School of CSA

Bachelor of Computer Applications (BCA)

HANDBOOK
2016-2017

REVA
UNIVERSITY
Bengaluru, India

SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS

Bachelor of Computer Applications (BCA)

HANDBOOK

2017

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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".

<div align="center">Welcome to the portals of REVA University!</div>

<div align="right">

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

</div>

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 BCA 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 BCA 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 BCA 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 administers, 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 relevence to local, reginal, natinal 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 BCA in REVA University will enjoythe curriculum, teaching and learning environment, the vast infrastructure and the experienced teachers involvement and guidance. We will strive to provide all needed comfort andcongenial 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 Censor 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, Nana 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 VikasYojana. 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, Okalahoma State University, Western Connecticut University, University of Alabama, Huntsville, Oracle India Ltd, Texas Instruments, Nokia University Relations, EMC^2, 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 classeseveryday 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".

MISSON

- 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

Bachelor of Computer Applications (BCA)

Programme Overview

Computer is not new in the context. Advent of computer dated back thousands of years. It may be the fact that computational instruments named differently. But basic human understanding were absolutely centralized on the scope of utilizing technology for making human led operations more and more swift and soft. Abacus was one of such instrument. Use of abacus in counting and other basic mathematical operations were evident even in ancient India. Advancement in the systematized information flow recorded only after advent of modern computer. It influenced the human life to a greater extent. It also entered all the fields of human society.

With the opening up of vast number of career options that stand in front of the students, computer applications is an attractive career choice for the students. Thousands of computer applications are launched every day and each of them has something better than its previous version. It follows the concept of continuous improvement and also offers the developers a large market place to showcase their innovations. This means better commercials involved for every computer application that is sold and hence it also means that large corporations and software firms look for people with a strong background in the computer applications. The better the skill, better are the employment opportunities and better is the pay. Not only this, business opportunities in the field of computer application are vast and do not need a huge financial investment but high level technical skills. A person can utilise his skill set to create a business according to his own industry and make a career out of it.

Computer applications have set a benchmark in terms of innovation and development making it an industry with constant growth and evolution. Technology is advancing at the speed of light and with the advent of bullet trains, super-fast connectivity and artificial intelligence, it has opened up several sub categories to be explored and worked on. This is one of the major factors which makes computer applications such a diverse and futuristic industry. The level of innovation that we see every day is constantly evolving the field and has opened a lot other doors for scope of advancement and innovation. One thought leads to a million ideas and computer application is giving life to these ideas

The BCA program of REVA University has been designed tocreate motivated, enthusiastic, and creative thinking graduates to fill the roles as computer algorithm developers, computer

programmers, computer application developers, teachers, scientists, professionals and administrators.

Indian economy is experiencing an upward growth right from the beginning of 21st century except for a short stint during the mid of present decade necessitating well qualified science graduates to work as teachers, scientists, professionals and often administrators. At present more than 400 million youth are below 18 years of age and government is committed to increase the GER to 30% by 2020. The proposed BCA programme designed will act as a foundation and first degree to prepare computer programmers, software developers for various applications, teachers, scientists, professionals and administrators to meet the challenges of growing economy as well as to fulfill the growing aspirations of the youth.

The BCA programme at REVA University has been developed after a careful study of regional national and international market involving experts from premier institutions, universities industries and established business firms. The curriculum is outcome based and it imbibes required theoretical concepts and practical skills in the domain. By undergoing this programme, students develop critical, analytical thinking and problem solving abilities for a smooth transition from academic to real-life work environment. In addition, students are trained in communication skills and interdisciplinary topics to enhance their scope. The above mentioned features of the programme, advanced teaching and learning resources, and experience of the faculty members with their strong connections with industry and research organizations makes this programme unique.

Programme Educational Objectives (PEOs)

The BCA programme is a foundation degree and helps to develop critical, analytical and problem solving skills at first level in computer applications. This foundation degree makes the graduates employable in IT industries, scientific organisations and also to assume administrative positions in various types of organisations. Further acquisition of higher level degrees help the graduates to pursue a career in academics or scientific organisations as a researchers and teacher in higher education institutions.

The Programme Educational Objectives are to prepare the students to:

Graduates from REVA University after 3 years of completion or the programme shall:

PEO-1	Be skilled Computer Application Developers, Algorithm developers, Computer Programmers and to operate various commercial software tools to solve scientific and business problems

PEO-2	Adopt lifelong learning philosophy for continuous improvement and acquire higher degrees to act as scientists in research establishments or business administrators or act as administrators in public, private and government organisations.
PEO-3	work as a member of a team and communicate effectively across team members, to be equipped to be competent in the field of computer science
PEO-4	understand 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)

- **PO 1: Disciplinary knowledge**: Capable of demonstrating comprehensive knowledge and understanding of computer science with specialization in computer Applications that form a part under graduate programme BCA-Bachelor of Computer Applications.

- **PO 2: Scientific reasoning**: Ability to analyze, and understand concepts in computer science critically evaluate ideas, logical reasoning and experiences in programming, algorithm development and application development.

- **PO 3: Problem solving**: Capacity to extrapolate and apply competencies to solve different kinds non-familiar problems, such as design Algorithms, develop computer programs for specific applications and operate commercially available software tools for solving scientific and business related problems

- **PO 4: Environment and Sustainability**: Understand the issues of environmental contexts and **sustainable development and provide solutions for the same using domain knowledge Computer Applications**.

- **PO 5: Research-related skills**: Ability to recognize cause-and-effect relationships, define problems analyze, interpret and draw conclusions from data.

- **PO 6: Ethics**: Conduct as a responsible citizen by recognizing different value systems and understand the **moral dimensions** of decisions, and **accept responsibility** for them.

- **PO 7: Cooperation/Team work**: Ability to work effectively and respectfully with diverse teams facilitate cooperative or coordinated effort on the part of a group, and act together as a group or team in the interests of a common cause and work efficiently as a member of a team.

- **PO 8: Communication Skills**: Ability to express thoughts and ideas effectively in writing and orally Communicate with others using appropriate media; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups

- **PO 9: Self-directed and Life-long Learning**: Acquire the ability to engage in independent and **life long learning** in the broadest context socio-technological changes

Programme Specific Outcomes (PSO)
After successful completion of the programme, the graduates will be able to

1. Assimilate technological expertise with practical skills in various fields of computer applications.

2. Use existing algorithms to develop software applications and operate on various software tools for solving scientific and business problems.

3. Provide computer based solutions for real time problems through software applications.

SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS
BCA PROGRAMME
SCHEME & SYLLABUS – 2016

FIRST SEMESTER

Sl. No	Code	Title	HC/SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	BPAL15F1100	Language –I:English	CC	2	1	0	3	4
2	BPAL15F1200	Language –II: K / H / F/AE	CC	3	0	0	3	3
3	BPAL15F1300	Basic Mathematics	HC	3	0	1	4	5
4	BPAL15F1400	Problem Solving Techniques using C	HC	4	0	0	4	4
5	BPAL15F1500	Digital Electronics	HC	4	0	0	4	4
6	BPAL15F1600	Environmental Studies	FC	2	0	0	2	2
7	BPAL15F1700	C Programming Lab	HC	0	0	2	2	4
8	BPAL15F1800	Electronics & Hardware Lab	HC	0	0	2	2	4
Total Credits				**18**	**1**	**5**	**24**	**30**

SECOND SEMESTER

Sl. No	Code	Title	HC/SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	BPAL15F2100	English – I : Communicative English and Critical Awareness	CC	2	1	0	3	4
2	BPAL15F2200	Language – II: K / H / F/AE	CC	3	0	0	3	3
3	BPAL15F2300	Statistical Methods	HC	3	0	1	4	5
4	BPAL15F2400	Data Structures using C	HC	4	0	0	4	4
5	BPAL15F2500	Data Base Management System	HC	4	0	0	4	4
6	BPAL15F2600	Indian Constitution & Professional Ethics	FC	2	0	0	2	2
7	BPAL15F2700	Data Structures Lab	HC	0	0	2	2	4
8	BPAL15F2800	Data Base Management System Lab	HC	0	0	2	2	4
Total Credits				**18**	**1**	**5**	**24**	**30**

THIRD SEMESTER

Sl. No	Code	Title	HC/SC /FC	L	T	P	Credits	Working Hrs
1	BPAL15F3100	Data Communication and Networks	HC	3	0	0	3	3
2	BPAL15F3200	Design & Analysis of Algorithms	HC	3	0	1	4	4
3	BPAL15F3300	Operating System	HC	4	0	0	4	4
4	BPAL15F3400	Object Oriented Programming Using C++	HC	4	0	0	4	4
5	BPAL15F3500	Unix Programming	HC	3	0	0	3	3
6	BPAL15F3600	C++ Lab	HC	0	0	2	2	4
7	BPAL15F3700	Unix Shell Programming Lab	HC	0	0	2	2	4
		Total Credits		**17**	**0**	**5**	**22**	**26**

FOURTH SEMESTER

Sl. No	Code	Title	HC/SC/FC	L	T	P	Credits	Working Hrs
1	BPAL15F4100	Computing Technologies	HC	4	0	0	4	4
2	BPAL15F4200	Visual Programming	HC	3	0	0	3	3
3	BPAL15F4300	Software Engineering	HC	3	1	0	4	5
4	BPAL15F4400	Computer Graphics	HC	3	0	0	3	3
5	BPAL15F4510	Cryptography and Network Security	SC	3	0	1	4	5
	BPAL15F4520	Python Programming						
6	BPAL15F4600	System Software	HC	3	1	0	4	5
7	BPAL15F4700	Visual Programming Lab	HC	0	0	2	2	4
8	BPAL15F4800	Computer Graphics Lab	HC	0	0	2	2	4
		Total Credits		**19**	**2**	**5**	**26**	**33**

FIFTH SEMESTER

Sl. No	Code	Title	HC /SC/ FC	Credit Pattern L	Credit Pattern T	Credit Pattern P	Credits	Working Hrs
1	BPAL15F5100	Computer Architecture	HC	3	1	0	4	5
2	BPAL15F5200	Data Warehousing and Data Mining	HC	3	1	0	4	5
3	BPAL15F5300	Java Programming	HC	3	1	0	4	5
4	BPAL15F5400	Open Elective	OE	3	0	1	4	5
5	BPAL15F5510	.NET Programming using C#	SC	3	0	0	3	3
	BPAL15F5520	Accounting and Financial Management						
6	BPAL15F5600	Data Analytics	HC	2	0	1	3	3
7	BPAL15F5700	Java programming Lab	HC	0	0	2	2	4
8	BPAL15F5810	.NET Programming Lab	SC	0	0	2	2	4
	BPAL15F5820	Accounting and Financial Management Lab						
		Total Credits		**17**	**3**	**6**	**26**	**34**

Open Elective offered by BCA Department

Sl. No	Code	Title	HC/SC/ OE	Credit Pattern L	Credit Pattern T	Credit Pattern P	Credits	Working Hrs
1	BPAL15F5400	PC Trouble Shooting	OE	3	0	1	4	5
		Total Credits		**3**	**0**	**1**	**4**	**5**

* **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.

SIXTH SEMESTER

Sl. No	Code	Title	HC/SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	BPAL15F6100	Web Programming	HC	3	1	0	4	5
2	BPAL15F6210	Cloud Computing	SC	3	1	0	4	5
	BPAL15F6220	Advanced Java						
3	BPAL15F6300	Web Programming Lab	HC	0	0	2	2	4
4	BPAL15F6410	Cloud Computing Lab	SC	0	0	2	2	4
	BPAL15F6420	Advanced Java Lab						
5	BPAL15F6500	Project Work	HC	0	2	8	10	20
		Total Credits		**6**	**4**	**12**	**22**	**38**

REVA UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

Scheme of Teaching, Examination and Credits

FIRST SEMESTER BCA

Detailed Syllabus-2016

Sl. No	Code	Title	HC/SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	BPAL15F1100	Language –I:English	CC	2	1	0	3	4
2	BPAL15F1200	Language –II: K / H / F/AE	CC	3	0	0	3	3
3	BPAL15F1300	Basic Mathematics	HC	3	0	1	4	5
4	BPAL15F1400	Problem Solving Techniques using C	HC	4	0	0	4	4
5	BPAL15F1500	Digital Electronics	HC	4	0	0	4	4
6	BPAL15F1600	Environmental Studies	FC	2	0	0	2	2
7	BPAL15F1700	C Programming Lab	HC	0	0	2	2	4
8	BPAL15F1800	Electronics & Hardware Lab	HC	0	0	2	2	4
		Total Credits		**18**	**1**	**5**	**24**	**30**

Course Code	Duration	Course Title	L	T	P	C
BPAL15F1100	16 Weeks	**Language –I: English**	2	1	0	3

COURSE OBJECTIVES:

- To assist the learners' acquisition of all the four language skills and the functional use of language in context.
- To familiarize the learners to a wide variety of writing styles.
- To inculcate in them a spirit of critical enquiry.

COURSE OUTCOMES:

At the end of the course, the learners should be able to:
- Identify formal and informal communication contexts and use appropriate language style
- Use language in specific academic and non-academic tasks such as explaining, directing, instructing, and note-taking and note making.

COURSE CONTENT:

UNIT I 15 Hours

Literary Component: 1. Fabre: Homer of Insects, 2. Deep Ecology

Communication Skills Component: Remedial Grammar – Articles, Prepositions, SV Concord, Tenses, Punctuation

UNIT II 15 Hours

Literary Component: 3. Daffodils, 4. Loser of Everything

Communication Skills Component: Reading Comprehension: Introduction; Descriptive and narrative passages

UNIT III 15 Hours

Literary Component: 5. The Thakurs' Well, 6. The Rat Communication Skills Component: Listening and Speaking Skills – Introducing oneself/others; Asking for and giving directions and instructions.

UNIT IV 15 Hours

Literary Component: 7. Honoring the Sahab, 8. Mistaken Modernity

Communication Skills Component: Writing Skills – Paragraph Writing Descriptive and Narrative; Note Making & Note Taking.

Text Books:

1. Board of Editors. Experience – 1: B U Prasaranga, Bengaluru
2. Board of Editors. Expression – 1: BU Prasaranga, Bengaluru
3. Alexander L.G. Guided Composition in English Language Teaching, Longman, 1971. Bellare Nirmala: Reading Strategies. Vol. 1 and 2. Oxford University Press, 1998 Bhasker W.W.S & Prabhu N.S.: English through Reading. Vols. 1 and 2. Macmilian, 1975. Freeman, Sarah: Study Strategies. Oxford University Press, 1979.
4. Freeman, Sarah: Written Communication. Orient Longman, 1977 Grellet. F.: Developing Reading Skills. Cambridge University Press, 1981. Leech, G. A Communicative Grammar of English, Longman, 2002
5. Martinet, A & John Silverwood. Beginning to Communicate in English, OUP, 2009 Mohan Krishna & Banerji Meera: Developing Communication Skills. Macmilian 1990. Mohan Krishna & Singh N.P.: Speaking English Effectively. Macmilian, 1995 Narayanaswami V.R.: Organised Writing. Book 2. Orient Longman.
6. Radha Krishnan Pillai. English Communication, Cambridge, 2010L Saraswati V.: Organised Writing. Book 1. Orient Longman
7. Widdowson H.G.: English in Focus. English for Students of Sciences. Oxford University Press. Wren & Martin. High School Grammar and Composition, New Delhi: Sterling.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F1200	16 Weeks	**LANGUAGE-II** **K / H / F/AE**	3	0	0	3

COURSE OBJECTIVES:

To improve language proficiency in respective language and learn grammar for critical and proper communication.

