:

1. Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 2008.
2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern-Oriented Software Architecture, A System of Patterns, Volume 1, John Wiley and Sons, 2006(chapters 1,3).

Reference Books:

1. Brahma Dathan, Sarnath Ramnath, "Object, Oriented Analysis, Design and Implementation", Universities Press, 2010.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Addison Wesley Long man, 1999.
3. Bernd Bruegge, Allen H. Dutoit, Object Oriented Software Engineering using UML, Patterns and Java, Pearson 2004
4. Martin Fowler, "UML Distilled A Brief Guide to Standard Object Modeling Language", 3 rd Edition, Addison Wesley, 2003
5. Russ Miles, Kim Hamilton, "Learning UML 2.0", O'Reilly, 2008.

Object Oriented Modeling and Design Laboratory

1. Practicing the different types of case tools such as Rational Seed / other Open Source can be used for all the phases of Software development life cycle.
2. Data modeling
3. Source code generators
4. Apply the following to typical application problems:
 1. Project Planning
 2. Software Requirement Analysis
 3. Software Design
 4. Data Modeling & Implementation

5. Software Estimation
6. Software Testing

A possible set of applications may be the following:

1. Library System
2. Student Marks Analyzing System
3. Text Editor.
4. Create a dictionary.
5. Telephone directory.
6. Inventory System.

MPAL16F5200	Software Project Management	L	T	P	C	Hrs/Wk
Duration :16 Wks		2	1	1	4	6

COURSE OBJECTIVES:

- 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

UNIT I Software Project Management Concepts

15 Hours

Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, Identify activity risks, and Allocate resources, Case Study: Project Planning case study.

UNIT II Software Evaluation and Costing

15 Hours

Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting, cost-benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach: Choosing technologies, choice of process models, structured methods. Case study: Software Evaluation and Costing

UNIT III Risk and Quality Management

15 Hours

Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Software Quality: defining software quality, ISO9126, External Standards, openProj. Case study: Risk and Quality Management

UNIT IV Agile Project Management using SCRUM

15 Hours

Introduction: Values, Principles, agile Manifesto, SCRUM Methodology: Roles and Responsibilities in Scrum, Implementing Scrum Process, Estimating Scrum Project, Challenges and Benefits of APM, Case Study: APM Using Scrum.

COURSE OUTCOMES:

- Design the activities during the project scheduling of any software application.
- Implement the risk management activities and the resource allocation for the projects.
- Able to apply the software estimation and recent quality standards for evaluation of the software projects
- Acquire knowledge and skills needed for the construction of highly reliable software project
- Able to create reliable, replicable cost estimation that links to the requirements of project planning and managing

Text Books:

1. Bob Hughes & Mike Cotterell, “Software Project Management”, Tata McGraw- Hill Publications, Fifth Edition 2012.
2. S. A. Kelkar,” Software Project Management” PHI, New Delhi, Third Edition, 2013.
3. Agile Project Management with Scrum (Developer best Practices) by Ken Schwaber, Microsoft press Publication 2009.

Reference Books:

1. Richard H.Thayer “Software Engineering Project Management,” IEEE Computer Society
2. Futrell , “Quality Software Project Management”, Pearson Education India, 2008
3. http://en.wikipedia.org/wiki/Comparison_of_project_management_software
4. http://www.ogc.gov.uk/methods_prince_2.asp
5. Project Management The Agile Way, Making it work in the Enterprise by John.C.Goodpasture, PMP Rose Publishing.

Software Project Management Lab

1. A case study of all the tools available for Software Project Management.

Hint : SCRUM,CANBAN,CRYSTAL,PRINCE2 etc.

2. Develop an application with agile methodology using any one of the tool (preferably scrum)

The following is the scrum process steps which student has to follow:

Scrum team

Product owner, scrum master and development team

Product owner

The person responsible for maintaining the product backlog by representing the interests of the stakeholders, and ensuring the value of the work the development team does.

Scrum master

The person responsible for the scrum process, making sure it is used correctly and maximizing its benefits.

Development team

A cross-functional group of people responsible for delivering potentially shippable increments of product at the end of every sprint.

Sprint burn-down chart

Daily progress for a sprint over the sprint's length.

Release burn-down chart

Feature level progress of completed product backlog items in the product backlog.

Product backlog (PBL) list

A prioritized list of high-level requirements.

Sprint backlog (SBL) list

A prioritized list of tasks to complete during the sprint.

Sprint

A time period (typically 1–4 weeks) in which development occurs on a set of backlog items that the team has committed to—commonly referred to as a time-box or iteration

Guide Lines

MPAL16F5300	Minor Project-II	L	T	P	C	Hrs/Wk
Duration :16 Wks		0	2	4	6	12

- The project should be inter disciplinary
- Team size should be of max *two* members
- Use any version control software
- Project should be of Client/Server based
- Latest database servers with PL/SQL statements is must
- Proper and meaningful reports should be generated by making use of latest reporting tools
- Project report should follow standard template with the following contents:
 - a) Abstract
 - b) Introduction to project
 - c) Basic Diagrams like (DFD, ER, Class diagram, etc..)
 - d) Database and stored procedure design
 - e) Screen shots
 - f) Concussion
 - g) Future enhancement
 - h) Bibliography
- project reports should be submitted for evaluation

Appendix: User Manual with the help of screen shots and text description

MPAL16F5410	System Simulation and Modeling	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

COURSE OBJECTIVES:

- To understand various applications of simulations.
- To discuss the General Principles and Simulation Software.
- To understand and apply Statistical Models and Random-Number Generation.
- To understand I/O Modeling
- To learn Verification and validation different models

UNIT I Introduction:

12 Hours

When simulation is the appropriate tool and when it is not appropriate, Advantages and disadvantages of Simulation, Areas of application, Systems and system environment, Components of a system, Discrete and continuous systems, Model of a system, Types of Models : Discrete-Event System Simulation, Steps in a Simulation Study. Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm.

Simulation examples: Single server, Two server, Multi server and Inventory problems.

UNIT II General Principles, Simulation Software and Queuing Models:

15 Hours

Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling, List processing. Simulation in Java, Characteristics of queuing systems, Queuing notation Simulation Examples: Queuing, Inventory

UNIT III Statistical Models, Random-Numbers and Random Variate Generation

15 Hours

Review of terminology and concepts, Random Variables, Probability Distribution, Probability distribution function, Useful statistical models, Discrete distributions, Continuous distributions, Poisson process, Empirical distributions. Properties of random numbers, Generation of pseudo-random numbers, Techniques for generating random numbers, Tests for Random Numbers, Random-Variate Generation: Inverse transform technique, Acceptance-Rejection technique, Special properties.

UNIT IV Input, Output Modeling, Verification and Validation:**18 Hours**

Data Collection, Identifying the distribution with data, Parameter estimation, Goodness of Fit Tests, Fitting a non-stationary Poisson process, Selecting input models without data, Multivariate and Time-Series input models, uniformity and independence, Chi-Square test, K-S Test. Types of simulations with respect to output analysis, Stochastic nature of output data, Absolute measures of performance and their estimation, Output analysis for terminating simulations, Output analysis for steady-state simulations. Verification, Calibration, and Validation, Optimization: Model building, verification and validation, Verification of simulation models, Calibration and validation of models

COURSE OUTCOMES:

- Able to implement various applications of simulations.
- Able to implement the General Principles and Simulation Software.
- Able to implement Statistical Models and Random-Number Generation.
- Able to implement I/O Modeling
- Able to implement Verification and validation of different models

Text Books:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: Discrete-Event System Simulation, 5th Edition, Pearson, 2010. (Listed topics only from Chapters 1 to 12)
2. Lawrence M. Leemis, Stephen K. Park: Discrete – Event Simulation: A First Course, Pearson / Prentice-Hall, 2006.

