REVA UNIVERSITY
Bengaluru, India

SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS

HANDBOOK

for

Bachelor of Computer Applications (BCA)

2021-24

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Rukmini Educational
Charitable Trust

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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".

Welcome to the portals of REVA University!

Dr. M. Dhanamjaya

Vice Chancellor, REVA University

Director –Message
Welcome note to students

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

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.

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, Bachelor of Science in Computer Science with Specialization in Cyber Security, Bachelor of Science in Computer Science with Specialization in Multimedia and Animation, MCA and MSc (Data 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 responsible citizens with high morale, leadership qualities and competent professionals of global standards emphasizing on Research and Innovation in the domain of Computer Science and 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. B.S.Anami Principal, KLE Institute of Technology, Hubli.
2	Dr.M N Birje Professor &Head, Department of Computer Applications, VTU, Belagvi.
3	Dr.Sathish Babu Professor & Head, Department of Computer Science, SIT,Tumkur.
4	Dr.P Nagabhusan Director, IIIT Allahabad.
5	Dr.Pethuru Raj Chief Architect & Vice President, Site Reliability Engineering (SRE), Division,Reliance Jio Infocomm Limited.
6	Mr.Raja Krishnamoorthy Director, SAP, Cognizant Technology Pvt.Ltd, Bengaluru.
7	Dr.Madan Kumar Srinivasan Associate Vice President, AI Innovation Centre, Accenture, Bengaluru.

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:

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 of 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 of 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 in 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 a 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.

Mapping of COs with POs

Course Code	POS/ COs	PO1	P2	PO3	PO4	PO5	PO6	P7	PO8	PO9	PSO1	PSO2	PSO3
B21AHK102	**CO1**	L	L	L	L	M	M	H	H	H	L	L	L
	CO2	L	L	L	L	L	M	H	M	H	L	L	L
	CO3	L	L	L	L	M	H	H	H	M	L	L	L
	CO4	L	L	L	L	L	H	H	H	H	L	L	L
B21AHH102	**CO1**	L	L	L	L	M	H	M	M	H	L	L	L
	CO2	L	L	L	L	M	M	H	M	H	L	L	L
	CO3	L	L	L	L	H	H	H	H	M	L	L	L
	CO4	L	L	L	L	H	M	H	H	M	L	L	L
B21AHA101	**CO1**	L	L	L	L	L	L	L	L	M	L	L	L
	CO2	L	L	L	L	L	L	L	H	M	L	L	L
	CO3	L	L	L	L	L	L	L	M	H	L	L	L
	CO4	L	L	L	L	L	L	L	H	H	L	L	L
B21AHE101	**CO1**	L	L	L	H	L	L	M	H	L	L	L	L
	CO2	L	L	L	L	L	L	M	H	L	L	L	L
	CO3	L	L	L	L	L	L	M	H	L	L	L	L
	CO4	L	L	L	L	L	L	M	H	L	L	L	L
B21DA0101	**CO1**	H	H	H	L	H	L	H	H	H	M	L	M
	CO2	H	H	H	L	H	L	H	H	H	H	M	H
	CO3	H	H	H	L	H	L	H	H	H	M	M	M
	CO4	H	L	L	L	H	L	H	H	H	H	H	H
B21DA0102	**CO1**	H	H	H	H	M	L	M	H	M	M	M	M
	CO2	H	M	H	H	M	L	M	L	L	M	M	M
	CO3	H	H	H	M	M	M	H	M	H	M	M	M
	CO4	M	M	H	H	H	L	M	H	H	M	M	M
B21DA0103	**CO1**	H	H	H	H	M	H	M	H	M	H	H	H
	CO2	M	M	M	M	M	M	M	H	M	M	M	M
	CO3	M	H	H	H	H	M	M	H	M	M	M	M
	CO4	H	H	H	M	M	M	M	H	M	M	M	M
	CO5	M	H	M	M	M	M	M	H	M	M	M	M
	CO6	M	H	H	M	M	M	M	H	M	M	M	M
	CO1	L	L	L	L	M	M	H	H	H	H	M	M