KANNADA

The following texts are prescribed:

1. T. P. Kailasam, TOLLUGATT ATWA MAKKALISCHOOL MANELALVE? A play, published by Ankita Pustaka - 2010, Bangalore
2. V. Sitaramiah (V.Si.),, PAMPA YATRE – (Pilgrimage to Hampi: Capital of Vijayanagar Empire), published by V. Si. Sampada (V. Si Samsamarana Vedike), 6th Edition, 2004, Bangalore

HINDI

The following texts are prescribed:

1. Jaya Prakash, Nutan Gadya Sangraha published by Sumitra Prakashan, Islamabad, 2009.

2. Dr. Sanjeev Kumar Jain, Media Writing and Mass Communication by Kailash Pustak Sadan, Bhopal

ADDITIONAL ENGLISH

The following text is prescribed:

1. Nandini Nayar, Footprints I, An anthology of prose, poetry and fiction, published by Cambridge University, New Delhi, 2008.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F1300	16 Weeks	**Basic Mathematics**	3	0	1	4

COURSE OBJECTIVES:

- To give students an understanding of matrices and determinants, differential calculus, vectors, set theory and functions;
- To enable them to work on problems relative any aspect of matrices, determinants etc;
- To solve given problems using set theory concepts.

COURSE OUTCOMES:

- Understand the concepts of modeling or translating a physical or any other problem in to a mathematical model.
- Able to apply this knowledge to solve the problems.
- An ability to identify, formulates, and solves the problems.
- Ability to know and to understand various types of Matrices and vectors.
- Ability to know the nature of Differential Calculus and Set theory.
- Ability to solve the model by selecting and applying a suitable mathematical method.

UNIT I   16 Hours

Matrices and determinants: Matrices-Definition, types of matrices, addition, subtraction, scalar multiplication and multiplication of matrices. **Determinants:** Definition, properties of determinants, minors, cofactors, adjoint of a matrix, cayley Hamilton theorem (without proof), eigen values and eigen vectors, inverse of a matrix using cayley Hamilton simultaneous equatiuons using Cramer's rule, gauss elimination Method and matrix inversion method.

UNIT II   15 Hours

Differential Calculus: Limits and continuity: Introduction-Real valued functions- limit of a function, algebra of limits, continuity of a function and points of discontinuity.
Differentiation: Derivatives, algebra of derivatives, chain rule, derivatives of composite function, logarithmic and exponential differentiation, and successive differentiation (second order).

UNIT III   15 Hours

Vectors: Definition of a vector and scalar, vector addition, dot and cross product, projection of a vector, area of parallelogram, area of triangle, scalar triple product, volume of a parallelepiped, co-planarity of three vectors, vector triple product.

UNIT IV   15 Hours

Set Theory: Introduction, definition and concepts, representation of sets, finite sets, infinite sets, set operators- union, intersection differences, symmetric differences, complement, Cartesian products -basic set identities, de-morgan's law, cardinality, and results related to all set operators. Relations, types of relations, equivalence relation, equivalence classes, partition of a set, matrix representation of binary relation. Functions: onto, one-one, into, inverse functions, composition of a functions and inverse of compositions.

Text Books:
1. Grimaldi, Ralph P., 2003 : "Discrete and Combinational Mathematics", Pearson Education, Singapore
2. Rao, G. Shanker, 1999 : "Mathematics for Computer Science", Kalyani Publishers., New Delhi
3. Thomas and Finney, 1998 : "Calculus with Analytical Geometry", Narosa Publishing Hous, 6th edition

Reference Books:
1. K.D.Joshi : "Foundations of Discrete Mathematics", 1989 edition, Wiley Eastern Ltd.,
2. S Narayan and T K Manicavachogam Pillai : "Calculus"- Vol I and Vol II, S.V.Publishers, 2009 edition.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F1400	16 Weeks	**Problem Solving Techniques using C**	4	0	0	4

COURSE OBJECTIVES:

- To gain experience about structured programming
- To help students to understand the implementation of C language
- To understand various features in C
- To solve the given problem using the syntactical structures of C language.

COURSE OUTCOMES:

At the end of the course students will be able to

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Understand the dynamics of memory by the use of pointers.

COURSE CONTENT:

UNIT I   **15 Hours**

Introduction to Programming Concepts: Software, Classification of Software, Modular Programming, Structured Programming, Algorithms and Flowcharts with examples. **Overview of C Language**: History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants , Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions.

UNIT II   **15 Hours**

Managing Input and Output Operation: Formatted and Unformatted I/O Functions, Decision making, branching and looping: Decision Making Statements - if Statement, if– else statement, nesting of if-else statements, else–if ladder, switch statement, operator, Looping - while, do-while, for loop, Nested loop, break, continue, and goto statements. **Functions:** Function Definition, prototyping, types of functions, passing arguments to functions, Nested Functions, Recursive functions.

UNIT III   **15 Hours**

Arrays: Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays, Multi Dimensional Arrays - Passing arrays to functions. **Strings:** Declaring and Initializing strings, Operations on strings, Arrays of strings, passing strings to functions. Storage Classes -

Automatic, External, Static and Register Variables.

UNIT IV   **15 Hours**

Structures-Declaring and Initializing, Nested structure, Array of Structure, Passing Structures to functions, Unions, Pointers – Introduction, Pointers and functions, Pointers and Arrays, Pointers and Structures, Dynamic memory allocation, Memory allocation functions.Intoduction to files, file opening modes, A simple program to write, read and appen

Text Books:

1. E. Balaguruswamy, "Programming In ANSI C", 4th edition, TMH Publications, recent version
2. Ashok N. Kamthane, "Programming with ANSI and Turbo C", Pearson Education, recent version.
3. Anami, Angadi, and Manvi, "Computer Concepts and C Programming – A Holistic approach", PHI 2008,

References Books:

1. Mahapatra, "Thinking in C", PHI Publications, 1998.
2. Yashwant Kanetkar, "Let Us C", 13th Edition, PHP, 2013.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F1500	16 Weeks	Digital Electronics	4	0	0	4

COURSE OBJECTIVES:

- The main objective of this course is to obtain a basic level of Digital Electronics knowledge
- Perform analysis and design of complex digital electronic circuits.
- Understand the logical operation of simple arithmetic and other MSI circuits (Medium Scale Integrated Circuits)

COURSE OUTCOMES:

On successful completion of this module, students should be able to:

- Explain and manipulate the representation of numbers in binary form and other codes e.g. signed forms of binary, hexadecimal.
- Describe basic digital logic components and use and/or interpret their representation in truth tables.

- Use of the different representations of digital circuits: truth tables, circuit diagrams and their logical descriptions.
- Explain ways of transmitting and storing data, especially the concepts of computer buses and addressing and multiplexing/de-multiplexing.

UNIT I   **10 Hours**
Number System: Binary, octal, Hexadecimal Number, their addition and substraction, Base conversions, Number code: 8421, Other BCD codes, Grey, ASCII, EBCDIC.

UNIT II   **15 Hours**
Boolean Algebra: Boolean Algebra: Laws and theorems of Boolean algebra. De Morgan's theorem, XOR and XNOR gates, Half and Full Adder and Subtractor circuits. **Digital Circuit Fundamentals:** Products, Sum of products and Product of sums, Form of Boolean expressions, Truth Tables and Karnaugh maps, pair reads octets and Karnaugh simplification.

UNIT III   **15 Hours**
Flip Flop: Flip Flop: RS Flip Flop, Clocked, RS Flip Flop, Edge trigger D Flip Flop. Flip Flop Switching time, JK Flip Flop. JK Master Slave Flip Flop. Clock wave forms, Shift registers: Serial in and serial out, Parallel in and parallel out**.**

UNIT IV   **20 Hours**
 Logic families: Scale of integration, Digital IC's, classifications, DTL, TTL, ECL, MOS, CMOS, Mention of features: speed of operation, power dissipation, propagation delay, fan-in, fan-out. IC's Manufacturing Technologies, Memories for Digital: System: Semiconductor Memories, Memory organization , classification of memories

Text Books:
1. Thomas L.Floyd ,''Digital Fundamentals", Pearson Education Inc, New Delhi, 2003.
2. Mehta V K and Mehta Shalu: "Principles of Electronics", 7th Edition S. Chand & Company Ltd.
3. Theraja B L: "Basic Electronics solid state", 5th Edition. S. Chand & Company Ltd

Reference Books:
1. Morris Mano, "Digital Design", 5Th Edition, Prentice Hall, 2013
2. R.P.Jain, "Modern Digital Electronics", 3rd Edition, Tata Mc Graw Hill, 2003.
3. Bignell and Donovan, "Digital Electronics", 5th Edition, Thomson Publication, 2007.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F1600	16 Weeks	**Environmental Studies**	2	0	0	2

COURSE OBJECTIVE:

To familiarize students with environmental issues as how to conserve, preserve our Environment.

COURSE OUTCOMES:

At the end of the course students will be able to :
- Know the dynamics and importance of environment and the need for public awareness;
- To understand the natural resources – water, energy, forest, food, mineral, soil and their conservation.
- Understand the causes and effects of environmental pollution and prevention of pollution & waste management.

COURSE CONTENT:

UNIT I   **10 Hours**
Introduction: Multidisciplinary nature of environmental studies – Definition -Scope and importance -Need for public awareness.

UNIT II   **15 Hours**
Natural Resources: Renewable and non-renewable -Problems associated - Forest resources- Water resources-Mineral resources-Food resources-Energy resources-Land resources and their conservation.

UNIT III   **15 Hours**
Environmental Pollution: Definition- Causes - Effects and control measures of air - Water- Soil-Marine-Noise-Thermal -Nuclear pollutions -Solid waste management-Prevention of pollution.

UNIT IV   **20 Hours**
Social Issues and the Environment: Unsustainable to sustainable development, Environmental ethics, Climate changes, global warming, Wildlife protection act, Public awareness,- Human Population and the Environment- Population growth - Population explosion - Human rights - Value education - Role of information technology in environment and human health - HIV/Aids -Women and child welfare - Case studies.

Text Books:

1. Desai R.G. - Environmental studies. Himalaya Pub. House.
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,
4. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi.
5. Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F1700	**16 Weeks**	**C Programming Lab**	**0**	**0**	**2**	**2**

PART – A

1) Programs on language operators
2) Programs on selective statements
3) Programs on Iterative statements
4) Programs on Arrays
5) Programs on functions
6) Programs on structures and unions
7) Programs on pointers
8) Programs on pointers to Arrays and Structures

(Minimum 2 programs on each type)

PART – B

Programs may be decided by External and Internal examiners.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F1800	16 Weeks	Electronics & Hardware Lab	0	0	2	2

PART – A

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. Design and Realization of BCD Adder using IC 7483.
7. Realizations of J-K flip flop using IC 7400 and 7410.
8. Realization of T and D flip flop using IC 7476.
9. Implementation of PIPO Shift Registers using flip flops. (IC 7476).
10. Design and implementation of odd and even parity checker Generator using IC 74180.

PART – B

PC Hardware lab - Components of PC, Assembling and installation

REVA UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

Scheme of Teaching, Examination and Credits

SECOND SEMESTER BCA

Scheme & Syllabus-2016

Sl. No	Code	Title	HC/ SC /FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	BPAL15F2100	English – I : Communicative English and Critical Awareness	CC	2	1	0	3	4
2	BPAL15F2200	Language – II: K / H / F/AE	CC	3	0	0	3	3
3	BPAL15F2300	Statistical Methods	HC	3	0	1	4	5
4	BPAL15F2400	Data Structures using C	HC	4	0	0	4	4
5	BPAL15F2500	Data Base Management System	HC	4	0	0	4	4
6	BPAL15F2600	Indian Constitution & Professional Ethics	FC	2	0	0	2	2
7	BPAL15F2700	Data Structures Lab	HC	0	0	2	2	4
8	BPAL15F2800	Data Base Management System Lab	HC	0	0	2	2	4
	Total Credits			**18**	**1**	**5**	**24**	**30**

Course Code	Duration	Course Title	L	T	P	C
BPAL15F2100	16 Weeks	**English-I: Communicative English and Critical Awareness**	2	1	0	3

COURSE OBJECTIVES:

- To assist the learners' acquisition of all the four language skills and the functional use of language in context.
- To familiarize the learners to a wide variety of writing styles.
- To inculcate in them a spirit of critical enquiry.

COURSE OUTCOMES:

At the end of the course, the learners should be able to:

- Identify formal and informal communication contexts and use appropriate language style
- Use language in specific academic and non-academic tasks such as explaining, directing, instructing, and note-taking and note making.

COURSE CONTENT:

UNIT I   **15 Hours**

Literary Component: 1. The Terrorist, He Watches 2. Sea Breeze, Bombay Communication Skills Component: Remedial Grammar – Direct Speech & Reported Speech Voices; Linking Devices; Question Forms

UNIT II   **15 Hours**

Literary Component: 3. Our Town, 4. On Ahimsa Communication Skills Component:

Listening and Speaking Skills – Making enquiries, Taking and leaving messages

UNIT III   **15 Hours**

Literary Component: 5.Starting from Mile Zero, 6. Beast Tales from Burma Communication Skills Component: Reading Comprehension - Classification; Process Analysis; Comparison and Contrast.

UNIT IV   **15 Hours**

Literary Component: 7. Young Pele 8. Audition Communication Skills Component: Writing Skills – Paragraph Writing Reflective & Persuasive paragraphs; summarizing

Text Books:

1. Board of Editors,Experience – 2: B U Prasaranga, Bengaluru
2. Board of Editors , Expression – 2 : BU Prasaranga, Bengaluru
3. Alexander L.G. Guided Composition in English Language Teaching, Longman, 1971.

Bellare Nirmala: Reading Strategies. Vol. 1 and 2. Oxford University Press, 1998 Bhasker

W.W.S & Prabhu N.S.: English through Reading. Vols. 1 and 2. Macmilian, 1975. Freeman, Sarah: Study Strategies. Oxford University Press, 1979.

4. Freeman, Sarah: Written Communication. Orient Longman, 1977 Grellet. F.: Developing Reading Skills. Cambridge University Press, 1981. Leech, G. A Communicative Grammar of English, Longman, 2002

5. Martinet, A & John Silverwood. Beginning to Communicate in English, OUP, 2009 Mohan Krishna & Banerji Meera: Developing Communication Skills. Macmilian 1990. Mohan Krishna & Singh N.P.: Speaking English Effectively. Macmilian, 1995 Narayanaswami V.R.: Organised Writing. Book 2. Orient Longman.