Reference Books:

1. Averill M. Law: Simulation Modeling and Analysis, 4th Edition, Tata McGraw-Hill, 2007.
2. Theory of modeling and simulation, Zeiglar, Elsevier.

Case Study:

Unit 1: Any simulation exercise program involves the participation of various concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm

Unit 2: For Restaurant Queuing Model, for Bank ATM Queuing Model

Unit 3: Application on randomness, statistical sampling, computer simulation, cryptology, completely randomized design

Unit 4: Data Collection for Modeling and Simulation at the University.

MPAL16F5420	E-Business using Agile Methodology	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

COURSE OBJECTIVES:

- To build an informed society
- To increase both business and customers interaction
- To create a better business environment
- Customers online, not in line
- Improving the quality of life for disadvantaged communities

UNIT I

15 Hours

Threats in e-commerce, Encryption overview, Elements of an encryption system, Secret key encryption, Public-key encryption, Digital signatures, Digital Certificates, Types of Cryptographies, Secure Sockets Layer (SSL), Smart Cards and its applications. Electronic Data Interchange Evolution, uses, Benefits, Working of EDI, EDI Standards, EDI Components, EDI Services, ANSI X12 and EDIFACT

UNIT II

15 Hours

Overview of Electronic Payment Systems, Cybercash, Smart Cards, Electronic Banking - types, Electronic Fund Transfers - Digital Token-based Electronic Payment Systems, E-cash, e-Cheque, Payment Systems on internet- Risk of Electronic Payment Systems. Secure Electronic Transactions (SET) Protocol

UNIT III

15 Hours

M-Commerce - Introduction – Infrastructure Of M-Commerce – Types Of Mobile Commerce Services – Technologies Of Wireless Business – Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non – Internet Applications/services in M-Commerce – Wireless/Wired Commerce Comparisons -A Framework For The Study Of Mobile Commerce – NTT Docomo’s I – Mode – Wireless Devices For Mobile Commerce – Towards A Classification Framework For Mobile Location Based Services – Wireless Personal And Local Area Networks – The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks, 2G, 3G and 4G technology.

UNIT IV

15 Hours

The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portals – Factors Influencing The Adoption Of Mobile Gaming Services – Mobile Data Technologies And

Small Business Adoption And Diffusion – M–Commerce In The Automotive Industry – Location – Based Services: Criteria For Adoption And Solution Deployment – The Role Of Mobile Advertising In Building A Brand – M–Commerce Business Models .

COURSE OUTCOMES:

- Able to apply E – commerce principles in market place.
- Able to design E – commerce applications.
- Able to pay through internet using various payment systems
- Able to learn the basics of M – commerce and its principles.
-

Text Books:

1. Dave Chaffey, —E-Business and E-Commerce Management, Third Edition, 2009, Pearson Education
2. Brian E. Mennecke, Troy J. Strader, —Mobile Commerce: Technology, Theory and Applications, Idea Group Inc., IRM press, 2003.
3. P. J. Louis, — M – Commerce Crash Course, McGraw – Hill Companies February 2001.

Reference Books:

1. Paul May, —Mobile Commerce: Opportunities, Applications, and Technologies of Wireless business 2. Cambridge University Press March 2001.
3. Michael P. Papazoglou, Peter M.A. Ribbers, —e – business organizational and Technical foundation_. Wiley India 2009
4. Dr. Pandey , Saurabh Shukla E-commerce and Mobile commerce Technologies , Sultan Chand , 2011
5. M-Commerce: Technologies, Services, and Business Models By Norman Sadeh, Wiley Publications.
6. Mobile Commerce: Technology, Theory, and Applications - Idea Group Incorporation, UK
7. Mobile Commerce: Opportunities, Applications, and Technologies of Wireless, By Paul May, Cambridge University Press

MPAL16F5430	Enterprise Application Integration	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	1	0	4	5

COURSE OBJECTIVES:

- Describe approaches to enterprise application integration
- Understand the integration middleware
- Evaluate the integration approaches suitable for a given problem

UNIT I Introduction

15 Hours

Requirements for EAI Challenges in EAI, Integration with legacy systems, Integration with partners, Heterogeneous environment, Implementation approaches, Web services, messaging ,ETL, direct data integration, Middleware requirements, Approaches to integration, services oriented and messaging.

UNIT II Integration Patterns

10 Hours

Introduction to integration patterns, Architecture for application integration, Integration patterns, Point to point, broker, message bus, publish/subscribe, Challenges in performance, security, reliability- Case studies

UNIT III Service Oriented Integration

15 Hours

Business process integration, Composite applications services, Web services, Service choreography and orchestration, Business process modeling, BPMN, Business process execution BPEL, Middleware infrastructure, Case studies

UNIT IV Enterprise Service Bus

20 Hours

Messaging, Synchronous and asynchronous, Message structure, Message oriented middleware, Reliability mechanisms, Challenges, Messaging infrastructure, Java Messaging Services, Case studies.

Enterprise Service Bus, routing, scalable connectivity, protocol and message transformations, data enrichment, distribution, correlation, monitoring, Deployment configurations, Global ESB, Directly connected, Federated, brokered ESBs, Application server based, Messaging system base, Hardware based ESBs, Support to SOA, message based and event based integrations, Case studies.

COURSE OUTCOMES:

Upon Completion of the course, the students will be able to

- Describe different approaches to integration enterprise applications
- Analyze specifications and identify appropriate integration approaches

- Develop a suitable integration design for a given problem
- Able to identify appropriate integration middleware for a given problem
- Evaluate the integration approaches against specified requirements

Text Books:

1. George Mentzas and Andreas Frezen (Eds), "Semantic Enterprise Application Integration for Business Processes: Service-oriented Frameworks", Business Science Reference, 2009.
2. WaseemRoshen, "SOA Based Enterprise Integration", Tata McGraw-Hill, 2009.

References Books:

1. G Hohpe and B Woolf, "Enterprise Integration Patterns: Designing, Building, and Deploying Messaging Solutions", Addison-Wesley Professional, 2003
2. D Linthicum, "Next Generation Application Integration: From Simple Information to Web Services", Addison-Wesley, 2003
3. Martin Fowler, "Patterns of Enterprise Application Architecture", Addison-Wesley, 2003
4. Kapil Pant and MatiazJuric, "Business Process Driven SOA using BPMN and BPEL: From Business Process Modeling to Orchestration and Service Oriented Architecture", Packt Publishing, 2008.

COURSE OBJECTIVES:

MPAL16F5510	MVC Architecture with ASP.NET	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	0	1	4	5

- To Understand the concept of MVC Architecture
- To understand the importance of MVC in the present scenario
- To understand the conceptual implementation requirements of an MVC application

UNIT I Introduction to Asp.net MVC

15 Hours

Origin of MVC, Difference between asp.net mvc and asp.net, Architecture of asp.net mvc application. Understanding of Views, Controllers, Actions, Models ,HTML Helpers, Model Binders, Action Filters, Routing.

UNIT II Development of Asp.net MVC Application

15 Hours

UI development using views, models and controllers, JQuery, Ajax. Controls and master pages development, Validation of form data. Database connection using entity framework. Error handling and Localization. State management.

UNIT III Securing Asp.net MVC application

15 Hours

Using Login Control Authentication & authorization, implementation of membership system, External authentication service.

UNIT IV Testing, Deployment & Performance Tuning of Asp.net MVC application

15 Hours

Testing of Views, Model, Controller, Data access, Helpers, Form validation & Routes. Tuning of Application using cache. Deployment of application

COURSE OUTCOMES:

- Able to design an website using MVC Architecture
- Able to deploy a web application using MVC Architecture

Text Books:

1. ASP.NET MVC Framework Unleashed- Stephen Walther by Pearson Education, Inc.
2. Programming Microsoft ASP.NET MVC- third Edition by Dino Esposito.

MVC Architecture with ASP.NET Laboratory

Lab 1: Creating a simple Hello World ASP.NET MVC application

Step 1: - Select the project template

Step 2: - Select the appropriate ASP.NET One options

Step 3: - Add Controller

Step 4: - Add Views

Step 5: - Connect the view to the controller

Step 6: Run the program

Lab 2: Passing data between controllers and views

Step 1: Create project view and set data

Step 2: Display view data in the view

Lab 3: Creating a simple model using MVC

- Step 1: Create a simple class file
- Step 2: Define the controller with action
- Step 3: Create strongly typed view using the class
- Step 4: Run your application

Lab 4: Creating a simple MVC data entry screen

- Step 1: Creating your data entry ASPX page
- Step 2: Creating the controller
- Step 3: Create the view to display the customer object
- Step 4: Finally run the project

Lab 5: Using HTML Helper to create views faster

- Step 1: Create the Customer class
- Step 2: Creating the input HTML form using helper classes
- Step 3: Create a strongly typed view by using the customer class
- Step 4: Creating the controller class

MPAL16F5520	IBM Mainframes	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	0	1	4	5

COURSE OBJECTIVES:

- To enable students to gain an insight into the challenges and technology involved in mainframe computing.
- To develop practical skills in using mainframe computing technologies.

Mainframes Technology Job Types:

- Technical Architect - Mainframes
- Mainframes Developer
- Mainframes Tester
- Consultant – Mainframe Technology
- Mainframes ZOS Administrator
- Mainframes QA/Test Analyst
- Mainframes Operations
- Application Developer Mainframes
- Technology Specialist - Mainframes

UNIT I IBM Mainframe Application Programming

12 Hours

IBM Mainframe Basic Concepts, Introduction to Mainframe Technology, TSO ISPF Essentials, JCL, COBOL Programming, CICS

UNIT II JCL for Business Analyst

15 Hours

The Testing Cycle, JOB Overview, Problems Encountered While Testing

UNIT III Advanced COBOL Programming

18 Hours

Compiling & Linking Programs, Structured Programming Techniques, Inter-Program Communication, VSAM File Processing, Advanced Table Processing, Additional Language Features

UNIT IV CICS for Business Analyst**15 Hours**

Introduction to CICS, CICS Commands, Basic Mapping Support, Program Basics, CICS Program Construction, Program Control, File Control, Abnormal Termination

Reference Books:

1. Nancy Stern and Robert A Stern: Structured COBOL Programming, 11th Edition, Willey Publications, 2006.
2. COBOL UNLEASHED - JON WESSLER\1998 - ISBN 81-7635-154-7
3. MURACH's STRUCTURED COBOL ISBN 1-890774-05-7
4. MURACH's OS/390 & z/OS JCL ISBN 1-890774-14-6
5. CICS Handbook – Yakhisha Kageyama – ISBN 0-07-463221-3
6. VSAM for the COBOL Programmer – Doug Lowe - ISBN 10:0911625453

MPAL16F5530	Information and Network Security	L	T	P	C	Hrs/Wk
Duration :16 Wks		3	0	1	4	5

COURSE OUTCOMES:

After completing the course student should be able to:

- Define the core components of mainframe computing and identify their role and function.
- Differentiate between the various application execution mechanisms available to mainframe
- Computers and evaluate the role of each.
- Critically evaluate the role of the mainframe in a corporate environment.
- Prepare and execute mainframe jobs and processes and produce appropriate output

COURSE OBJECTIVES:

- Understand Network Security Devices (IDS, Firewall..etc)
- Analyze network services.
- Able to Understand and analyze application performance.
- Identify various network security concepts.
- Understand network intrusions.

UNIT I Planning for Security and security technology: 15 Hours

Information Security Policy, Standards, and Practices, The Information Security Blue Print, Contingency plan , Firewalls, Intrusion Detection Systems (IDS), Honey Pots, Honey Nets, and Padded cell systems, Scanning and Analysis Tools, Firewalls

UNIT II Introduction to Network Security, Authentication Applications 12 Hours

Security Attacks and Services, A model for Internetwork Security, Kerberos, X.509 Directory Authentication Service, IT-Act-2008, Cyber terrorism.

UNIT III Cryptography and IP Security 15 Hours

Principles of Cryptography, private and public cryptography, Cryptography Tools, Attacks on Cryptosystems. Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload,

UNIT IV Electronic Mail security and Web Security 18 Hours

Pretty Good Privacy (PGP),S/MIME, Secure Socket layer (SSL) and Transport layer Security (TLS), Secure Electronic Transaction (SET)

COURSE OUTCOMES:

- Able to create the information policy for organization.
- Implement various security components in the network.

Text Books:

1. Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, 2nd Edition, Thomson, 2005.
(Chapters 5, 6, 7, 8, Exclude the topics not mentioned in the syllabus)
2. William Stallings: Network Security Essentials: Applications and Standards, Pearson Education, 2000.
(Chapters: 1, 4, 5, 6, 7, 8)

Reference Books:

1. Behrouz A. Forouzan: Cryptography and Network Security, Special Indian Edition, Tata McGraw-Hill, 2007.

Information and Network Security Laboratory

1. Perform an experiment to demonstrate how to sniff for router traffic by using the tool Wireshark.
2. Install Jcrypt tool (or any other equivalent) and demonstrate asymmetric, symmetric crypto algorithm, hash and digital/pki signatures.
3. Demonstrate intrusion detection system (IDS) using any tool (eg. Snort or any other s/w)
4. Generating password hashes with openssl.
5. Exploring auditing the network using NMAP.
6. Demonstrate how to detect the trojans in a system.

REVA UNIVERSITY
MASTER OF COMPUTER APPLICATIONS
Scheme of Teaching, Examination and Credits
SIXTH SEMESTER MCA
Scheme & Syllabus

Sl. No	Course Code	Title of the Course	Examination					Credit Pattern L:T:P	Credits
			C1	C2	Dissertation	Viva	Total		
1	MPAL16F6100	Project work (Real time)	25	25	75	75	200	0:2:14	16

MPAL16F6100	Project work	L	T	P	C	Hrs/Wk
Duration :16 Wks		0	2	14	16	32

COURSE OBJECTIVES:

- Provides an exposure to industry oriented Projects.
- Makes the student gear up for real time project development.
- Provides a detailed understanding of Project Development strategies
- Provides a detailed understanding of document writing and project maintenance

COURSE OUTCOMES:

- Able to implement and develop industry oriented Projects.
- Able to understand real time project development.
- Able to implement Project Development strategies
- Able to create document and do project maintenance

General Rules

1. Students are required to take up individual project in companies/Respective Colleges other than the mini project standards already taken up during previous semesters.

2. Project should be real time work, for total of 5 months duration

3. Project work may be application oriented or research oriented as per student and guide's interest.

Therefore the project reports will vary depending on whether it is application oriented project or research based project.