6. Radha Krishnan Pillai. English Communication, Cambridge, 2010L Saraswati V.: Organised Writing. Book 1. Orient Longman

7. Widdowson H.G.: English in Focus. English for Students of Sciences. Oxford University Press. Wren & Martin. High School Grammar and Composition, New Delhi: Sterling.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F2200	16 Weeks	LANGUAGE – II : K/H/F/AE	3	0	0	3

COURSE OBJECTIVES:

To improve language proficiency in respective language and learn grammar for critical and proper communication.

KANNADA
The following texts are prescribed:
1. T. P. Kailasam, TOLLUGATT ATWA MAKKALISCHOOL MANELALVE, A play, published by Ankita Pustaka - 2010, Bangalore
2. V. Sitaramiah (V.Si.),, PAMPA YATRE – (Pilgrimage to Hampi: Capital of Vijayanagar Empire), published by V. Si. Sampada (V. Si Samsamarana Vedike), 6th Edition, 2004, Bangalore

HINDI
The following texts are prescribed:
1. Jaya Prakash, Nutan Gadya Sangraha published by Sumitra Prakashan, Islamabad, 2009.
2. Dr. Sanjeev Kumar Jain, Media Writing and Mass Communication by Kailash Pustak Sadan, Bhopal

ADDITIONAL ENGLISH

The following text is prescribed:

1. Nandini Nayar, Footprints II, An anthology of prose, poetry and fiction, published by Cambridge University, New Delhi, 2008

Course Code	Duration	Course Title	L	T	P	C
BPAL15F2300	16 Weeks	**Statistical Methods**	3	0	1	4

COURSE OBJECTIVE:

- To acquaint students with various statistical methods.
- To cultivate statistical thinking among students.
- To prepare students for future courses having quantitative components.

COURSE OUTCOMES:

Upon successful completion of the course one should be able to

- Understand and appreciate descriptive statistics.
- Understand the concepts of probability and random variables.
- Understand and apply statistical theory to analytics field

COURSE CONTENTS:

UNIT II   **15 Hours**

Introduction Of Statistics And Tabulation And Presentation Of Data: Meaning and Definition-Functions-Scope-limitations. Collection of data Classification of data, preparation of frequency distribution and tabulation of data. Importance of graphic and diagrammatic presentation, Percentage bar diagrams and pie diagrams, Graphical representation of median and mode- Ogives, histograms, smoothed frequency curve, frequency polygon.

UNIT II   **10 Hours**

Measures Of Central Tendency: Introduction- Introduction- Types of averages- Arithmetic Mean (using direct, shortcut & step deviation methods only & excluding missing frequency problems) (Simple and Weighted), Median, Mode, Direct method & grouping method, Quartiles

UNIT III   **15 Hours**

Measures Of Dispersion And Skewness: Introduction- Meaning & Definition – Methods of Dispersion range, Q.D, M.D: Standard Deviations and Coefficient of Variation. Skewness: Meaning, uses and problems on Karl Pearson's coefficient of skewness.

UNIT IV   **15 Hours**

Probability And Random Variables: Random Experiment- Sample space and events. Conditional probability and Bayes theorm. Random variable Definition, types of random variables,

Text Book:

1. Berenson and Levine: Basic Business Statistics, New Jersey, 6th edition, Prentice- Hall India, 1996.

Reference Books:

1. Gupta.S.C and V.K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, Newelhi, 2014 edition

2. S.P.Gupta, "Statistical methods"- Sultan Chand & Sons, New Delhi, 2012 Edition

3. Peter Dalgaard, "Introductory Statistics for R", Springer; 2nd edition -2008, Springer publications

4. Medhi.J, "Statistical methods - An introductory text", new age publications, 2009 edition.

5. D.C. Montogomery and G.C.Runger, "Applied Statistics and Probability for engineers", New Jersey,John Wiley and Sons, 3rd edition, 2003.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F2400	**16 Weeks**	**Data Structures using C**	**4**	**0**	**0**	**4**

COURSE OBJECTIVES:

Following this course student will be able to:
- Assess how the choice of data structures and algorithm design methods.
- Choose the appropriate data structure and algorithm design method for a specified application.
- Write programs using function-oriented design principles.
- Solve problems using data structures such as linear lists, stacks, queues, binary trees, heaps, binary search trees, and graphs and writing programs for these solutions.

COURSE OUTCOMES:

On successful completion of this module, students should be able to:

- Develop suitable algorithm for any application
- Analyse algorithm based on time and space complexity
- Write efficient program to implement any data structure.

COURSE CONTENTS:

UNIT I   **15 Hours**

Introduction and Overview: Definition of Data Structures, Elementary data organization, data structures operations, Abstract data types, control structures, String Processing: Definition, Pointers, Storing Stings, String as ADT, String operations, word/text processing, Pattern Matching algorithms.

UNIT II   **15 Hours**

Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory, Traversing Linear arrays, Inserting and deleting, Sorting: Bubble sort, Insertion sort, Selection sort, Searching: Linear Search, Binary search, Multidimensional arrays, Matrices and Sparse matrices.

UNIT III   **20 Hours**

Linked list: Definition, Representation of Singly linked list in memory, Traversing a Singly linked list, Searching a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly liked list; Doubly liked list, Header liked list, Circular linked list.**Stacks –** Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack.

UNIT IV   **15 Hours**

Queues – Definition, Array representation of queue, Linked list representation of queues Types of queue: Simple queue, Circular queue, Double ended queue, Priority queue, Operations on Queues, Applications of queues.

Tree – Definitions, Binary trees, Representing binary trees in memory, Traversing Binary Trees, Binary Search Trees, Searching, Inserting and Deleting in a Binary Search Tree.

Text Book:

1. Seymour Lipschutz, "Data Structures with C", Schaum's outLines, Tata McGraw-Hill, 2011.

Reference Books:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2013.
2. Robert Kruse, C.L.Tondo, Bruce Leung, Shashi Mogalla, "Data Structures and Program Design using C", Pearson Education, 2009.
3. Forouzan, "A Structured Programming Approach using C", 2nd Edition, Cengage Learning India, 2008.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F2500	**16 Weeks**	**Data Base Management Systems**	**4**	**0**	**0**	**4**

COURSE OBJECTIVES:

- Learn and practice data modeling using the entity-relationship and developing database designs.
- Design and implement a database schema for a g iven problem-domain
- Apply normalization techniques to normalize the database
- Understand the use of Structured Query Language (SQL) and learn SQL syntax.

COURSE OUTCOMES:

- To describe data models and schemas in DBMS
- To use SQL- the standard language of relational databases.
- To understand the functional dependencies and design of the database.
- To understand the concept of Transaction and Query processing

COURSE CONTENT:

UNIT I 15 Hours

Introduction: Database and Database Users, Characteristics of the Database Approach, Different people behind DBMS, Implications of Database Approach, Advantages of using DBMS, When not to use a DBMS. **Database System Concepts and architecture**: Data Models, Schemas, and Instances. DBMS Architecture and Data Independence., Database languages and interfaces. The database system Environment, Classification of DBMS.

UNIT II 10 Hours

Data Modelling Using the Entity-Relationship Model: High level conceptual Data Models for Database Design with and example., Entity types, Entity sets, attributes, and Keys, ER Model Concepts, Notation for ER Diagrams, Proper naming of Schema Constructs

UNIT III 20 Hours

Functional Dependencies and Normalization for Relational Database: Informal Design Guidelines for Relational schemas, Functional Dependencies, Normal Forms Based on Primary Keys., General Definitions of Second and Third Normal Forms Based on Primary Keys., General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form. Relational Data Model and Relational Algebra: Relational Model Concepts., relational Model Constraints and relational Database Schema, defining Relations, Update Operations on Relations., Basic Relational Algebra Operations, Additional Relational Operations., Examples of queries in the Relational Algebra., Relational Database design Using ER-to-Relational Mapping.

UNIT IV   **15 Hours**

Relational Database Language: Relational Database Language: Data definition in SQL, Queries in SQL, Insert, Delete and Update Statements in SQL, Views in SQL, Specifying General Constraints as Assertions, specifying indexes, Embedded SQL.

Text Book:

1. Remez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2007.

Reference Books:

1. Abrahamsi. Silberschatz, Henry. F. Korth, S. Sudarshan, "Database System Concepts" 6th Edition, McGraw Hill, 2012.
2. C.J.Date, "Introduction to database systems", Eight Edition, Addison Wesley, 2003.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F2600	16 Weeks	Indian Constitution & Professional Ethics	2	0	0	2

COURSE OBJECTIVES:

- To provide and gain knowledge on Constitution of India.
- To know and understand about the Fundamental Rights, Duties and other Rights which is been given by our law.
- To prepare students in the praticality of Constitution perspective and make them face the world as a bonafide citizen.
- To attain knowledge about ethics and also know about professional ethics.
- Explore ethical standards followed by different companies.

COURSE OUTCOMES:

On completion of this course the student will be able to:

- Strengthen the knowledge on Indian constitutional law and make the pratical implementation of it.
- Understand the fundamental rights and human rights.
- Get the knowledge to explain the duties and more importantly practise it in a right way.
- Adopt the habit of raising their voice against a non constitutionality of any laws and upon any legal discrimination as we have session of debates on Constitutional validity.
- Get exposed about professional ethics and know about etiquettes about it.
- Know about ethical standards of different companies which will increase their professional ability.

UNIT I   20 Hours
Constitution of India

Definition, Making of Indian Constitution, Preamble to the Constitution of India, Fundamental Rights under Part III; Rights to Equality, Right to Freedom, Right against Exploitation, Rights to Freedom of Religion, Cultural and Educational Rights, Constitutional Remedies. Fundamental Duties of the Citizen, Significance and Characteristics. Elements of National Significance; National Flag, National Anthem, National Emblem.

UNIT II   10 Hours
Union and State

Organs of the Government; Legislature, Executive and Judiciary. Union and State Excecutives: President, Vice President, Prime Minister, Supreme Court, Cabinet, Governor, Councill of Ministers, Electoral process, Election Commission. Right to Information (RTI), Consumer and Consumer Protection.

UNIT III   15 Hours
Ethics

Meaning, Definition, Evoltion, Need of ethics, Aristotlean Ethics, Utilitarianism, Katianism, Professional Ethics, Personal Ethics and Business Ethics, Ethical Standards, Duties of Employers and Employees.

UNIT III   15 Hours
Engineering Ethics

Definition Scope and needs, Ethics in Consumer Protection, Due Care theory, Environmental Ethics, Ethical Code of Conduct in ethics.Best Ethical Companiesin India and Abroad; Corporate Social Responsibilities,Code of Conduct and Ethical Excellence.

Text books:
1. M V Pylee, An introduction to Constitution of India
2. M Govindarajan, S Natarajan, V S Senthil Kumar, Engineering Ethics.
3. Dr.Durga Das Basu, Introduction to constitution of India

Course Code	Duration	Course Title	L	T	P	C
BPAL15F2700	16 Weeks	Data Structures Lab	0	0	2	2

PART - A

1. Write a menu driven C program to perform the following string operations without using string functions: (i) String Length (ii) String Concatenation
2. Write a C program to search for an element in an array using Binary search
3. Write a C program to sort a list of N elements using Selection Sort Algorithm.
4. Write a C program to demonstrate Queue using Linked List.
5. Write a C program to demonstrate the working of stack using linked list.
6. Write a C program for Towers of Hanoi problem.
7. Write a C program to find GCD of two numbers using recursion
8. Write a C program to convert infix arithmetic expression to post fix expression.
9. Write a C program to simulate the working of Circular Queue using an array.
10. Write a C program to create and traverse a binary search tree.

PART – B

Programs may be decided by External and Internal examiners.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F2800	**16 Weeks**	**Database Management System Lab**	**0**	**0**	**2**	**2**

V. Retrieving Data from Multiple Tables
 Joining Tables (Equi-Joins)
 Aliases for Table Names
 Joining Tables (Non-Equi-Joins)
 Joining Tables (Outer Joins)
 Joining Tables (Inner Joins)

 Virtual table

I. SQL*Plus and SQL

1. Introduction
   Logging on to SQL*Plus and Leaving
2. SQL*Plus
   Choosing and Describing
3. Tables
   Elements of the SQL
4. Query
5. Editing SQL Statements

6. The System Dummy Table

7. Selecting Columns

8. Duplicate Information (DISTINCT)
9. Sorting Information

VI. Group By and Group By Functions
 Group Function Examples
 Group Function with Having

VII. Sub-Queries (04Hours)

 Basic Subqueries
 Multiple Column Subqueries

 Subqueries with Having
 Correlated Subqueries

II. SQL Functions
   The Concatenation
1. Operator

2. Elements of the SQL Query: Arithmetic
   Column
3. Aliases
   String
4. Functions

5. Arithmetic Functions
   Date
6. Functions
   Mixed
7. Functions

8. Operator precedence

VIII. Data Definition Language (DDL)
 Create, Drop Alter Keywords
 Tables, Column ,
 Views

 Synonyms

 Sequences

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III. Advanced SQL Functions

Nesting Different
1. Functions
2. Crosstab

Decode with ">", "<" &
3. "="

4. Select with Minus Union and Intersect

Handling
5. NULL

IV. Filtering Data Using Where

Where
1. Operators
2. Where with Keywords

Where and Logical
3. Operators

4. Where and Soundex

2. Unique Option

3. When and What to Index

4. Drop Index

5. Validate Index

6. Index Type Overview

XI. Data Manipulation Language (DML)

1. Insert , Update , Delete

2. OPS Commands (Commit, Rollback and Savepoints)

3. Locking tables

XII. Data Control Language (DCL)

1. Data Security

2. Grant and Revoke

3. Session control statements

4. System control statements

XIII. Introducing SQL*Plus for Reporting

1. Using SQL*Plus

2. SQL*Plus Command Variables

3. Building SQL*Plus Reports

4. Titles and Headings

Object

Alter table

IX. Integrity Constraints

Types of Constraint
Referential
Integrity
Defining
Constraints
Integrity Constraints and Data
Dictionary
Disabled
constraints

X. Indexes

1.Create Index

REVA UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

Scheme of Teaching, Examination and Credits

THIRD SEMESTER BCA

Scheme & Syllabus-2016

Sl. No	Code	Title	HC /SC /FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	BPAL15F3100	Data Communication and Networks	HC	3	0	0	3	3
2	BPAL15F3200	Design & Analysis of Algorithms	HC	3	0	1	4	4
3	BPAL15F3300	Operating System	HC	4	0	0	4	4
4	BPAL15F3400	Object Oriented Programming Using C++	HC	4	0	0	4	4
5	BPAL15F3500	Unix Programming	HC	3	0	0	3	3
	BPAL15F3600	C++ Lab	HC	0	0	2	2	4
7	BPAL15F3700	Unix Shell Programming Lab	HC	0	0	2	2	4
Total Credits				**17**	**0**	**5**	**22**	**26**

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Course Code	Duration	Course Title	L	T	P	C
BPAL15F3100	16 Weeks	**Data Communication and Networks**	3	0	0	3

COURSE OBJECTIVES:

After successful completion of this course students will be able to

- Identify the different components and their respective roles in a communication System
- Propose efficient, cost effective, reliable and appropriate technology to establish communication links
- Design an enterprise network employing the common LAN technologies and be able to evaluate the advantages and disadvantages
- Configure a PC to work as a host in a TCP/IP network and to use the IP based commands to facilitate the trouble shooting process
- Describe the technical issues related to the Wide Area Networks and identify the common technologies available in establishing WAN infrastructure
- Describe the specific actions that can be taken to enforce network level security.

COURSE OUTCOMES:

- To master the fundamentals of data communications and networks by gaining knowledge of data transmission concepts.
- Understanding the operation of physical and data link layer.
- Learning the algorithms used to design data networks.
- Understanding the principles of transport and application layers

COURSE CONTENT:

UNIT I Network Fundamentals 15 Hours

Introduction: Communication Network and services, Network Functions and Topology, Switching Techniques: Message, packet and circuit Switching, Network Evolution - Layered Architecture and Applications – Examples of Layering, OSI Reference Model, TCP/IP Model, Transmission Systems: Guided media – Twisted Pair, Coaxial Cable, Optical Fibre, Unguided media - Radio Transmission Infrared Light, Wi-Fi Systems.

UNIT II Data Link Layer 15 Hours

Error detection and correction – Error detection , Two – dimensional parity checks , Internet checksum , Polynomial code; Multiplexing – frequency Division , Time Division , SONET; Peer – to-Peer Protocols: Protocols and service models, Sliding window protocols, flow control, Data Link Control, HDLC, PPP, [

UNIT III Network Layer   **15 Hours**
Switching-IP, Datagram, IP addresses, IPV6, DHCP, ARP, ICMP, Routing Protocols, Distance Vector, Link State and BGP.

UNIT IV Transport Layer   **15 Hours**
Transport layer: Service, Connection establishment, Flow control, Transmission control protocol, Congestion control and avoidance, User datagram protocol, Transport for Real Time Applications (RTP). Applications: DNS, SMTP, WWW.
LAN Standard –Ethernet and 802.3 LAN Standard ; Token Ring FDDI, Wireless LAN's and IEEE 802.11 Standards; LAN Bridges – Transparent Bridges , Source Routing Bridges , Mixed – media Bridges.

Text Books:
1. Stallings, "Data and Computer Communications", Pearson Education
2. Communication Networks (McGraw-Hill Series in Computer Science) Hardcover – by Alberto Leon-Garcia , Indra Widjaja

Reference Books:
1. Larry &Peterson & Bruce S Davis; Computer networks, Morgan Kaufman, 2000.
2.   Behrouz Ferouzan, Introduction to Data Communication & Networking TMH
3. Andrew S Tanenbaim, "Computer Networks", Pearson Education.

Code	Duration	Course Title	L	T	P	C
BPAL15F3200	**16 Weeks**	**Design and Analysis of Algorithms**	**3**	**0**	**1**	**4**

COURSE OBJECTIVES:

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

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.

COURSE OUTCOMES:

Algorithms are the basic recipes for solving computational problems. Upon completion of this course, students should be able to:

- Understand the fundamental principles underlying algorithm analysis and design and be able to apply them in specific instances

- Understand Asymptotic notations and apply them to simple methods, including methods that utilize complex loops and recursion;

- Analyze run-time execution of previous learned sorting methods, including selection and merge sort;

- Implement and analyze insertion sort and Quick sort

- Understand essential algorithm design techniques such as divide-and conquer, dynamic programming and the greedy methods and many of its applications

- Understand and implement various algorithms on graph data structures, including finding the minimum spanning tree and shortest path.

COURSE CONTENT:

UNIT I   15 Hours
Introduction: Definition of algorithm, Characteristics of algorithm, Asymptotic Notations, Analysis of algorithms. Divide and Conquer: General Method, Binary Search, Finding Maximum &Minimum, MergeSort, Quick Sort.

UNIT II   15 Hours
Greedy Method: General method, Knapsack Problem, Job Sequencing with deadline, Minimum – cost Spanning trees, Single – Source Shortest Paths.

UNIT III   15 Hours
Dynamic Programming: Introduction to Graphs, Definition types, Terms related to graph, General Method, Multistage Graphs, All pair Shortest Paths, 0/1 – knapsack, The traveling salesperson problem, Flow Shop Scheduling.

UNIT IV   15 Hours
Basic traversal & Search techniques: Search & traversal techniques for trees, Search & traversal techniques for graphs **Backtracking:** General method, The 8- Queens Problem, Sum of subsets, Graph Coloring.

Text Books:

1. Sara Baase, Allen Van Gelder, Computer Algorithms , Introduction to design and Analysis, 3rd edition (9th reprint), Pearson, 2005.

2. Design& Analys of alogorithm- Horowitz &sahni
3. Fundamentals of Computer algorithm – Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran.

Reference Books:

1. Berman :   Algorithms   , 1st Edition 2008,   Cengage Learning India

ADA LAB

The list of programs will be decided by the course faculty.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F3300	16 Weeks	**Operating System**	4	0	0	4

COURSE OBJECTIVES:

- Enabling Knowledge: the operation, implementation and performance of modern operating systems, and the relative merits and suitability of each for complex user applications
- Critical Analysis: Ability to compare, contrast, and evaluate the key trade-offs between multiple approaches to operating system design, and identify appropriate design choices when solving real-world problems
- Throughout the course, practical aspects that pertain to the most popular operating systems such as Unix/Linux and Windows, and some instructional operating systems will be studied

COURSE OUTCOMES:

On completion of this course, students will be able to describe the basic principles used in the design of modern operating systems. Specifically, you should be able to:

- Explain the objective and functions of modern operating systems.
- Describe how computing resources are used by application software and managed by system software.

UNIT I   **15 Hours**
Introduction: Batch Systems, Multiprogramming and Time Sharing, Parallel, Distributed and real time Systems, Operating System Structures, Components & Services, System calls, System programs, Virtual machines.
Process Management: Process Concept, Process Scheduling, Co – Operating process, Threads, Inter process communication, CPU Scheduling Criteria, Scheduling algorithm, Multiple Processor Scheduling, Algorithm evolution.

UNIT II   **15 Hours**
Process Synchronization and deadlocks: The Critical Section Problem, Synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, monitors,
Dead locks – system model, Characterization, Dead lock prevention, avoidance and detection, Recovery from dead lock, combined approach to deadlock handling.

UNIT III   **15 Hours**
Memory Management: Logical and Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Virtual memory-Demand paging and it's performance, Page replacement algorithms, Allocation of frames, thrashing, page size and other considerations.
File management: File Concepts, Access methods, Directory Structure, Protection and consistency, File system structure, Allocation methods, free space management, Directory Implementation, Recovery.

UNIT IV   **15 Hours**
Disk Management (Structure, Disk Scheduling Methods): Disk Structure & Scheduling methods, Disk management, Swap – Space management.
Protection and Security: Goals of protection, Domain Protection, Access matrix, Security Problem, Authentication, One time password, program threats, System threads. Case Study of Windows and Linux Operating System

Text Books:
1. Abraham Silberschatz and Peter Baer Galvin, "Operating System Concepts", 7th Edition, Pearson Education, 2002.
2. " Operating System" by Gary Nutt, Pearson/Addison Wesley – 2004

Reference Books:
1. H.M.Deitel, "Operating Systems", Pearson Learning Solutions, 3rd Edition, 2003.
2. William Stallings, "Operating Systems", 6th Edition, Pearson Education, 2010.
3. Stuart, "Operating systems: Principles, Design and Implementation", 1st Edition 2008, Cengage Learning India.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F3400	16 Weeks	Object Oriented Programming Using C++	4	0	0	4

COURSE OBJECTIVES:

- To introduce object oriented programming concepts and implement them in C++.
- To get a clear understanding of object-oriented concepts.

COURSE OUTCOMES:

After completion of this course, the students would be able to

- Describe the differences between procedure oriented programming and object oriented programming.
- Define the three key features of the object-oriented programming language:
- Declare a class and object.
- Describe how to access private, public and protected members of a class.
- Define member functions inside the class definition and outside the class definition.
- Design and use friend functions and friend classes.
- Use inheritance to build class hierarchies.
- Identify benefits of using virtual functions.

COURSE CONTENTS:

UNIT I   **15 Hours**
Introduction : Procedure Languages, definition of OOP, Basic concept of OOP, Object, Class, Data Abstraction, Data Encapsulation, Data Hiding, Reusability, Inheritance, Polymorphism, Overloading, Dynamic binding and Message passing.
C++ Features: The iostream class, C++ Comments, C++ Keywords, Variable declaration, The Const Qualifier. Manipulators, The scope resolution operator, new & delete operators.
Functions: Simple Functions, Function declaration, calling the function, function definition, passing argument to functions, returning value from function, passing constants, Variables, pass by value; pass by reference, inline function, overloaded functions, default arguments, return statements.
UNIT II   **15 Hours**
Objects & Classes: Classes & Objects, Class Declaration, Class members, Data Members, Member functions, Class member visibility, private, public, protected. Constructors and Types of Constructors,

Overloaded Constructor, Objects as arguments, returning objects from functions, Destructors, Array of objects.

Friend function; Friends for functional notation, friend classes, the pointer; Accessing Member Data with this, using this for returning values.

UNIT III   **15 Hours**

Operator Overloading: Overloading unary operator: Operator Keyword, Operator arguments, Operator return.

Overloading binary operator: arithmetic operators, comparison operator.

Inheritance: Derived Class & Base Class: Specifying the Derived class accessing Base class members, the protected access specifier, Types of inheritance: Single inheritance, Multiple inheritance, Multilevel inheritance, Hybrid inheritance, public and private inheritance, Overriding member functions.

UNIT IV   **15 Hours**

Virtual functions: Normal member function accessed with pointers, Virtual member functions accessed with pointers, Dynamic binding, pure virtual functions,

Templates & Exception Handling: Introduction, Templates, Class Templates, function templates, Member function templates, Template arguments, Exception Handling

Text books:
1. Lafore Robert, "Object Oriented Programming in Turbo C++", Galgotia Publications, 2012.

Reference Books:
1. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill Publications, 2011.
2. P. B. Kotur, "Object Oriented Programming with C++" Eigth Edition.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F3500	16 Weeks	UNIX Programming	3	0	0	3

COURSE OBJECTIVES:

- To understand the design of the UNIX operating system.
- To become familiar with the various commands of the UNIX OS.
- To learn the different types of filters used in UNIX.
- To understand the scripting language of UNIX.

COURSE OUTCOMES:

- Implement the various filters of UNIX.
- Design and implement the concepts of shell programming.
- Design and Implement the AWK script.
- Implement the commands which are used for scheduling of the UNIX OS.

COURSE CONTENT:

UNIT I   15 Hours
Introduction: History, salient features, Unix system architecture, Unix command format, Unix internal and external commands, Directory commands, File related commands, Disk related commands, general utilities. Unix File System: Boot, inode, super and data block Process Management: Process state and data structures of a Process, User vs, kernel node, context of a Process, background processes, Process scheduling   commands,   Process   terminating   and   examining   commands.

UNIT II   15 Hours
Special Tools and Utilities: Filters, Stream editor SED and AWK, Unix system calls and library functions, Processes, signals and Interrupts, storage and compression facilities. Secondary Storage Management: Formatting, making file system, checking disk space, mountable file system, disk partitioning, file compression.
UNIT III   15 Hours
Shell Programming: Vi editor, shell types, shell command line processing, shell script features, executing a shell script, system and user-defined variables, expr command, read and echo statement, command substitution, escape sequence characters, shell script arguments, positional parameters, test command, file test, string test, numeric test.

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UNIT IV   **15 Hours**

Conditional Control Structures-if statement, case statement Looping Control Structure-while, until, for, statements. Jumping Control Structures – break, continue, exit.
 Unix System Communication: Introduction, write, read, wall commands, sending and handling mails.
System Administration: Roles of a System Administrator

Text Books:
1. M.G.Venkateshmurthy, "Introduction to UNIX & SHELL Programming", First Edition, Pearson Education, 2004.
2. Raymond, The Art of Unix Programming, Pearson Education, Asia 2002.
3. Kernighan B W & Robert B, The Unix programming environment.
4. UNIX and Shell Programming, Archana Verma, Firewall Media.

Reference Books:
1. Forouzan,"Unix and Shell Programming", 1st Edition,2008 Cengage Learning India
2. UNIX and Shell Programming, Archana Verma, Firewall Media.
3. Sumithaba Das – UNIX: Concepts and Applications
4. Kernighan, The Unix Programming Environment
5. Sobell G, A practical Guide to Unix System.
6. Kochan, Unix Shell Programming, Pearson.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F3600	**16 Weeks**	**C++ Lab**	**0**	**0**	**2**	**2**

PART-A

 Write a program to prepare shopping lists
1. Write a program to perform bank transactions.
2. Write a program to swap numbers using friend function.
3. Write a program to calculate area and circumference of circle using inline function
4. Write a program to perform addition of two matrices using operator overloading.
5. Write a program to find sum of complex number using operator overloading and friend function.
6. Write a Program to find the area and volume of respective figures using function overloading.
7. Write a program to find factorial of number using function overloading.
8. Write a program to create a student report using inheritance technique.
9. Write a program to find the maximum of two numbers using template.

PART – B

 Programs may be decided by External and Internal examiners.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F3700	**16 Weeks**	**UNIX Shell Programming Lab**	**0**	**0.**	**2**	**2**

PART- A

Write Shell programs for the following:
1. To count the number of characters in a given string
2. To find whether the given year is leap year or not
3. To check whether a given number is even or odd
4. To find the factorial of a given number.
5. To print a string in the reverse order.
6. To count the number of vowels in a given string.
7. To print all prime numbers between m and n (m<n).
8. To check whether a given string is a palindrome or not.
9. Write a shell script that displays all the files in the current directory.
10. To write a shell script that creates a file and compresses it using:
    a) Compress b) pack

PART- B

Programs may be decided by External and Internal examiners.