4. Regular project work weekly diary should be maintained by the students, signed by the external guide and internal guide in order to verify the regularity of the student. (Enclosing the Format)

5. Seminars / presentation should be given at Synopsis, SRS, Design and Project Completion levels.

6. Project verification at the place of project work must be mandatory by the internal guide, for completion of the work.

7. If project report is not as per the format and not a real time project, external guides will have every right to reject the project

Guidelines for the Preparation of Project Reports

- 1. Printing Area:** The margins should be: **Left:** 1.25”, **Right:** 1.00”, **Top and Bottom-** 1.00”. The text should be justified to occupy the full line width, so that the right margin is not ragged, with words hyphenated as appropriate. Please fill pages so that the length of the text runs to the right margin
- 2.** The report must be printed on one side only. Please use a high-resolution printer, preferably a laser printer with at least 300 dpi. Project reports must be printed neatly on 127 one side of the paper on a A4 size bond paper. The reports submitted to the department/guide(s) must be hard bounded with dry tone Xerox.
- 3. Abstract:** The abstract should summarize the contents of the report and should contain at least 150 and at most 350 words. It should be set in 12-point font size. There should be two blank (10-point) lines before and after the title **ABSTRACT**.
- 4. Layout, Typeface, Font Sizes, and Numbering:** For the main text, please use 12-point type and 1.5 line spacing. We recommend using **Times New Roman** fonts. Italic type may be used to emphasize words in running text. Bold type and underlining should be avoided.
- 5. Headings:** The chapter headings should be in capitals and must be separated from the other text by 24point line space. Headings should be in the form where each word is capitalized (i.e., nouns, verbs, and all other words except articles, prepositions, and conjunctions should be set with an initial capital) and should, with the exception of the title, be aligned to the left. The font sizes are given in Table 1.

Here are some examples of headings: “Criteria to Disprove Context-Freeness of Collage Languages”, “On Correcting the Intrusion of Tracing Non-deterministic Programs by Software”, “A User-Friendly and Extendable Data Distribution System”, “Multi-flip Networks: Parallelizing GenSAT”, “Self-determinations of Man”.

6. Program Code: Program listings or program commands or algorithms in the text are normally set in typewriter font, e.g., CMTT10 or Courier. Example of an Algorithm is

Algorithm-1: Database Creation (Mean and Standard Deviation based approach)

Input: Static images of potential traffic sign

Output: Database created.

Methodology: For each input image do

Step1: Preprocess the image

Step2: Calculate the number of components in a sign

Step3: calculate a feature vector

Step4: Store the feature vector computed in step 3 in the corresponding database, based on number of components present in the sign.

For End: Algorithm End

7. Footnotes/ Header

Footnotes/Header should appear at the bottom of the normal text area, with a line of about 5 cm in Word set immediately below/above the text.

Header sample: (Project title is left aligned and page number is right aligned) <<Project Title>><<Page Number>>

8. Page Numbering

Reports must be printed with page numbers on the top right corner.

9. The total number of reports to be prepared are three

- One copy to the concerned guide
- One copy for University
- One copy to candidate
- Two CD's having soft copy of Project report (for department purpose)

10. Before taking the final printout, the approval of the concerned guide is mandatory and suggested corrections, if any, must be incorporated.

11. Every copy of the report must contain (See formats towards the end of this document)

- Outer title page (color will be specified later) with a plastic cover
- Inner title page (White)
- Certificate in the format enclosed, only certificate will be signed by following:

o Principal

o HOD

o Internal guide and External guide (if project is carried out in company)

o Guide and/or Co-guide (if project is carried out in college)

12. The organization of the report should be as follows

- Inner title page
- Certificate
- Project Completion certificate from Company / College
- Declaration (by student)
- Acknowledgement
- Abstract
- Table of Contents
- List of table and figures
- Main body of project

CONTENTS (For Application oriented Projects)

1. INTRODUCTION

1.1 PROJECT DESCRIPTION

1.2 COMPANY PROFILE

2. LITERATURE SURVEY

2.1 EXISTING AND PROPOSED SYSTEM

2.2 FEASIBILITY STUDY

2.3 TOOLS AND TECHNOLOGIES USED

2.4 HARDWARE AND SOFTWARE REQUIREMENTS

3. SOFTWARE REQUIREMENTS SPECIFICATION

- 3.1 USERS
- 3.2 FUNCTIONAL REQUIREMENTS
- 3.3 NON-FUNCTIONAL REQUIREMENTS
- 4. SYSTEM DESIGN (High level or Architectural design)**
 - 4.1 SYSTEM PERSPECTIVE
 - 4.2 CONTEXT DIAGRAM
- 5. DETAILED DESIGN (various design diagrams according to project)**
 - 5.1 USE CASE DIAGRAM
 - 5.2 SEQUENCE DIAGRAMS
 - 5.3 COLLABARATION DIAGRAMS
 - 5.4 ACTIVITY DIAGRAM
 - 5.5 DATABASE DESIGN
- 6. IMPLEMENTATION**
 - 6.1 SCREEN SHOTS
- 7. SOFTWARE TESTING**
- 8. CONCLUSION**
- 9. FUTURE ENHANCEMENTS**
- Appendix A BIBLIOGRAPHY**
- Appendix B USER MANUAL**

Programme Regulations

Students will be provided with programme regulations which deals about credit structure, teaching and Learning processes, Assessment, Re-examination, Degree awarding requirements

Summary of REVA University Regulations for Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) for Three Years Graduate Degree Programs, 2016.

1. Teaching and Learning Process:

The teaching & learning process under CBCS – CAGP of education in each course of study will have three components, namely:

(i) L= Lecture (ii) T= Tutorial (iii) P=Practice; where:

L stands for Lecture session consisting of classroom instruction.

T stands for Tutorial session consisting participatory discussion / self study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands for Practice session and it consists of Hands on Experience / Laboratory Experiments / Field Studies / Case Studies that equip students to acquire the much required skill component.

2. Courses of Study and Credits

- a. The study of various subjects in MCA degree program is grouped under various courses. Each of these courses carries credits which are based on the number of hours of teaching and learning.
- b. In terms of credits, every one hour session of L amounts to 1 credit per Semester and a minimum of two hour session of T or P amounts to 1 credit per Semester or a three hour session of T / P amounts to 2 credits over a period of one Semester of 16 weeks for teaching-learning process.
- c. The total duration of a semester is 20 weeks inclusive of semester-end examination.
- d. A course shall have either or all the four components. That means a course may have only lecture component, or only practical component or combination of any two or all the three components.
- e. The total credits earned by a student at the end of the semester upon successfully completing the course are L + T + P. The credit pattern of the course is indicated as L: T: P

Different Courses of Study are labeled and defined as follows:

a. Core Course:

A course which should compulsorily be studied by a candidate as a core-requirement is termed as a Core course. The CORE courses of Study are of THREE types, viz – (i) Foundation Course, (ii) Hard Core Course, and (iii) Soft Core Course.

b. Foundation Course (FC):

The foundation Course is a core course which should be completed successfully as a part of graduate degree program irrespective of the branch of study. These would include basic courses in Languages, courses of study prescribed by the University.

c. Hard Core Course (HC):

The Hard Core Course is a Core Course in the main branch of study and related branch(es) of study, if any that the candidates have to complete compulsorily.

d. Soft Core Course (SC):

A Core course may be a Soft Core if there is a choice or an option for the candidate to choose a course from a pool of courses from the main branch of study or from a sister/related branch of study which supports the main branch of study.

e. Open Elective Course:

An elective course chosen generally from other discipline / subject, with an intention to seek exposure to the basics of subjects other than the main discipline the student is studying is called an Open Elective Course.

f. Project Work / Dissertation:

Project work / Dissertation work is a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A project work carrying FOUR or SIX credits is called Minor Project work / Dissertation. A project work of EIGHT,

TEN, TWELVE or SIXTEEN credits is called Major Project work / Dissertation. A Minor Project work may be a hard core or a Soft Core as decided by the BOS / concerned. But the Major Project shall be Hard Core.