REVA UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

Scheme of Teaching, Examination and Credits

FOURTH SEMESTER BCA

Scheme & Syllabus-2016

Sl. No	Code	Title	HC/SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	BPAL15F4100	Computing Technologies	HC	4	0	0	4	4
2	BPAL15F4200	Visual Programming	HC	3	0	0	3	3
3	BPAL15F4300	Software Engineering	HC	3	1	0	4	5
4	BPAL15F4400	Computer Graphics	HC	3	0	0	3	3
5	BPAL15F4510	Cryptography and Network Security	SC	3	0	1	4	5
	BPAL15F4520	Python Programming						
6	BPAL15F4600	System Software	HC	3	1	0	4	5
7	BPAL15F4700	Visual Programming Lab	HC	0	0	2	2	4
8	BPAL15F4800	Computer Graphics Lab	HC	0	0	2	2	4
Total Credits				**19**	**2**	**5**	**26**	**33**

Course Code	Duration	Course Title	L	T	P	C
BPAL15F4100	16 Weeks	**Computing Technologies**	4	0	0	4

COURSE OBJECTIVES:

The student should be made to:
- Understand the technological aspects of various CPU's
- Know the challenges in parallel and multi-threaded programming.
- Learn about the various Muticore Processors, their performance, and limitations

COURSE CONTENTS:

UNIT I   **15 Hours**

Computer Evolution and Performance

A Brief History of Computers, Designing for Performance, The Evolution of the Intel x86 Architecture, Embedded Systems and the ARM

UNIT II   **15 Hours**

Single core to Multi-core architectures – SIMD and MIMD systems – Interconnection networks - Symmetric and Distributed Shared Memory Architectures – Cache coherence

Performance Issues, Scalability – Synchronization and data sharing

UNIT III   **15 Hours**

Multicore Computers – Hardware Performance Issues, Software Performance Issues, **Multicore** Organization, ARM11 MPCore

UNIT IV   **15 Hours**

Multicore Architectures - Homogeneous and Heterogeneous Architectures – Intel Multicore Architectures – SUN CMP architecture – IBM Cell Architecture

Text books:

1. Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press, 2006
2. COMPUTER ORGANIZATION AND ARCHITECTURE DESIGNING FOR PERFORMANCE, by William Stallings
3. John L. Hennessey and David A. Patterson, " Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier,.

Reference books:

1. Peter S. Pacheco, "An Introduction to Parallel Programming", Morgan Kaufmann, Elsevier

2. Michael J Quinn, Parallel Programming in C with MPI and OpenMP, Tata McGraw Hill, Darryl Gove, Multicore Application programming: For Windows, Linux, and Oracle Solaris", Pearson. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture : A Hardware/ Software Approach" , Morgan

Course Code	Duration	Course Title	L	T	P	C
BPAL15F4200	16 Weeks	Visual Programming	3	0	0	3

COURSE OBJECTIVES:

- To introduce the concepts of visual programming.
- To introduce GUI programming using Microsoft foundation classes.
- To enable the students to develop programs and simple application using Visual Basic.

COURSE OUTCOMES:

After completion of this course, the students would be able to

- Incorporate programming control structures of sequence, selection and iteration using Visual Basic.
- Create and manipulate variables.
- Design forms by using various controls like labels, textbox, command button etc.
- Use events and methods of visual basic objects.
- Create sub procedures and functions using Visual Basic.

COURSE CONTENT:

UNIT I   **15 Hours**

Introduction to Visual Programming: Features of Visual Basic, Advantages and Disadvantages of Visual Basic, Types of Visual Basic Applications, The Integrated Development Environment (IDE). A standard EXE Project: Title bar, Menu bar, Tool bar. **Windows:** Project Window, Form Designer Window, ToolBox, Properties Window, Form Layout Window. Form Object And Controls: Form Object, Control Menu, MinButton and MaxButton, Title Bar, Moveable, StartUp Position, Window State. **Form Properties:** Name, Caption, Back color, Border style, Height, Width, Scalemode, Forecolor, Font, Visible etc. Form Events –Load, Unload, Click. Form Methods – Show, Hide, Cls, Print Form.   **Intrinsic Controls**: Adding and Removing Controls, Properties and Events of Different Controls- Label, Command Buttons, TextBox, Frame, Option Button, Check Box, Combo Box, List Box, Picture Box, Image Box, Timer Control, Scroll Bars, MM Controls.

UNIT II   15 Hours

Predefined Dialog Boxes: MsgBox and InputBox.

Programming in VB: Event-Driven Programming, Types of Events, Writing Event Procedures, Common Events-Mouse Events, Keyboard Events and Focus Events. Data Types: Numeric, Byte, String, Date, Boolean, Object, Variant; Variables: Variables, Rules for naming variables, Declaring variables- Explicit declaration, Implicit declaration and Forcing variable declaration. Constants and Operators: Constants, Operators-Arithmetic, Relational or Comparison and Logical Operators. Control Statements: If-Then, If-Then-Else and Select Case. End and Exit Statement.

UNIT III   15 Hours

Looping Structures: Entry-Controlled and Exit- Controlled, Do-Loop, While-Wend, For-Next. Arrays, Fixed-Sized Arrays and Dynamic Arrays. Functions, Built-In Functions-Numeric Functions, Formatting Functions, String Functions and Date Functions. Genaral Procedures, Types of Procedures, Steps to create a general procedure in a form file. Creating and calling Functions. **Arguments :** Passing Arguments By Value, Passing Arguments By Reference. Modules.   Designing Menus: The Menu Editor, Menu Editor Properties, Designing Multiple Document Interface forms (MDI Forms).

UNIT IV   15 Hours

Microsoft Common Controls: Date Time Picker, Common Dialog, Progress Bar. DriveListBox, DirListBox and FileListBox Controls. Dynamic Link Libraries(DLLs) and Windows API. File Handling – File Components, Writing and Reading a Sequential File. Database Connectivity – Introduction, Data Access Mechanism-Data Control, DAO, RDO and ADO. ADO Data Control(ADODC), Data Grid Control, Open Database Connectivity(ODBC), Data Sourse Name(DSN) in ODBC, Properties Methods and Events of ADO Data Control. Common Properties of Data Aware Controls: Data Source, Data Field, Data Format and Data Member. Methods: AddNew, Update, CancelUpdate, Delete, Edit, Refresh and Find Methods. Navigation Methods: MoveFirst, MoveLast, MovePrevious, MoveNext. ADO Object Model(OLEDB) : Connection, Command,Error and Recordset- Properties and Methods.

Text Books:
1. Gurumit Singh, "Visual Basic 6", First Edition, Firewall Media, 2007.

Reference Books:
1. "Visual Basic 6.0 Complete Reference". Gottfried, "Programming with Visual Basic 6", PHI, 2000.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F4300	16 Weeks	Software Engineering	3	1	0	4

COURSE OBJECTIVES:

- It seeks to complement this with a detailed knowledge of techniques for the analysis and design of complex software intensive systems.
- It aims to set these techniques in an appropriate engineering and management context.

COURSE OUTCOMES:

- The ability to analyse, design, verify, validate, implement, apply, and maintain software systems.
- The ability to work in one or more significant application domains.
- An ability to design and conduct experiments, as well as to analyze and interpret data.

COURSE CONTENTS:

UNIT I 15 Hours

Introduction: Definition of software, types of software, Software Products and Software process, Process models: Waterfall model, Evolutionary Development, Bohemia's Spiral model, Process Visibility, Professional responsibility. **Computer based System Engineering:** Systems and their environment, System Procurement, System Engineering Process, System architecture modeling. Human Factors, System reliability Engineering. Requirements and Specification: The requirement Engineering Process.The Software requirement document, Validation of Evolution of requirements, Requirement Specification, Non functional requirement.

UNIT II 15 Hours

Software Prototyping: Prototyping in software process, Prototyping techniques, User interface prototyping. Software Design: Design Process, Design Strategies, Design Quality , System Structuring control models, Modular decomposition , Domain Specific architecture, detailed design, A comparison of design strategies.

UNIT III 15 Hours

User interface design: Design Principles, User System interaction, Information Presentation, User Guidance, Interface Evaluation   Software Reliability and reusability : Software reliability metrics , Software reliability Specification , Statistical testing ,Reliability Growth modeling, Fault avoidance & tolerance, Exception handling & defensive programming , Software development with reuse,

Software' development for reuse , Generator based reuse, Application System Portability.

UNIT IV   **15 Hours**

Software Verification and Validation : The testing Process , Test Planning & Strategies, Black Box , Structural, interface testing , Program inspections , Mathematically based verification, Static analysis tools. Management Issues: Project management, Quality management, Software cost estimation, Software maintenance, risk management.

Text Book:

1. Ian Sommerville – Software Engineering, 9th Edition, Pearson Education Ltd, 2010.

Reference Books:

1. Roger S. Pressman – Software Engineering, A Practitioner's approach, 7th Edition, McGRAW-HILL Publication, 2010.
2. Pankaj Jalote, "An integrated approach to Software Engineering", 3rd Edition, Narosa Publishing House, 2013.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F4400	**16 Weeks**	**Computer Graphics**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

- This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.

- A thorough introduction to computer graphics techniques, focusing on 2D modeling, image synthesis, and rendering.

- Introduction to 3D modeling and graphics techniques.

- The interdisciplinary nature of computer graphics is emphasized in the wide variety of examples and applications.

COURSE OUTCOMES:

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics.

- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
- Use of geometric transformations on graphics objects and their application in composite form.
- Extract scene with different clipping methods and its transformation to graphics display device.
- Explore projections and visible surface detection techniques for display of 3D

COURSE CONTENT:

UNIT I Graphics Systems: **15 Hours**
Application of CG, CRT Functioning- Factors Affecting CRT- Raster scan System – Shadow mask method, Display Processor with raster system- Raster co-ordinate system- Instruction set and Raster System applications. Output Primitives Line drawing methods-Direct, DDA and Bresenhams, line attributes, - Circle drawing-Direct and midpoint circle drawing Area filling- scan-line area filling and character attributes.

UNIT II Two Dimensional Transformation: **15 Hours**
Basic Transformation, Translation, Rotation, Scaling-Reflection and Shearmatrix representations-Homogeneous co-ordinates- composite transformation- Raster methods for transformation.

UNIT III Windowing and Clipping: **15 Hours**
Viewing Transformations, Clipping process, Point clipping, Line Clipping, Cohen Sutherland line clipping algorithm, Midpoint Subdivision algorithm, Area clipping, Sutherland and Hodgeman Polygon clipping Algorithm, Text clipping.

UNIT IV Three Dimensional Graphics: **15 Hours**
3D-coordinate system, 3D-Display techniques, 3D-transformations, Polygon surfaces, Octrees, Bezier curves. **Graphical Input Techniques**: Positioning techniques, Grid, Constraints, Dynamic manipulation, Gravity field, Rubber band, Selection technique, Menu, Pointing and selection by naming.

Text Books:
1. Donald Hearn & M. Pauline Baker, Computer Graphics C version, PHI 1990
2. Steven Harrington, Computer Graphics, MCGH.

Reference Books:
1. Newman & Sproull, Principles of Interactive Computer Graphics, McGraw Hill.
2. Yeshwant Kanetkar, Graphics under C, BPB publications.

3. J.D. Foley, A.V. Dam, S.K. Feiner & J.F. Hughes, Computer Graphics, Addison Wesley, 1997.
4. Cooley, The Essence of Computer Graphics, Pearson Education
5. Sinha – Computer Graphics.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F4510	16 Weeks	**Cryptography and Network Security**	3	0	1	4

COURSE OBJECTIVES:

- Understand security concepts, Ethics in Network Security.
- Understand security threats, and the security services and mechanisms to counter them
- Comprehend and apply relevant cryptographic techniques
- Comprehend security services and mechanisms in the network protocol stack
- Comprehend and apply authentication services and mechanisms

COURSE OUTCOMES:

- Understand the basic concept of Cryptography and Network Security, their mathematical models.
- Acquire knowledge in security issues, services, goals and mechanism.
- Identify and classify computer and security threats and develop a security model to prevent, detect and recover from attacks.
- Encrypt and decrypt messages using block ciphers.
- Understand the SSL or firewall based solution against security threats.
- Describe the ethical issues related to the misuse of computer security

COURSE CONTENTS:

UNIT I Security and Cryptography   **15 Hours**
Security Trends, Security Services, Security attacks, Security mechanisms, A Model for Network security. A short History of Cryptography; Cryptographic techniques, Symmetric and asymmetric key algorithm, Cryptography Tools, Attacks on Cryptosystems.

UNIT II Security Technology   **15 Hours**
Physical design; Firewalls; Protecting Remote Connections,Intrusion Detection Systems (IDS),Honey Pots, Honey Nets, and Padded cell systems.

UNIT III Network security and email security: **15 Hours**

Kerberos, X.509 Directory Authentication Service, Pretty Good Privacy (PGP),S/MIME, ISO-2700,NS standard.

UNIT IV IP&web Security   **15 Hours**

IP security over view, IP Security architecture, Web Security Considerations, Secure Socket layer , Transport layer Security (TLS); Secure Electronic Transaction (SET).

Text Books:

1. Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, 2nd Edition, Thomson, 2005.
2. William Stallings: Network Security Essentials: Applications and Standards, Pearson Education, 2000.

Reference Books:

1. Behrouz A. Forouzan: Cryptography and Network Security, Special Indian Edition, Tata McGraw-Hill, 2007.
2. Data Communication and networking, Fred Halsall

Cryptography and Network Security Lab

The List of programs will be decided by the course faculty

Course Code	Duration	Course Title	L	T	P	C
BPAL15F4520	16 Weeks	Python Programming	3	0	1	4

COURSE OBJECTIVES:

- To help students to understand the implementation of python language
- To understand various features in python
- To solve the given problem using the syntactical structures of python language.

COURSE OUTCOMES:

- Understand the basic terminology used in python programming
- Able to walk through the algorithm Improve programming skills
- Appreciate Python Programming Paradigm

UNIT I Introduction to Python   **15 Hours**
Introduction of python, origin, Programming Basics and Strings, Numbers and Operators, Variables Names for Values, Program Files, Directories ,Changing Data Through Names, Copying Data, Accessing a Tuple Through Another Tuple

UNIT II Decision making in Python   **15 Hours**
Making Decisions: Comparing Values for Sameness, Comparing Values for Difference, More Than or Equal, Less Than or Equal, Reversing True and False, Repetition, Handling Errors.

UNIT III Functions in Python   **15 Hours**
Functions: Grouping Code under a Name, Describing a Function in the Function, Layers of Functions

UNIT IV Classes and Objects in Python   **15 Hours**
Classes and Objects: What is an Object, Defining a Class, Creating an Object from the Class, Objects and their Scope, Writing simple programs using classes and objects in Python.

Text book:
  1. Beginning Python Using Python 2.6 and Python 3.1by James Payne

Python Lab

The list of programs will be decided by the course faculty.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F4600	16 Weeks	System Software	3	1	0	4

COURSE OBJECTIVES:

- The System Programming course concentrates on how programs run in user space and how the interact with the OS.
- To understand the basics of system programs like editors,, assembler, linker, loader, interpreter and debugger.
- Describe the various concepts of assemblers and macro processors.
- To understand how linker and loader create an executable program from an object module created by assembler and compiler.

- To know various editors and debugging techniques.

COURSE OUTCOMES:

- To be able to understand the basic terminology used in computer programming
- To be able to write, compile and debug programs in C language.
- To be able to distinguish between operating systems software and application software.
- To be able to understand the main functions of an operating system.

COURSE CONTENTS:

UNIT I Machine Architecture and Assemblers   **15 Hours**
Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) – SIC Machine Architecture, SIC/XE Machine Architecture, SIC Programming Examples. Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes, Program Relocation

UNIT II Loaders and Linkers   **15 Hours**
Basic Loader Functions - Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation, Program Linking, Algorithm and Data Structures for a Linking Loader; Machine-Independent Loader Features - Automatic Library Search, Loader Options, Loader Design Options - Linkage Editor, Dynamic Linkage, Bootstrap Loaders.

UNIT III Editors and Debugging Systems   **15 Hours**
Text Editors - Overview of Editing Process, User Interface, Editor Structure, Interactive Debugging Systems - Debugging Functions and Capabilities, Relationship With Other Parts Of The System, User-Interface Criteria.

UNIT IV   Macro Processor   **15 Hours**
Basic Macro Processor Functions - Macro Definitions and Expansion, Macro Processor Algorithm and Data Structures, Machine-Independent Macro Processor Features - Concatenation of Macro Parameters, Generation of Unique Labels, Conditional Macro Expansion, Keyword Macro Parameters, Macro Processor Design Options - Recursive Macro Expansion, General-Purpose Macro Processors, Macro Processing Within Language Translators, Implementation Examples - MASM Macro Processor, ANSI C Macro Processor.

Text Books:

1. Leland.L.Beck: System Software, 3rd Edition, Addison-Wesley, 1997.

2. John.R.Levine, Tony Mason and Doug Brown: Lex and Yacc, O'Reilly, SPD,   1998.

Reference Books:

1. D.M.Dhamdhere: System Programming and Operating Systems, 2nd Edition, Tata

    McGraw - Hill, 1999.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F4700	16 Weeks	**Visual Programming Lab**	0	0	2	2

PART-A

1. Design a User Interface (UI) to accept the student details such as name, department and total marks. Validate the input data and calculate the percentage and division.

2. Write a VB Program to design a simple calculator to perform addition, subtraction, multiplication and division (Use functions for the calculations).

3. Design a small Alarm Clock Application.
4. VB program to Encrypt and Decrypt a string. (Use Rnd() to generate the Encryption and decryption keys).

5. Create a Vending machine application, that display images for four snacks and corresponding labels that indicates the number for each snack. The GUI should contain a text box in which the user specifies the number of desired snack. When the dispense snack button is clicked, it should display on a label the name of the snack dispensed. At end it should print (display) the bill of the product.

6. Design a VB application which has MDI and Child forms. Create a menu having the items such as file (New, Open), Format (Font, Regular, Bold, Italic) and Exit in the MDI form. flso create a text box and use a Common Dialog Box control for changing the font, foreColor and Back Color of the Text Box.

7. VB program to create a sequential file containing the fields name, address, city, pin code and phone number. Display the records in a neat format.

8. Write a VB Program to Validate the username and password form the database and display the appropriate message.(Use Data Control)
9. Design a VB application to accept the Item Details (Item ID, Item Name, MFD Date, Unit Of measure and RatePerUnit).Item Id should be a system generated ID. The application should allow operations –Add, Modify, Delete, Update and Navigations of the items. Use ADO Data controls and Grid controls.
10. Design a VB application to record the employee details such as EmpId, EmpName, designation and Basic Pay. Calculate the DA, HRA, Deduction and Gross Salary. (Make the necessary assumptions).

PART – B

Programs may be decided by External and Internal examiners.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F4800	16 Weeks	**Computer Graphics Lab**	0	0	2	2

PART - A

1. DDA technique to draw Straight line
2. DDA technique to draw circle
3. Bresenham's techniques to draw Straight line
4. Bresenham's techniques to draw circle
5. Piechart depiction of the results of an election between four parties.
6. Transform a triangle and illustrate reflection, translation, rotation and scaling.
7. Clipping the triangle ABC against a window.
8. Animate a man walking with umbrella
9. Animate shadow of a pole as sun moves
10. Animate India National flag

PART – B

Programs may be decided by External and Internal examiners.

REVA UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

Scheme of Teaching, Examination and Credits

FIFTH SEMESTER BCA

Scheme & Syllabus-2016

Sl. No	Code	Title	HC /SC /FC	Credit Pattern L	T	P	Credits	Working Hrs
1	BPAL15F5100	Computer Architecture	HC	3	1	0	4	5
2	BPAL15F5200	Data Warehousing and Data Mining	HC	3	1	0	4	5
3	BPAL15F5300	Java Programming	HC	3	1	0	4	5
4	BPAL15F5400	PC Trouble Shooting	OE	3	0	1	4	5
5	BPAL15F5510	.NET Programming using C#	SC	3	0	0	3	3
	BPAL15F5520	Accounting and Financial Management						
6	BPAL15F5600	Data Analytics	HC	2	0	1	3	3
7	BPAL15F5700	Java programming Lab	HC	0	0	2	2	4
8	BPAL15F5810	.NET Programming Lab	SC	0	0	2	2	4
	BPAL15F5820	Accounting and Financial Management Lab						
		Total Credits		**17**	**3**	**6**	**26**	**34**

Course Code	Duration	Course Title	L	T	P	C
BPAL15F5100	16 Weeks	**Computer Architecture**	3	1	0	4

- To become familiar in following topics:
- How Computer Systems work & its basic principles
- How to analyze the system performance
- Concepts behind advanced pipelining techniques
- The current state of art in memory system design
- How I/O devices are being accessed and its principles
- To provide the knowledge on Instruction Level Parallelism
- To impart the Knowledge on nano programming.

COURSE OUTCOMES:

- To apply the knowledge of performance metrics to find the performance of systems.
- To create an assembly language program to program a microprocessor system.
- design a hardware component for an embedded system

COURSE CONTENT:

UNIT I   **18 Hours**

Digital Logic Circuits: Logic gates Boolean algebra, map method for simplification, combinational circuits, flip-flop, and sequential circuits.

Integrated circuits and digital functions: Digital integrated circuits, flip –flops and registers, decoders and multiplexers, binary counters, shift registers, random –access memories (RAM) read –only memories (ROM).

UNIT II   **12 Hours**

Data Representation: Data types, fixed-point representation, floating – point representation, other binary codes, error detection codes.

Data transfer operations: Register Transfer, Memory Transfer and I/O Transfer.

UNIT III   **15 Hours**

Basic Computer Organisation and Design: Instruction codes, computer instruction, timing and control, execution and instruction, input-output and interrupt, design of computer.

Central processor organization: Processor bus organization, arithmetic logic unit (ALU) instruction formats, addressing modes, data transfer and manipulation, program control, microprocessor

organization.

UNIT IV   **15 Hours**

Input-Output Organisation: Peripheral devices. Asynchronous data transfer, direct memory access (DMA), priority interrupt, input –output processor (IOP).
Memory organization: Auxiliary memory, microcomputer memory hierarchy, associative memory, virtual memory, cache memory.

Text Books:
1. M.Moris Mano, Computer System, Architecture, 2nd Edition Prentice Hall of India.

Referenc Books
1. Heuring and Jordan, Computer systems design and Architecture , Pearson Edition
2. William Stallings , Computer Organization and Architecture, Pearson Education
3. Floyd, Digital Fundamentals,8th Edition , Pearson Education.
4. Andrew S. Tenenbauam, Structured Computer Organization, 3rd Edition; Prentice Hall of India.
5. David Patterson & Hennessy, Computer Organization & Design, Elsevier.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F5200	**16 Weeks**	**Data Warehousing and Data Mining**	**3**	**1**	**0**	**4**

COURSE OBJECTIVES:
- To expose the students to the concepts of Data warehousing Architecture and Implementation
- To Understand the Data mining principles and the importance of data transformation.
- To learn to use association rule mining for handling large data.
- To understand the concept of classification.
- To learn clustering techniques.

COURSE OUTCOMES:
- Able to understand the various concepts behind data warehousing and business intelligence
- Able understand the Data mining principles.
- Able to understand the various Data Mining techniques like Association, Classification and Clustering.

UNIT I   **15 Hours**
Introduction: What is Data Warehouse? Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Implementation, Data Mining, What kinds of Data can be Mined, What kinds of patterns can be Mined, Data cleaning, Data integration: (Entity, Identification Problem, Redundancy & Correlation Analysis),

UNIT II   **15 Hours**
Data Reduction: (Wavelet Transforms, Attribute Subset Selection, Histogram, Clustering, Sampling, Data Cube Aggregation), Data Transformation: Strategies Overview, Data Transformation by Normalization.

UNIT III   **15 Hours**
Mining Frequent Patterns, Associations & Correlations: Basic Concept, Frequent Itemset mining methods, pattern evaluation methods. Classification, Decision tree Induction, Attribute Selection Measures, Tree Pruning, Bayesian Classification Methods.

UNIT IV   **15 Hours**
Cluster Analysis: What is a cluster analysis? Requirement for Cluster Analysis, Partitioning methods, Hierarchical methods.
Data Mining Applications & Trends: Mining Sequence Data; Time Series, Symbolic, Biological; Statistical Data Mining, Visual & Audio Data Mining, Data Mining Applications, Data Mining Trends.

Text Books:
1. Jiawei Micheline Kamber, 'Data Mining Concepts and Techniques', Morgan Kauf Mann Publishers.
2. George M. Marakas, 'Modern Data Warehousing, Mining and Visualization', Pearson Education, 2003.
3. W.H. Inmon, 'Building the Data Warehouse', Wiley dreamtech, 3rd Edition.
4. Mastering Data Mining – Michael J.A. Berry & Gordon S. Linoff (Wiley Pub.).
5. Data Warehousing (Pearson Ed.) – Sam Anahory & Dennis Murray.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F5300	16 Weeks	Java Programming	3	1	0	4

- Able to understand the four pillars of Object orientation.
- Understand the concepts of classes and objects.
- Able to understand the concepts of Exception handling.
- Understand the lifecycle of an applet.

COURSE OUTCOMES:

- Implement the concepts of classes with different types of inheritance.
- Able to use the stream input and output.
- Can differentiate between an Application and an Applet.

COURSE CONTENTS:

UNIT I   **15 Hours**

An Overview of Java

Object-Oriented Programming: Two Paradigms, Abstraction, The Three OOP Principles. A First Simple Program: Entering the Program, Compiling the Program, A Closer Look at the First Sample Program. Setting the path and class path, Difference between JDK, JRE and JVM, Internal Architecture of JVM, Unicode System, Operators in java, Operators in java**.**

UNIT II   **15 Hours**

Data Types, Variables, Arrays, Operators and Control Statements.**The Primitive Types:** Integers, Floating-Point Types, Characters, Booleans. A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence. Java's Selection Statements, Iteration Statements, Jump Statements.

UNIT III   **15 Hours**

Introducing Classes, Constructors and Methods.

Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, Overloading Methods, Overloading Constructors, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static and final.

UNIT IV   **15 Hours**

Inheritance, Packages, Interfaces, Exception Handling and Multithreaded Programming Inheritance Basics, Using super, Creating a Multilevel Hierarchy, Method Overriding, Dynamic

Method Dispatch, Using Abstract Classes, Using final with Inheritance, Packages, Interfaces, concept of exception handling and Multi-threaded Programming in java.

Text Books:
1. A.Balaguruswamy, "Programming with JAVA", A Primer, TMH, 1999.

Reference Books:
1. Thomas Boutel, "CGI programming in C and Perl", Addison – Wesley, 1996.

2. Jefry Dwight et al, Using CGI, Second Edition, Prentice Hall, India, 1997.

3. Patrick Naughton & Herbert Schildt, JAVA 2: The Complete Reference, THM, 1999.

4. Schildt, "JAVA The Complete Reference", 7th Edition.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F5400	16 Weeks	PC Trouble Shooting	3	0	1	4

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.

COURSE OUTCOMES:
- 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.

COURSE CONTENTS:

UNIT I   **10 Hours**

Fundamental of Computers:

Block diagram and brief introduction of each block. Types of computers. Personal Computers, Laptop and Portable Devices**:** Laptop Hardware, Other Portable Devices,
Operating Systems**:** Types of Operating Systems, Windows XP, UNIX, MAC OS

Input Output Devices, Printers and Scanners: Printer Overview, Installing and Configuring Printers, Scanners and other input devices.

UNIT II   20 Hours
Computers Personal/ Micro:
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

Pc-Assembly and CMOS Setup And Troubleshooting:
Identification of PC Components, Assembling the PC and Power Supply (SMPS-Switch Mode Power Supply). Replacing and fitting of Hard Disk and Removable Disk Drives on PC, Disc Managers and its use. 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.

UNIT IV   15 Hours
Installation of Softwares and Packages
Installation of Operating Systems., Installation of Software Packages, Virus removal and disc scan. Backup and Restoration utility, Connecting input/output devices and installation of their driver software, Configuration of Audio and Video.

Text Books:
1. Winn L Rosch, Hardware bible, Techmedia publications.
2. Stephon J Bigelow, Trouble shooting, maintaining and repairing PCs, Tata McGraw Hill Publication.

Reference Book:
1. Manohar Lotia, Pradeep, Nair, Bijal Lotia, Modern All about printers, BPB publications.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F5510	16 Weeks	.Net programming using C#	3	0	0	3

COURSE OBJECTIVES:

- To get the Knowledge about different Object Oriented Features.
- To understand disconnected architecture of .Net.

COURSE OUTCOMES:

- Minimize code repetition.
- Comment code where appropriate.
- Debug an application using breakpoints and Try/Catch/Finally blocks.
- Incorporate .NET Framework classes into a C#.NET application

COURSE CONTENTS:

UNIT I Introduction   **15 Hours**

Introduction to .Net, Two tier and Three tier client server model, .Net Architecture, Features   of .Net, Advantages of .Net, .Net Framework, CLR, CTS, CLS, Assemblies, Memory management issues – Garbage Collector and collection process, Exception Handling, Code Access Security

UNIT II C# Languages Fundamentals   **15 Hours**

Need of c# ,C# pre-processor Directives , Features of C# , Creating a Simple c# Console Application, Identifiers and keywords , Data Types ,Variables and Constants Value type and reference types ,Boxing and unboxing types , Iterators Constructs ,Control flow constructs Arrays , C# Enumerations

UNIT III Object- oriented Programming with C#   **15 Hours**

Namespaces, Class and objects, using this keyword, creating array of objects, defining partial Classes and Methods,   Properties ,Constructors and Destructors Static classes and static method, static variables Encapsulations using properties ,Inheritances

UNIT IV Graphical User interface with Windows Forms   **15 Hours**

Event Handling Control properties and layout labels, Textboxes, buttons Group boxes and panels, checkboxes and radio button, Tooltips, ListBox and Combo Box, Understanding ADO.NET and Creating Connection string.

Text Books:

1. NET4.0 Programming(6-in-1),BlackBook,Kogent Learning SolutionInc, Wiely-Dream Tech Press
2. PaulDeiteland Harvey Deitel :C#2010 for Programmers,4th Edition, Pearson Education.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F5520	**16 Weeks**	**Accounting and Financial Management**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

- Define Financial Management.
- Know the objectives, scope and how it has evolved over a period of time.
- Focus on Profit Maximization vis -à- vis Wealth Maximization.
- Outline the role of Chief Financial Officer in light of growing needs of a modern organization.
- Emphasis on relationship between Financial Management with accounting and other related fields

COURSE OUTCOMES:

- Apply theories of accounting and corporate finance.
- Apply treasury management and corporate finance techniques.
- Critically evaluate the financial controls of an organization.
- Understand, apply and critically evaluate financial accounting techniques.
- Understand, apply and critically evaluate management accounting techniques.
- Demonstrate time management.