3. Scheme, Duration and Medium of Instructions:

3.1. The MCA Degree program is of 6 semesters - 3 years duration. A candidate can avail a maximum of 12 semesters - 6 years as per double duration norm, in one stretch to complete the MCA, including blank semesters, if any. Whenever a candidate opts for blank semester, he/she has to study the prevailing courses offered by the School when he/she resumes his/her studies.

3.2. The medium of instruction shall be English.

4. Credits and Credit Distribution

4.1. A candidate has to earn 144 credits for successful completion of Three Year MCA degree with the distribution of credits for different courses as decided by the Board of Studies.

4.2. The concerned BOS based on the credits distribution pattern given above shall prescribe the credits to various types of courses and shall assign title to every course including project work, practical work, field work, self study elective, as Foundation Course(FC), Hard Core(HC) or Soft Core(SC) or Open Elective(OE).

4.3. A candidate can enroll for a maximum of 30 credits and a minimum of 20 credits per Semester. However he / she may not successfully earn a maximum of 30 credits per semester. This maximum of 30 credits does not include the credits of courses carried forward by a candidate.

4.4. Only such full time candidates who register for a minimum prescribed number of credits in each semester from I semester to VI semester and complete successfully 144 credits in 6 successive semesters shall be considered for declaration of Ranks, Medals, Prizes and are eligible to apply for Student Fellowship, Scholarship, Free ships, and such other rewards / advantages which could be applicable for all full time students and for hostel facilities.

5. Add- on Proficiency Certification:

To acquire Add on Proficiency Certification a candidate can opt to complete a minimum of 4 extra credits either in the same discipline /subject or in different discipline / subject in excess to 144 credits for the Three Year MCA Degree program.

6. Add on Proficiency Diploma:

6.1. To acquire Add on Proficiency Diploma, a candidate can opt to complete a minimum of 18 extra credits either in the same discipline /subject or in different discipline / subject in excess to 144 credits for the Three Year MCA Degree program.

6.2. The Add on Proficiency Certification / Diploma so issued to the candidate contains the courses studied and grades earned.

7. Scheme of Assessment & Evaluation

7.1. The Scheme of Assessment and Evaluation will have two parts, namely;

- i. Internal Assessment (IA); and
- ii. Semester End Examination

7.2. Assessment and Evaluation of each Course shall be for 100 marks. The Internal Assessment and Semester End Examination of UG non engineering programs and PG programs shall carry 50 marks each (i.e., 50 marks internal assessment; 50 marks semester end examination).

7.3. The 50 marks of Internal Assessment shall comprise of:

Internal Test	=	30 marks
Assignments	=	10 marks
Seminars	=	10 marks

7.4. There shall be three internal tests conducted as per the schedule given below. The students have to attend all the three tests compulsorily.

- 1st test for 15 marks at the end of 5th week of the beginning of the Semester;
- 2nd test for 15 marks at the end of the 10th week of the beginning of the Semester; and
- 3rd test for 15 marks at the end of the 15th week of the beginning of the Semester.
- 7.5. The coverage of syllabus for the said three tests shall be as under:

- For the 1st test syllabus shall be 1st unit of the course;
- For the 2nd test it shall be 2nd unit and 1st half of the 3rd unit;
- For the 3rd test the syllabus will be 2nd half of the 3rd unit and complete 4th unit.

7.6. Out of 3 tests, the highest marks scored in **two tests** are automatically considered while assessing the performance of the students.

7.7. The Semester End Examination for 50 marks shall be held during 18th and 19th week of the beginning of the semester and **the syllabus for the semester end examination shall be entire 4 units.**

7.8. The **duration of the internal test shall be 75 minutes and for semester end examination the duration shall be 3 hours.**

Summary of Continuous Assessment and Evaluation Schedule

Type of Assessment	Period	Syllabus	Marks	Activity
First Test	2 nd half of 5 th Week	1 st Unit	15	Consolidation of 1 st Unit
Allocation of Topics for Assignments	6 th Week	First Unit and 1 st half of second unit		Instructional process and Continuous Assessment
Submission of Assignments	7 th Week	First Unit and 1 st half of second unit	5	Instructional process and Continuous Assessment
Seminars	8 th Week	First unit and 1 st half of second unit	5	Instructional process and Continuous Assessment
Second Test	2 nd half of 10 th Week	Second unit and 1 st half of third unit	15	Consolidation of 2 nd and 3 rd Unit
Allocation of Topic for 2nd Assignment	11 th Week	2 nd half of second unit and 3 rd Unit		Instructional process and Continuous Assessment
Submission of Assignments	12 th Week	2 nd half of second unit and 3 rd Unit	5	Instructional process and Continuous Assessment
Seminars	13 th Week	2 nd half of	5	Instructional

		second unit and 3 rd Unit		process and Continuous Assessment
Third Test	2 nd half of 15 th Week	Second half of third unit and complete 4 th Unit	15	Consolidation of 2 nd half of 3 rd Unit and entire 4 th Unit
Semester End Practical Examination	16 th Week	Entire syllabus	50	Conduct of Semester - end Practical Exams
Preparation for Semester–End Exam	16 th & 17 th Week	Entire Syllabus		Revision and preparation for semester–end exam
Semester End Theory Examination	18 th Week & 19 th Week	Entire Syllabus	50	Evaluation and Tabulation
	End of 20 th Week			Notification of Final Grades

Note: 1. Examination and Evaluation shall take place concurrently and Final Grades shall be announced latest by 5 days after completion of the examination.

1. Practical examination wherever applicable shall be conducted after 3rd test and before semester end examination. The calendar of practical examination shall be decided by the respective School Boards and communicated well in advance to the Registrar (Evaluation) who will notify the same immediately

8.0. Evaluation of Practicals and Minor Project / Major Project / Dissertation

8.1. The performance in the practice tasks / experiments shall be assessed on the basis of:

- a) Knowledge of relevant processes;
- b) Skills and operations involved;

i	Conduction of regular practical / experiments throughout the semester	20 marks
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ii	Maintenance of lab records	10 marks
iii	Performance of mid-term test (to be conducted while conducting second test for theory courses); the performance assessments of the mid-term test includes performance in the conduction of experiment and write up about the experiment.	20 marks
	Total	50 marks

c) Results / products including

calculation and reporting.

8.2

The 50 marks meant for continuous assessment of the performance in carrying out practicals shall further be allocated as under:

The 50 marks meant for Semester End (C3) Examination, shall be allocated as under:

i	Conduction of semester end practical examination	30 marks
ii	Write up about the experiment / practical conducted	10 marks
iii	Viva Voce	10 marks
	Total	50 marks

8.3. The duration for semester-end practical examination shall be decided by the concerned School Board.

8.4 Evaluation of Minor Project / Major Project / Dissertation:

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form of seminars in addition to the regular discussion with the supervisor. At the end of the semester, the candidate has to submit final report of the project / dissertation, as the case may be, for final evaluation. The components of evaluation are as follows:

i	Periodic Progress and Progress Reports (25%)
ii	Results of Work and Draft Report (25%)
iii	Final Evaluation and Viva-Voce (50%). Evaluation of the report is for 30% and the Viva-Voce examination is for 20%.

9.1 Provision to Carry Forward the Failed Subjects / Courses:

A student who has failed in a given number of courses in odd and even semesters shall move to next semester of immediate succeeding year and final year of the study. However, he / she shall have to clear all the courses of all semesters within the double duration, i. e., within six years of admission of the first semester failing which the student has to re-register to the entire program.

9.2 Re-Registration and Re-Admission:

a) In case a candidate's class attendance in aggregate of all courses in a semester is less than 75% or as stipulated by the University, such a candidate is considered as dropped the semester and is not allowed to appear for end semester examination and he / she shall have to seek re-admission to that semester during subsequent semester / year within a stipulated period.

b) In such a case where in a candidate drops all the courses in a semester due to personal reasons, it is considered that the candidate has dropped the semester and he / she shall seek re-admission to such dropped semester.

10. Attendance Requirement:

10.1 All students must attend every lecture, tutorial and practical classes.

10.2 In case a student is on approved leave of absence (e g:- representing the university in sports, games or athletics, placement activities, NCC, NSS activities and such others) and / or any other such contingencies like medical emergencies, the attendance requirement shall be minimum of 75% of the classes taught.

10.3 Any student with less than 75% of attendance in aggregate of all the courses including practical courses / field visits etc, during a semester shall not be permitted to appear to the end semester examination and such student shall seek re-admission as provided above.

10.4 Teachers offering the courses will place the above details in the School Board meeting during the last week of the semester, before the commencement of examination, and subsequently a notification pertaining to the above will be brought out by the Director of the School before the commencement of examination. A copy of this notification shall also be sent to the office of the Registrar & Registrar (Evaluation).

11. Challenge Valuation

- a. A student who desires to apply for challenge valuation shall obtain a photo copy of the answer script by paying the prescribed fee within 10 days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Registrar (Evaluation) within 10 days after the announcement of the results. This challenge valuation is only for SEE.
- b. **The answer scripts for which challenge valuation is sought for shall be evaluated by the external examiner who has not involved in the first evaluation. The higher of two marks from first valuation and challenge valuation shall be the final.**

12. Grade Card and Grade Point:

- a. **Provisional Grade Card:** The tentative / provisional Grade Card will be issued by the Registrar (Evaluation) at the end of every semester indicating the courses completed successfully. The provisional grade card provides **Semester Grade Point Average (SGPA)**.
- b. **Final Grade Card:** Upon successful completion of MCA Degree a Final Grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Registrar (Evaluation).
- c. **The Grade and the Grade Point:** The Grade and the Grade Point earned by the candidate in the subject will be as given below:

Marks P	Grade G	Grade Point (GP=V x G)	Letter Grade
90>100	10	v*10	O
80>90	9	v*9	A+
70 > 80	8	v*8	A
60> 70	7	v*7	B+

55 > 60	6	v*6	B
50 > 55	5.5	V*5.5	C
40 > 50	5	v*5	P
0-40	0	v*0	F
ABSENT			AB

O - Outstanding; A-Excellent; B-Very Good; C-Good; D-Fair; E-Satisfactory; F - Fail

Here, P is the percentage of marks ($P=[(IA)+M]$) secured by a candidate in a course which is **rounded to nearest integer**. V is the credit value of the course. G is the grade and GP is the grade point.

i. Computation of SGPA and CGPA

The following procedure to compute the Semester Grade Point Average (SGPA)

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student in a given semester, i.e :

$$SGPA (S_i) = \frac{\sum(C_i \times G_i)}{\sum C_i}$$

where C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course.

Illustration for Computation of SGPA and CGPA

Illustration No. 1

Course	Credit	Grade Point	Grade letter	Credit Point (Credit x Grade point)
Course 1	4	8	A	4X8=32
Course 2	4	7	B+	4X7=28
Course 3	3	9	A+	3X9=27
Course 4	3	7	B+	3X7=21
Course 5	3	6	B	3X6=18
Course 6	3	5	P	3X5=15
Course 7	2	7	B+	2X7=14
Course 8	2	8	A	2X8=16
	24			171

Thus, $SGPA = 171 \div 24 = 7.13$

Illustration No. 2

Course	Grade Point	Grade letter	Credit	Credit Point (Credit x Grade)
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Course 1	9	A+	4	4X9=36
Course 2	8	A	4	4X8=32
Course 3	7	B+	3	3X7=21
Course 4	10	O	3	3X10=30
Course 5	5	C	3	3X5=15
Course 6	6	B	3	3X6=18
Course 7	10	O	2	2X10=20
Course 8	8	A	2	2X8=16
			24	188

Thus, $SGPA = 188 \div 24 = 7.83$

Illustration No.3

Course	Credit	Grade Point	Grade Letter	Credit Point (Credit x Grade point)
Course 1	4	10	O	4 x 10 = 40
Course 2	4	9	A+	4 x 9 = 36
Course 3	3	7	B+	3 x 7 = 21
Course 4	3	8	A	3 x 8 = 24
Course 5	3	9	A+	3 x 9 = 27
Course 6	3	9	A+	3 x 9 = 27
Course 7	4	10	O	4 x 10 = 40
	24			215

Thus, $SGPA = 215 \div 24 = 8.99$

ii. Cumulative Grade Point Average (CGPA):

Overall Cumulative Grade Point Average (CGPA) of a candidate after successful completion of the required number of credits (144) for MCA degree is calculated taking into account all the courses undergone by a student over all the semesters of a program i. e.,

$$CGPA = \frac{\sum(C_i \times S_i)}{\sum C_i}$$

where S_i is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Illustration:

CGPA after Final Semester

Semester (i th)	No. of Credits (C _i)	SGPA (S _i)	Credits x SGPA (C _i X S _i)
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1	24	6.83	24 x 6.83 = 163.92
2	24	7.13	24 x 7.13 = 171.12
3	24	7.83	24 x 7.83 = 187.92
4	24	8.99	24 x 8.99 = 215.76
5	24	8.68	24 x 8.68 = 208.32
6	24	9.20	24 x 9.20 = 220.80
Cumulative	144		1167.84

Thus, $CGPA = \frac{24 \times 6.83 + 24 \times 7.13 + 24 \times 7.83 + 24 \times 8.99 + 24 \times 8.68 + 24 \times 9.20}{144} = 8.11$

144

CONVERSION OF GRADES INTO PERCENTAGE:

Conversion formula for the conversion of CGPA into Percentage is:

Percentage of marks scored = CGPA Earned x 10

Illustration: CGPA Earned 8.11 x 10 = 81.10

12.1 Classification of Results

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	Grade (Numerical Index)	Letter Grade	Performance	FGP
	G			Qualitative Index
9 >= CGPA 10	10	O	Outstanding	Distinction
8 >= CGPA < 9	9	A+	Excellent	
7 >= CGPA < 8	8	A	Very Good	First Class
6 >= CGPA < 7	7	B+	Good	
5.5 >= CGPA < 6	6	B	Above average	Second Class
> 5 CGPA < 5.5	5.5	C	Average	
> 4 CGPA < 5	5	P	Pass	Satisfactory
CGPA < 4	-	F	Fail	-

Overall percentage = 10 * CGPA

12.2 Provision for Appeal

If a candidate is not satisfied with the evaluation of C1 and C2 components, he/she can approach the grievance cell with the written submission together with all facts, the assignments, test papers etc, which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty as prescribed by the university on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the grievance cell is final.