COURSE CONTENT:

UNIT I   **15 Hours**

Introduction: History and Development of Accounting –Meaning Objectives and functions of Accounting-Book–keeping V/s Accounting –Users of accounting data – systems of book-keeping and accounting – branches of accounting –advantages and limitations of accounting. Accounting Concepts and conventions: Meaning need and classification, Accounting standards –meaning, need and classification of Indian accounting standards. Accounting principles V/s Accounting standards.

UNIT II   **15 Hours**

Financial Accounting Process: Classification of accounting transaction and accounts, rules of debit and credit as per Double Entry System. Journalisation and Ledger position Preparation of different subsidiary books: Purchase Day Book Sales Day Book, Purchase Returns Day Books, Sales Returns Day Book, Cash Book. Bank Reconciliation Statement: Meaning, Need, Definition, preparation of BRS, budgeting.

UNIT III   **15 Hours**

Accounting for bill of exchange: Meaning, Need, Definition, Partice to Bill of Exchange, Types of Bills. Accounts Procedure: Honour of the Bill, Dishonour of the Bill, Endorsement, Discounting, Renewal, Bills for collection, Retirement of the Bill, Accommodation Bills, Bill Receivable Book and Payable Book. Preparation of Trial Balance: Rectification of errors and journal Proper.

UNIT IV   **15 Hours**

Preparation of Final accounts: Meaning, need and classification, Preparation of Manufacturing, Trading, Profit and loss account and Balance-Sheet of sale –traders and partnership firms.

Text Books:

1. S.Ramesh, B.S.Chandrashekar, a Text Book of Accountancy.

Reference Books:

1. V.A.Patil and J.S.Korihalli, Book–Keeping and Accounting, (R. Chand and Co. Delhi)
2. R.S.Singhal, Principles of Accountancy, Nageen Prakash pvt.Ltd, Meerut.
3. B.S.Raman, Accountancy, (United Publishers, Mangalore)

Course Code	Duration	Course Title	L	T	P	C
BPAL15F5600	16 Weeks	Data Analytics	2	0	1	3

COURSE OBJECTIVES:

- Understand and apply the Big Data Flow to actual projects
- Being able to describe and apply the Data Analytics lifecycle to Big Data projects and lead other team members in the process
- Identify and successfully apply appropriate techniques and tools to solve actual Big Data problems.
- Have an in-depth understanding of the Big Data ecosystem

At the end of the course the student will be able to:

- deploy a structured lifecycle approach to data science and big data analytics projects
- select visualization techniques and tools to analyse big data and create statistical models
- Use tools such as R and RStudio, and MapReduce/Hadoop.
- Understand and Work with big data platform
- Analyse the Map Reduce technologies associated with big data analytics
- Understand the fundamentals of various bigdata analysis techniques
- Analyse the big data analytic techniques for useful business applications.

COURSE CONTENT:

UNIT I The Fundamentals of Big Data   14 Hours

The Evolution of Data Management, Understanding the Waves of Managing Data, Wave 1: Creating manageable data structures, Managing big Data, Defining Big Data, Building a Successful Big Data Management Architecture, Beginning with capture, organize, integrate, analyse, Setting the architectural foundation, Performance matters, Traditional and advanced analytics, The Big Data Journey Examining Big Data Types, Defining Structured Data, sources of big structured data, Understanding the role of relational databases in big data, Defining Unstructured Data, Exploring sources of unstructured data

UNIT II Big Data Analytics   12 Hours

Data Analytics Introduction, Data Analytics Lifecycle – Discovery, Data Preparation, Model Planning, Model Building, sharing results.
Using R for analytics: Introduction to R, Analysing and exploring data, methods for model building and Evaluation

UNIT III Big Data Management   16 Hours

Data Storage and Analysis, 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,   mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics, Introduction to Analytic Processes and Tools, Analysis Vs Reporting, Modern Data Analytic Tools.

UNIT IV   Applications of Big Data Analytics   18 Hours

Using Big Data to Get Results, Basic analytics, Advanced analytics, Operationalized analytics, Monetizing analytics Modifying Business Intelligence Products to Handle Big Data, Data, Analytical algorithms, Infrastructure support, Studying Big Data Analytics Examples, Orbitz, Nokia, NASA,

Big Data Analytics Solutions, Understanding Text Analytics and Big Data, Exploring Unstructured Data, Understanding Text Analytics, Voice of the customer, Social media analytics**.**

Text Books:
1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper,and Marcia Kaufman, Big Data for Dummies, wiley publications, 2013

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. Anand Rajaraman And Jeffrey David Ullman, "Mining Of Massive Datasets", Cambridge University Press, 2012.
3. Bill Franks, "Taming The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics", John Wiley & Sons, 2012.
4. Glenn J. Myatt, "Making Sense Of Data", John Wiley & Sons, 2007
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.

Data Analytics Lab

The list of programs will be decided by the course faculty.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F5700	**16 Weeks**	**Java Programming Lab**	**0**	**0**	**2**	**2**

PART – A

1. Write a program to find factorial of list of number reading input as command line argument.
2. Write a program to display all prime numbers between two limits.
3. Write a program to sort list of elements in ascending and descending order and show the exception handling.
4. Write a program to implement all string operations.
5. Write a program to find area of geometrical figures using method.
6. Write a program to implement constructor overloading by passing different number of parameter of different types.
7. Write a program to create student report using applet, read the input using text boxes and display the o/p using buttons.
8. Write a program to calculate bonus for different departments using method overriding.
9. Write a program to implement thread, applets and graphics by implementing animation of ball moving.
10. Write a program to implement mouse events and keyboard events.

PART – B

Programs may be decided by External and Internal examiners.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F5810	16 Weeks	.Net programming Lab	0	0	2	2

PART – A

1. Solve simple problems using the fundamental syntax and semantics of the C# programming language
2. Write a Program in C# to demonstrate Command line arguments processing.

3. Write a program in c# to implement stack operations

4. Write C# programs that use selection (if, switch, conditional operator)

5. Write C# programs that use loops (while, do while, for)

6. Write a program to reverse a given string using C#

7. Write C# programs that use one-dimensional arrays

8. Apply simple searching and sorting algorithms

9. Write a Program in C# to find the second largest element in single dimensional arrays.
10. Write programs in C# to demonstrate boxing and unBoxing
11. Write simple object oriented programs using objects and classes

12. Develop graphical user interfaces for C# programs using GUI components such as labels, buttons, text boxes, radio button, check boxes

13. Use the C# event-handling model to respond to events arising from the GUI components.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F5820	16 Weeks	Accounting and financial management Lab	0	0	2	2

Tally Lab

The List of Questions will be decided by the course faculty.

REVA UNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS

Scheme of Teaching, Examination and Credits

SIXTH SEMESTER BCA

Scheme & Syllabus-2016

Sl. No	Code	Title	HC /SC/ FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	BPAL15F6100	Web Programming	HC	3	1	0	4	5
2	BPAL15F6210	Cloud Computing						
	BPAL15F6220	Advanced Java	SC	3	1	0	4	5
3	BPAL15F6300	Web Programming Lab	HC	0	0	2	2	4
4	BPAL15F6410	Cloud Computing Lab	SC	0	0	2	2	4
	BPAL15F6420	Advanced Java Lab						
5	BPAL15F6500	Project Work	HC	0	2	8	10	20
Total Credits				**6**	**4**	**12**	**22**	**38**

Course Code	Duration	Course Title	L	T	P	C
BPAL15F6100	16 Weeks	Web Programming	3	1	0	4

- Highlighting the theory and principle underlying website design
- Introducing the design principle and techniques of website design

COURSE OUTCOMES:

The students will be able to:
- Develop website with basic HTML,CSS and JavaScript programming
- Gain knowledge on XHTML ,XML and other programming tools

COURSE CONTENTS:

UNIT I   **15 Hours**
Fundamentals of Web: Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. XHTML: Origins and evolution of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables.

UNIT II   **15 Hours**
HTML and XHTML: Forms, Frames in HTML and XHTML, Syntactic differences between HTML and XHTML. CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The Box model, Background images, The and tags, Conflict resolution.

UNIT III   **15 Hours**
Java Script: Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, Operations, and expressions; Screen output and keyboard input; Control statements; Object creation and Modification; Arrays; Functions; Constructor; Pattern matching using expressions; Errors in scripts; Examples.

UNIT IV   **15 Hours**

Java Script and HTML Documents: The JavaScript execution environment; The Document Object Model; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model; The navigator.

Text Books:
1. Robert W Sebesta, "Programming the World Wide Web", 4th Edition, Pearson Education, 2008**.**

Reference Books:
1. M.Deitel, P.J.Deitel, A.B.Goldberg, "Internet & World Wide Web How to program", 3rd Edition, Pearson Education / PHI, 2004.
2. Chris Bates, "Web Programming Building Internet Applications",3rd Edition, Wiley India, 2006. 3. Xue Bai et al, "The Web Warrior Guide to Web Programming", Thomson, 2003.
3. Sklar, "The Web Warrior Guide to Web Design Technologies", 1st Edition, Cengage Learning India.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F6210	16 Weeks	Cloud Computing	3	1	0	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.

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.
- Understand the concepts behind NoSQL

COURSE CONTENT:

UNIT I Fundamental Cloud Computing   15 Hours
Cloud computing at a glance, the vision of cloud computing, defining a cloud, A closer look, Historical developments, Clusters, Grid computing, Distributed computing and Cloud computing.

Application development, Building cloud computing environments, Computing platforms and technologies, Introduction to Distributed files systems, HDFS.

UNIT II Fundamental concept and Models   **10 Hours**
Basics of Virtualization, Types of Virtualization, Virtualization and cloud computing. Introduction to Cloud Software Environments, Architecture of OpenStack, Aneka.

UNIT III Cloud Infrastructure Mechanisms and Architecture   **15 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

UNIT IV   **20 Hours**
Cloud Storage Systems:
Storage Systems: Storage models and file systems, Databases and the cloud. RDBMS and the cloud. Need for NoSQL Databases. Defining NoSQL, History of NoSQL Types of NOSQL Data bases- key-value Column store and document data models. Introduction to Key value stores, Introduction to Column store. Distributed computing and NoSQL.
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 Language Binding PHP, Indexing in MongoDB
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   .

Reference Books:
1. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management,and Security", CRC Press, 2010.
2. . "Professional NOSQL" by Shashank Tiwari, 2011, WROX publications.
3. . The Definitive guide to MongoDB, The NoSQL Database for Cloud and Desktop Computing, Apress 2010
4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH,2009.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure
6. The cloud O Reilly.

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Course Code	Duration	Course Title	L	T	P	C
BPAL15F6220	16 Weeks	**Advanced Java**	3	1	0	4

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 Sockets.

COURSE OUTCOMES:

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

COURSE CONTENT:

UNIT I Collections & Multithreading   15 Hours

Collections: Collection Interfaces, Concrete Collections, The Collections Framework.

Multithreading : Creating thread and running it, Multiple Thread acting on single object, Synchronization, Thread communication, Thread group, Thread priorities, Daemon Thread, Life Cycle of Thread**.**

UNIT II   15 Hours

Datagrams.Java Database Connectivity (JDBC): Merging Data from Multiple Tables:Joining, Manipulating .Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures.

UNIT III Servlets and JSP   15 Hours

Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling.HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession. JavaServer Pages (JSP): Introduction, JavaServer Pages Overview,A First JavaServer Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries.

UNIT IV   15 Hours

Remote Method Invocation: Defining the Remote Interface, Implementing the Remote Interface, Compiling and Executing the Server and the Client. Enterprise Java Bean: Preparing a Class to be

a JavaBean, Creating a JavaBean, JavaBean Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean.

Text Books:

1. "Advanced Java 2 Platform HOW TO PROGRAM" by H. M.Deitel, P. J. Deitel, S. E. Santry – Prentice Hall

2. "Beginning Java™ EE 6 Platform with GlassFish 3 From Novice to Professional" by Antonio Goncalves – Apress publication

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.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F6300	16 Weeks	**Web Programming Lab**	0	0	2	2

1. Write a program to find factorial of list of number reading input as command line argument.
2. Write a program to sort list of element in ascending and descending order and show the exception handling.
3. Write a program to implement all string operations.
4. Write a program to find area of geometrical figures using method overloading.
5. Write a program to implement constructor overloading by passing different number of parameter of different types.
6. Write a program to create student report using applet, read the input using text boxes and display the o/p using buttons.
7. Write a program to implement an apply by passing parameter to HTML.
8. Write a program to implement thread, applets and graphics by implementing animation of ball moving.
9. Write a program to implement mouse events.
10. Write a program to implement keyboard events.

PART – B

Programs may be decided by External and Internal examiners.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F6410	16 Weeks	**Cloud Computing Lab**	0	0	2	2

PART-A

1. CRUD- Operations using MongoDB
2. Connecting MongoDB using PHP
3. Import and Export Big Data using MongoDB
4. Indexing in MongoDB
5. Map Reduce Using MongoDB

PART – B

Programs may be decided by External and Internal examiners.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F6420	16 Weeks	**Advanced Java Lab**	0	0	2	2

PART-A

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.
5. Simple programs using RMI concept.

PART-B

Programs may be decided by External and Internal examiners.

Course Code	Duration	Course Title	L	T	P	C
BPAL15F6500	**16 Weeks**	**Project Work**	**0**	**2**	**8**	**10**

Project Guidelines

1. Students should develop a project in a group (max. 3 students each group).

2. They should implement their project in the university in any RDBMS package or any language available in the University.

3. The project should web based. The students have to collect data outside practical hours.

4. Project may be taken outside but must be implemented in the college.

5. Internal marks can be awarded by the guide by evaluating the performance of the students during the course of project work.

6. In viva-voce the questions must be directed only on the project work to access the involvement and understanding of the problem by the students.

7. The project carries 200 marks is distributed as follows:
   Demonstration and Presentation   130 Marks
   Viva-voce   50 Marks
   Project Report   20 Marks

CAREER DEVELOPMENT AND PLACEMENT

Having a degree will open doors to the world of opportunities for you. But Employers are looking for much more than just a degree. They want graduates who stand out from the crowd and exhibit real life skills that can be applied to their organizations. Examples of such popular skills employers look for include:

1. Willingness to learn
2. Self motivation
3. Team work
4. Communication skills and application of these skills to real scenarios
5. Requirement of gathering, design and analysis, development and testing   skills
6. Analytical and Technical skills
7. Computer skills
8. Internet searching skills
9. Information consolidation and presentation skills
10. Role play
11. Group discussion, and so on

REVA University therefore, has given utmost importance to develop these skills through variety of training programs and such other activities that induce the said skills among all students. A full-fledged Career Counseling and Placement division, namely Career Development Center (CDC) headed by well experienced senior Professor and Dean and supported by dynamic trainers, counselors and placement officers and other efficient supportive team does handle all aspects of Internships and placements for the students of REVA University. The prime objective of the CDC is to liaison between REVA graduating students and industries by providing a common platform where the prospective employer companies can identify suitable candidates for placement in their respective organization. The CDC organizes pre-placement training by professionals and also arranges expert talks to our students. It facilitates students to career guidance and improves their employability. In addition, CDC forms teams to perform mock interviews. It makes you to enjoy working with such teams and learn many things apart from working together in a team. It also makes you to participate in various student clubs which helps in developing team culture, variety of job skills and overall personality.