For every program there will be one grievance cell. The composition of the grievance cell is as follows:-

- The Registrar (Evaluation) - Ex-officio Chairman / Convener
- One Senior Faculty Member (other than those concerned with the evaluation of the course concerned) drawn from the school / department/discipline and/or from the sister schools / departments/sister disciplines – Member.
- One Senior Faculty Members / Subject Experts drawn from outside the University school / department – Member.

12.3 With regard to any specific case of ambiguity and unsolved problem, the decision of the Vice-Chancellor shall be final.

LIST OF FACULTY MEMBERS

FACULTY PROFILE OF SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS

	<p>Dr. S. Senthil, Associate Professor and Director has completed his B.Sc (Applied Sciences – Computer Technology) from P.S.G College of Technology, MCA from Bharathidasan University, M.Phil in Computer Science from Manonmaniam Sundaranar University and Ph.D in Computer Science from Bharathiar University. He has passed State Eligibility Test conducted by Bharathiar University. While he has an experience of 18 years in teaching, his areas of interest are RDBMS, Data Mining, Data Compression, Computer Networks and Data Structures. He has published 30 papers in various National and International Journals of repute. He has presented a paper entitled "Lossless Preprocessing Algorithms for better Compression" in an IEEE International Conference at Zhangjiajie, China. He was also the recipient of the best paper awards, at an International Conference on “Wisdom Based Computing” at Thiruvananthapuram and at a National Conference on “Transforming India through Digital Innovations” at Guru Shree Shantivijai Jain College for Women, Chennai. (Email Id-dir.csa@reva.edu.in)</p>
	<p>Prof. K. Vijayalakshmi, Associate Professor and Coordinator-MCA, School of Computer Science & Applications holds M.Phil in Computer Science from MS University, MCA from Bharathidasan University and B.Sc in Mathematics from Bharathiar University. She has 14 years of teaching experience, teaching various subjects like C Programming, Data Structures, OOPs Concepts using C++, Computer Networks, Management Information System, Simulation Modeling and Design, and Data Mining. She has presented and published papers in National Level Conferences and International Journals. She is pursuing research in Data Mining. (Email ID: vijaykrishna@revainstitution.org)</p>
	<p>Prof. Lokesh C.K., Associate Professor and Coordinator-MCA in School of Computer Science and Application holds MCA, M Sc, M Phil. He has 15 years of the teaching experience. He served as Head of the Department of Computer Science for 9 years in REVA Institute of Science and Management. He has served as a member of BOE, Bangalore University, CMR Institute of Management Studies and Jain Group of Institutions, Bangalore. (Email Id-lokeshck@revainstitution.org)</p>



Dr. M. Vinayaka Murthy, Professor, School of Computer Science and Applications, holds Ph. D degree in “Computational Fluid Dynamics - Mathematics” from Bangalore University, M.Sc., degree in “Mathematics”, B.Sc., degree in” Mathematics” from Bharathidasan University and B. Ed., degree in Mathematics from Annamalai University. He has 23 years of teaching experience, teaching various subjects like Discrete Mathematics, Probability and Statistics, Operations Research, System Simulation and Modeling, Finite Automata Theory, Analysis and Design of Algorithms, Computer Graphics, Data Mining & Data Warehousing and Numerical Methods. He is interested in guiding research in Data Mining.

(Email: dr.m.vinayakamurthy@gmail.com; vinayakamurthy@revainstitution.org)



Prof. D. Revina Rebecca, Associate Professor, School of Computer Science and Applications, holds M.Phil degree in “Computer Science” and M.C.A Degree from Madurai Kamaraj University. She has 19 years of teaching experience, teaching various subjects like NoSQL, Database Management System, Data Mining, Multimedia, Cloud Computing, Computer Organization, System Software, Communication Skills, COBOL. She is pursuing research in Cloud Computing. (Email ID: revinaprabhu@revainstitution.org)



Prof. Manjunath B, Sr. Assistant Professor, School of Computer Applications, holds M.S degree in “Information Technology” and B.E degree in” Computer Science Engineering” from Bangalore University. He has 14 years of teaching experience, teaching various subjects like Logic Design, Digital Electronics, Computer Graphics, ERP, UID, Computer Organization, DBMS, E-commerce & Mobile Commerce, and Distributed Objects. He is pursuing his research in Distributed Systems.

(Mobile No. 9845265965 Email ID: manjunath_b@revainstitution.org)



Prof. G.Sasikala, Sr. Assistant Professor, School of Computer Applications holds MCA from Sri Venkateswara University, MBA from Sri Venkateswara University and B.Com (Computers) from Sri Venkateswara University. She has 11 years of teaching experience, teaching various subjects like C Programming, Unix Programming, Operating Systems, OOPs Concepts using C++, Data Structures, Advanced web Programming, .Net, Network Security, and Cloud computing. She has presented and published papers in National Level Conferences and International Journals. She is pursuing research in Network Security.

(Email ID: sasikalag@revainstitution.org)



Prof. Ravi D, Assistant Professor, School of Computer Applications holds MCA from VTU. He has 07 years of teaching, teaching various subjects like C Programming, Unix Programming, Operating Systems, JAVA, Advanced web Programming, J2EE, Compiler Design and Cloud computing. He is interested in Network Security.

(Email ID: ravi_d@revainstitution.org)



Prof. Parthasarathi M, Assistant Professor, School of Computer Science and Applications, holds MCA degree From Thiruvalluvar University and B.Sc degree in "Computer Science" from Madras University. He has 07 years of teaching experience, teaching various subjects like Data Structures, Analysis and Design of Algorithms, dot NET, Computer Graphic.
(Email ID: parthasarathi@revainstitution.org)



Prof. Pinaka Pani R, Assistant Professor, School of Computer Science and Applications, holds M.C.A degree from Sri Venkateswara University (SVU), Tirurpati. He has 7 years of teaching experience and one year in IT Industry. He is teaching Data Structures, Object Oriented Programming with C++, JAVA, Database Management Systems, Software Testing, Management Information Systems, Information and Network Security, Advanced Computer Networks.
(Email ID: pinakapani@revainstitution.org)



Prof. M. Ranganathappa, Assistant Professor, School of Computer Science and Applications, holds MCA degree in from Sri Venkateswara University, B.Ed degree in "Physics and Mathematics" from Bangalore University. He has 7 years of teaching experience in Discrete Mathematics, System Simulation Modeling, Web Programming, Problem Solving using C, Object Oriented Programming using C++, Database Management Systems, Data Structures, Data Warehousing and Data mining, Operating Systems and Fundamentals of Computer Organization. (Email ID: ranganath@revainstitution.org)



Prof. Vijaya Kumar H, Assistant Professor, School of Computer Science and Applications, holds MCA degree from VTU, Belgaum and B.Sc., degree in "Computer Science, Electronics and Mathematics" from Kuvempu University, Shimoga. He has 6 years of teaching experience, teaching various subjects like UNIX programming, Computer Networks, COBOL Programming, Fundamentals of computer organization, Software Engineering, Principles of User Interface Design, Operating Systems, Network simulator-2. He is interested in pursuing research in Industrial Drives. (Email ID: vijayakumarmca@revainstitution.org)



Prof. Vijayalaxmi P Chiniwar, Assistant Professor, School of Computer Science and Applications, holds MCA degree from VTU. She has 5 years of teaching experience. She has published 1 research paper in National Conference. She is teaching various subjects like C, C++, JAVA, Data Structures, Operating Systems, System Software, Unix, and Professional communication and Ethics
(Email ID: chiniwarvijaya@revainstitution.org)



Prof. Talloori Thanooj Kumar, School of Computer Applications holds MCA from VTU. He has 07 years of teaching, teaching various subjects like C Programming, Unix Programming, Operating Systems, JAVA, Advanced web Programming, J2EE, Software Engineering, Software Project Management, Software Testing and Cloud computing. He is interested in Project Management.

	<p>Prof. Deepa.B.G Assistant Professor, School of Computer Science & Applications, holds M.C.A degree in “Computer Applications” from VTU and B.Sc degree in” Computer Science” from Kuvempu University. She has 4 years of teaching experience, teaching System simulation, Design & Analysis of Algorithms, Fundamentals of Computer Organizations, Discrete Mathematics, System Software, Operation Research. (Email ID:deepabg@revainstitution.org)</p>
	<p>Prof. M. Manjusree, Assistant Professor, School of Computer Science and Applications, holds MCA degree from Sri Venkateswara University, Tirupathi. She has 7 years of teaching experience, teaching various subjects like DBMS, Information and Network Security, Computer Networks, Advanced Database Management Systems, Operational Research, Computer Graphics, Web Programming ,UNIX, C programming and C++. Her area of research interest is Data Mining. (Email ID: manjusreem@revainstitution.org)</p>
	<p>Prof. Vidya S, Assistant Professor, School of Computer Science and Applications, holds MCA degree from Bangalore University. She has 4 years of teaching experience. She is teaching C, C++, JAVA, Data Structures, Computer Graphics, and Communicative English and Technical Writing. She is interested in pursuing research. (Email ID: vidyas@revainstitution.org)</p>
	<p>Prof. Prasanna Kumar R.B. Associate Professor in School of Computer Science and Application. Educational Qualification: MCA. He is working in this reputed institution REVA ISM from last Eight years as a Associate Professor in Computer Science department, and He has more than 14 years of experience in the field of education. He was a BOE for Exams of 2012-13, Bangalore University for BSc (CS) Program. He was a Deputy Custodian for BA Valuation Unit, Bangalore University for the academic 2014-15. (Email ld-prasannakumarrb@revainstitution.org)</p>
	<p>Prof. Krishnamurthy R, Professor in School of Computer Science & Applications holds B.E. in Computer Science & Engineering from Mysore University, pursuing M. Tech (CSE) from VTU. Prof. Krishnamurthy R has 19 years of teaching experience in Computer Science. He has served as a member of BOE, Kuvempu University, CMRIMS college. His areas of interest are Big data, Pervasive Computing, Data Analytics. (Email Id-krishnamurthyr@revainstitution.org)</p>
	<p>Prof. Mohankumari C., Assistant Professor in School of Computer Science and Applications holds a M.Sc. Degree in “Statistics” specialization from Bangalore University, Bangalore, and pursuing PhD in “ Statistical Analysis for Daily Stock Exchange Data” REVA University. She has 5 years of teaching experience. Her specialized area of research is Time Series Analysis. Prof. Mohankumari has taught Bio-Statistics, Applied Statistics, Testing Of Hypothesis, Probability, Non Parametric tests, Interval Estimation, Point Estimation, Operation research, Statistical Quality Control at graduate and post graduate level. She has attended 16 workshops and seminars on various subjects. (Email Id-mohankumaric@revainstitution.org)</p>

	<p>Prof. Rachana Vajpai, Assistant Professor in the School of Computer Science and Applications holds M.C.A from Rajiv Gandhi Technical University, Gwalior (M.P). She has 6 years of teaching experience in Computer Science. She has done Diploma in Oracle and Web Designing languages. She worked as software programmer in software development company AGL Technologies. She has conducted many technical workshops organized by IIT, BOMBAY. (Email ID- rachanavajpai@revainsitution.org).</p>
	<p>Prof. Varish P V, Assistant Professor in School of Computer Science & Applications holds MCA and B Sc from Bangalore University. He has 6 years of teaching experience. He has taught Java Programming, Analysis and Design of Algorithms, Numerical Analysis, Operation Research, DBMS, Web Programming, Visual Programming, etc., He served as Assistant Custodian for MCA/BHM and BA/BVA Valuation Units of Bangalore University. (Email varish.klr@gmail.com)</p>
	<p>Prof. Shreetha sudhindra Bhat, Assistant Professor, School of Computer Science and Applications, around 12 years of experience in Teaching & Student Management. She has completed her MCA from Gulbarga University Campus, Gulbarga, Karnataka. She also has an M.Phil Degree in Computer Science from Madurai Kamaraj University. She is a certified as a Soft Skills Trainer from IIMPT, Bengaluru, which is accredited by IAO (International Accreditation Organization), Houston, USA. The subjects taught include Software engineering, Operating Systems, Computer Networks, C Programming, Optimization Techniques, Human Computer Interface (HCI), Research Methodologies & Statistical Tools, Soft Skills, Programming Language Paradigms (PLP) to name a few. Has presented a research paper in National Conference on Cloud Security. (EmailId- shreethabhat@reva.edu.in)</p>
	<p>Prof. Mohamed Abdul Kader Jailani, Assistant Professor, School of Computer Science and Applications, holds MCA, M.phil and M.Tech degree. He has 16years of teaching experience, teaching OOAD with UML, Analysis and Design of Algorithms, Computer Graphics, Fuzzy Logic. He has presented and published papers in National and International Conferences. . Having interest in pursuing research in Computer Graphics and image processing. (Email Id- mohamadgilani@reva.edu.in)</p>
	<p>Prof. Shobhana Saxena, Assistant Professor, School of Computer Science and Applications, holds MCA and has been working in REVA Institute of Science Management for last 6 years as Assistant Professor in Computer Science Department and she has more than 12 years of experience in the field of computer science and has taught in various universities in different states. She is teaching various subjects like C, C++, Java, DBMS, Software Engineering, Data Network and Communication, Operating systems and design of algorithms. (Email Id:shobhanasaxena@reva.edu.in)</p>



Mr.V.Thirunavukkarasu, Assistant Professor, School of Computer Science and Applications. He has completed his B.Sc (Mathematics) from NGM College, MCA from SST College, M.Phil in Computer Science from Bharathidasan University and currently pursuing his Ph.D in Bharathiar University. He has 8 years of teaching experience and 3 years of research experience, his area of interest includes Image processing and its application in crime domain, image security, computational intelligence and machine leaning algorithms. He has passed State Eligibility Test (SET). He has published 6 papers in international journals, 5 papers in international conferences, 3 papers in national conferences and he is an author of one book chapter.

(Email Id: thirunavukkarasu.v@reva.edu.in)



Mrs. Sinduja K M, Assistant professor, School of Computer Science and Applications She has done M.C.A in Computer Science & Engineering, from Maharaja Institute of Technology-Mysore, Under Visveshwariah Technological University (VTU). She has 1 year of experience in industry and 1.5 years of teaching experience. She has co-ordinates various activities such maintaining documentation and student's activity forum. Her Area of Interest: Internet of Things.

(Email Id sinduja.km@reva.edu.in)



Mrs. P.Sreelakshmi, Assistant Professor, School of Computer Science and Applications, She has completed MCA and B.Sc (computers) from Sri Venkateswara University. She has 9 years of experience including 2 years of industry experience. Her areas of interest are Data mining, Big data analytics, Data structures, Computer graphics, operating systems, software engineering, Analysis and design of algorithms and IOT. She is interested in pursuing research in data mining.

(Email p.sreelakshmi@reva.edu.in)