The need of the hour in the field of Computer Application is not only knowledge in the subject, but also the skill to do the job proficiently, team spirit and a flavour of innovation. This kept in focus, the CDC has designed the training process, which will commence from second semester along with the curriculum. Special coaching in personality development, career building, English proficiency, reasoning, puzzles, and communication skills to every student of REVA University is given with utmost care. The process involves continuous training and monitoring the students to develop their soft skills including interpersonal skills that will fetch them a job of repute in the area of his / her

interest and March forward to make better career. The School of Computer Science and Applications also has emphasised subject based skill training through lab practice, internship, project work, industry interaction and many such skilling techniques. The students during their day to day studies are made to practice these skill techniques as these are inbuilt in the course curriculum. Concerned teachers also continuously guide and monitor the progress of students.

The University has also established University-Industry Interaction and Skill Development Centre headed by a Senior Professor & Director to facilitate skill related training to REVA students and other unemployed students around REVA campus. The center conducts variety of skill development programs to students to suite to their career opportunities. Through this skill development centre the students shall compulsorily complete at least two skill / certification based programs before the completion of their degree. The University has collaborations with Industries, Corporate training organizations, research institutions and Government agencies like NSDC (National Skill Development Corporation) to conduct certification programs. REVA 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 University has also signed MOU's with Multi-National Companies, research institutions, and universities abroad to facilitate greater opportunities of employability, students' exchange programs for higher learning and for conducting certification programs.

DO'S AND DON'TS

DO'S
1. Maintain discipline and respect the rules and regulations of the university
2. Be regular and punctual to classes
3. Study regularly and submit assignments on time
4. Be respectful to your Teaches/friends and hostel staff/management.
5. Read the notice board (both at your college and the hostel) regularly.
6. Utilize your Personal Computer for educational purpose only.
7. Follow the code of conduct.
8. Visit Health Center on the campus whenever you are unwell.
9. Be security conscious and take care of your valuables especially Cash, Mobile Phones, Laptop and other valuables.
10. Carry your valuables along with you whenever you proceed on leave/vacation.
11. Use electric appliances, lights and water optimally.
12. Keep the campus clean and hygienic.
13. Use decent dressing.

DON'TS

1. Ragging inside / outside the campus.
2. Possession of Fire arms and daggers etc.
3. Use of Alcohols, Toxic drugs, sheesha, gutkha and hashish/heroin etc.
4. Use of Crackers, explosives and ammunition etc.
5. Smoking and keeping any kind of such items.
6. Misusing college & hostel premises/facilities for activities other than studies.
7. Playing loud music in the room which may disturb studies of colleagues / neighbors.
8. Making noise and raising slogans.
9. Keeping electrical appliances, other than authorized ones.
10. Involvement in politics, ethnic, sectarian and other undesirable activities.
11. Proxy in any manner.
12. Use of mobiles in the academic areas.

Note: 1. Rules are revised / reviewed as and when required.

2. Healthy suggestions are welcome for betterment of Institution

Programme Regulations

Students will be provided with programme regulations which deals about credt 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 B Tech 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. **O**pen 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 **O**pen Elective Course.

f. Project Work / Dissertation:

Project work / Dissertation work denoted as 'D' 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 Three Year 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 Three Year Degree, 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 BCA degree with the distribution of credits for different courses as decided by the BoS concerned.

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 BCA 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 BCA Degree program.

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

7. **Continuous Assessment, Earning of Credits and Award of Grades.**

7.1. The assessment and evaluation process happen in a continuous mode. However, for

reporting purpose, **a semester is divided into 3 components as C1, C2, and C3.** The performance of a candidate in a course will be assessed for a maximum of 100 marks as explained below.

(i) Component C1: The first Component (C1), of assessment is for 25 marks. This will be based on test, assignment / seminar. During the first half of the semester (i.e. by 8th week), the first 50% of the syllabus (Unit 1&2) will be completed. This shall be consolidated during the first three days of 8th week of the semester. A review test based on C1 will be conducted and completed in the beginning of the 9th week. In case of courses where test cannot be conducted, the form of assessment will be decided by the concerned school and such formalities of assessment will be completed in the beginning of the 9th week. The academic sessions will continue for C2 immediately after completion of process of C1.

The finer split - up for the award of marks in C1 is as follows:
Assignment …………………………………….… 5 marks for Unit 1&2
Seminar ………………….…………………..….. 5 marks for Unit 1&2
Test (Mid-Term) ……………….…………….. 15 marks for Unit 1&2
Total …………………………….……………… 25 marks

(ii) Component C2: The second component (C2), of assessment is for 25 marks This will be based on test, assignment / seminar. The continuous assessment and scores of second half of the semester (9th to 16th week) will be consolidated during 16th week of the semester. During the second half of the semester the remaining units in the course will be completed. A review test based on C2 will be conducted and completed during 16th week of the semester. In case of courses where test cannot be conducted, the form of assessment will be decided by the concerned school and such formalities of assessment will be completed during 16th week.

The 17th week will be for revision of syllabus and preparation for the semester - end examination.

The finer split - up for the award of marks in C2 is as follows:
Assignment …………………………………….. 5 marks for Unit 3&4
Seminar ………………….……………….…..….. 5 marks for Unit 3&4
Test (Mid-Term) ……………….……………15 marks for Unit 3&4
Total …………………………….…………….… 25 marks

(iii) The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective School Board. The students should be informed about the modalities well in advance. The evaluated courses / assignments

during Component-I (C1) and Component-II (C2) of assessment are immediately brought to the notice of the students individually and obtain acknowledgement of students in the register maintained by the concerned teacher for this purpose. All such records relating to assignments, tests etc, shall be maintained in the respective Schools for a period of one academic year excluding the year of study.

(iv) Component C3: The end semester examination (C3) of 3 hours duration covering the curriculum of all the four units for each course shall be conducted during the 18th & 19th week. **This forms the third / final component of assessment (C3) and the maximum marks for the final component will be 50.**

(v) Valuation will be undertaken concurrently and results are announced latest by the end of 20th week. This practice will be followed both in odd semester and even semester.

7.2. Evaluation of Practical's and Minor Project / Major Project / Dissertation

7.2.1. A practical examination shall be assessed on the basis of:

    a) Knowledge of relevant processes;
    b) Skills and operations involved;
    c) Results / products including calculation and reporting.

7.2.2. In case a course is fully of P type (L=0:T=0:P=4), the performance of a candidate shall
 be assessed for a maximum of 100 marks as explained below:

a)   Continuous assessment (C1 and C2) = 50 marks
b)   Semester end (C3) practical examination = 50 marks

The 50 marks meant for continuous assessment shall further be allocated as under:

i	Conduction of regular practical throughout the semester	20 marks
ii	Maintenance of lab records	10 marks
iii	Performance of mid-term test	20 marks
	Total	**50 marks**

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 arks**

7.2.3. The C3 examination for Practical work will be conducted jointly by internal and external examiners. However, if external examiner does not turn up, then both the examiners will be internal examiners.

7.2.4. In case a course is partly P type i. e, (L=3): (T=0) (P=1), then the examination for C3 component will be as decided by the BoS concerned.

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

7.3. **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:

Component – I	(C1)	Periodic Progress and Progress Reports (25%)
Component – II	(C2)	Results of Work and Draft Report (25%)
Component– III	(C3)	Final Evaluation and Viva-Voce (50%). Evaluation of the report is for 30% and the Viva-Voce examination is for 20%

7.4. The details of continuous assessment are summarized in the following table:

Component	Period	Syllabus	Weightage	Activity
C1	1st Week to 8th Week			Instructional process and Continuous Assessment
	Last 3 days of 8th Week	First 50% (two units)	25%	Consolidation of C1
	From first day of 9th Week to first 3 days of 16th Week			Instructional process and Continuous Assessment
C2	Last 3 days of 16th Week	Second 50% remaining two units	25%	Consolidation of C2
C3	17th Week and 18th Week	Entire syllabus		Practical examination and Revision and preparation for semester–end exam
C3	to 19th Week and 20th Week	Entire syllabus	50%	Conduct of Semester - end Exams and Evaluation
	Beginning of 21st Week			Tabulation
	End of 21st 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.

2. Practical examination wherever applicable shall be conducted after C2 and before C3 examination. The calendar of practical examination shall be decided by the respective

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School Boards and communicated well in advance to the Registrar (Evaluation) who will notify the same immediately.

7.5. Finally awarding the grades should be completed latest by 20th week of the semester.

8. **Eligibility to Appear C3 (Semester - end) Examination**
Only those students who fulfill a minimum of 75% attendance in aggregate of all the courses including practical courses / field visits etc, as part of the course(s) shall be eligible to appear for C3 examination.

9. **Requirements to Pass the Semester and Provision for make-up examination and to Carry Forward the Failed Subjects / Courses:**

9.1. **Requirements to Pass a Course**
A candidate's performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (25 + 25 + 50; i.e, C1 + C2 + C3) and have to secure a minimum of 40% to declare pass in the course. However, a candidate has to secure a minimum of 25% (12 marks) in C3 which is compulsory.

9.2. Provision for Make- up Examination:
a) For those students who have secured less than 40% marks in C1, C2 and C3 (end semester examination) together; the university shall conduct a make-up C3 examination of both odd semester and even semester together, after the end of even semester and before the commencement of next odd semester.

b) A student who is absent to End Semester Examination (C3) due to medical emergencies or such other exigencies and fulfills the minimum attendance is also eligible to appear for make-up examination.

9.3 **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 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.

9.4 **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 (C3) and he / she shall have to seek re-admission to that semester during subsequent semester / year within a stipulated period.

b) In such 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 (C3) 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 C3, and subsequently a notification pertaining to the above will be brought out by the Director of the School before the commencement of C3 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 C3 component.

   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.**

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12. **Grade Card and Grade Point:**

12.1. **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).**

12.2. **Final Grade Card:** Upon successful completion of BCA Degree a Final Grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Registrar (Evaluation).

12.3. **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=[(C1+C2)+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.

12.3.1. **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 (Si) = ∑(Ci x Gi) / ∑Ci

where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith 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 ÷ 24 = 7.13**

Illustration No. 2

Course	Grade Point	Grade letter	Credit	Credit Point (Credit x Grade)
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 ÷ 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 ÷ 24 = 8.99**

12.3.2. **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 BCA degree is calculated taking into account all the courses undergone by a student over all the semesters of a program i. e

CGPA = $\sum$(Ci x Si) / $\sum$Ci

Where Si is the SGPA of the ith semester and Ci 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 (ith)	No. of Credits (Ci)	SGPA (Si)	Credits x SGPA (Ci X Si)
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** = $\dfrac{24\text{x}6.83+24\text{x}7.13+24\text{x}7.83+24\text{x}8.99+24\text{x}8.68+24\text{x}9.20}{144}$ = 8.11

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

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

Overall percentage=10*CGPA

13. 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.

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

Course Numbering Scheme

Code for the Program	Discipline Code	Year of Introduction of Curriculum

| B | T | M | E | 1 | 4 | F | 1 | 1 | 0 | 0 |

Full time (P for part time)	Semester	Course	Elective
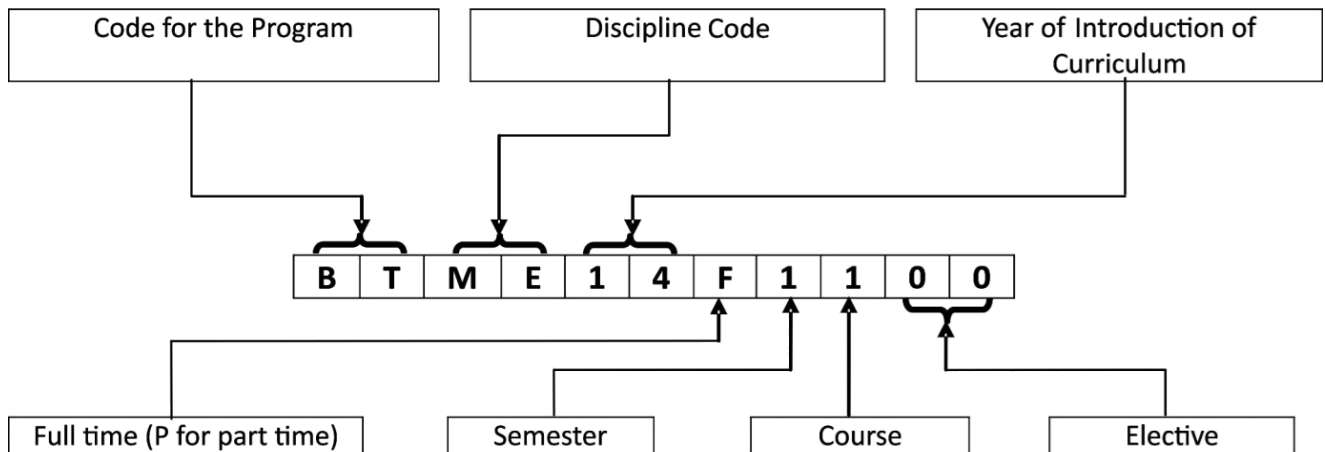
List of Codes for Programs and Disciplines / Branch of Study

Program Code	Title of the Program	Discipline Code	Name of the Discipline / Branch of Study
BA	Bachelor of Arts	AE	Advanced Embedded Systems
BB	BBM (Bachelor of Business	AI	Advanced Information Technology
BC	B.Com (Bachelor of Commerce)	AP	Advanced Power Electronics
BR	B. Arch (Bachelor of Architecture)	CA	Computer Aided Structural Engineering
BS	B Sc, BS (Bachelor of Science)	CE	Civil Engineering
BT	B.Tech (Bachelor of Technology)	CH	Chemistry
BP	Bachelor of Computer Applications	CO	Commerce
BL	LLB (Bachelor of Law)	CS	Computer Science and Engineering /
MA	Master of Arts	DE	Data Engineering and Cloud Computing
MB	MBA (Master of Business Administration)	EC	Electronics and Communication Engineering
MC	M.Com (Master of Commerce)	EN	English
MS	M.Sc / MS (Master of Science)	MD	Machine Design and Dynamics
MT	M Tech (Master of Technology)	ME	Mechanical Engineering
MC	Master of Computer Applications	EE	Electrical & Electronics Engineering

LIST OF FACULTY MEMBERS

	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)
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