B21DA0104	**CO2**	L	L	L	L	L	M	H	M	H	H	L	L
	CO3	L	L	L	L	M	H	H	H	M	H	M	L
	CO4	L	L	L	L	L	H	H	H	H	M	M	L
B21DA0105	**CO1**	L	L	L	L	M	H	M	M	H	H	L	H
	CO2	L	L	L	L	M	M	H	M	H	H	L	H
	CO3	L	L	L	L	H	H	H	H	M	H	L	H
	CO4	L	L	L	L	H	M	H	H	M	H	L	H
B21AHK202	**CO1**	L	L	L	H	L	L	L	L	L	H	L	L
	CO2	L	L	L	L	L	L	L	L	H	M	M	M
	CO3	L	L	L	L	L	L	L	L	H	H	M	M
	CO4	L	L	L	L	L	L	L	L	H	H	L	L
B21AHH202	**CO1**	L	L	L	L	L	L	M	H	M	H	M	L
	CO2	L	L	L	L	L	L	M	H	M	H	L	H
	CO3	L	L	L	L	L	L	M	H	M	H	L	H
	CO4	L	L	L	L	L	L	M	H	M	H	L	H
B21AHA201	**CO1**	H	H	H	M	H	M	M	L	M	L	L	L
	CO2	M	H	H	M	H	L	L	L	M	L	L	L
	CO3	M	H	H	M	H	M	L	L	M	L	L	L
	CO4	M	H	H	M	M	M	L	L	M	L	L	L
B21AHE201	**CO1**	H	H	M	L	H	L	H	H	H	H	M	M
	CO2	H	M	M	L	H	L	H	H	H	L	M	M
	CO3	H	M	M	L	H	L	H	H	H	H	H	M
	CO4	H	L	L	L	H	L	H	H	H	H	M	H
B21DA0201	**CO1**	H	H	L	M	H	L	L	M	H	H	L	L
	CO2	H	L	H	M	L	H	M	L	H	M	M	M
	CO3	M	H	H	L	M	L	H	M	H	H	M	M
	CO4	H	H	H	L	M	L	M	M	H	H	M	M
B21DA0202	**CO1**	L	L	L	L	L	M	H	H	H	L	L	L
	CO2	L	L	L	L	L	M	H	M	H	L	L	L
	CO3	L	L	L	L	M	H	H	H	M	H	M	M
	CO4	L	L	L	L	L	H	H	H	H	L	M	M
B21DA0203	**CO1**	L	L	L	L	M	H	M	M	H	H	H	M
	CO2	L	L	L	L	M	M	H	M	H	H	M	H
	CO3	L	L	L	L	H	H	H	H	M	H	L	L
	CO4	L	L	L	L	H	M	H	H	M	M	M	M
B21DA0204	**CO1**	H	L	H	H	L	L	M	L	H	H	M	M
	CO2	H	L	H	H	L	M	H	L	H	H	M	M
	CO3	H	L	H	H	L	L	H	L	H	M	H	M
	CO4	H	L	H	H	L	M	H	L	H	L	L	H
B21DA0205	**CO1**	H	L	L	H	L	M	M	L	H	M	M	M
	CO2	H	H	L	H	M	l	L	L	H	H	H	H
	CO3	H	M	H	H	M	L	L	L	H	H	H	H
	CO4	H	H	H	M	M	M	L	L	H	H	H	H
B21AHK302	**CO1**	H	H	H	H	H	L	H	H	M	H	M	H
	CO2	H	H	H	H	M	M	M	M	M	H	M	H
	CO3	H	H	H	M	M	M	H	M	H	H	H	H
	CO4	H	H	H	H	H	L	H	H	H	L	H	M
	CO5	H	H	H	M	H	L	H	H	H	M	M	M
	CO1	M	H	H	L	L	L	H	H	L	H	L	L

B21AHH302	**CO2**	L	M	M	L	L	L	H	H	L	M	H	H
	CO3	L	M	M	L	L	L	H	L	L	M	H	H
	CO4	L	M	M	L	L	L	H	L	L	M	H	H
B21AHA301	**CO1**	H	H	H	M	L	L	H	H	L	H	H	H
	CO2	H	H	H	H	L	L	H	H	L	M	M	H
	CO3	H	M	L	L	L	L	H	H	L	L	M	H
	CO4	L	M	L	L	L	L	H	H	L	M	H	H
B21DA0301	**CO1**	H	M	H	L	L	L	L	L	L	M	M	L
	CO2	M	H	H	L	M	L	H	L	L	M	M	M
	CO3	H	H	H	L	M	L	H	L	L	M	H	L
	CO4	H	H	H	L	M	L	M	L	L	M	L	L
B21DA0302	**CO1**	M	H	H	L	H	L	L	L	L	L	L	H
	CO2	L	M	H	L	L	L	L	L	L	L	L	H
	CO3	L	M	L	L	L	L	L	L	L	M	M	H
	CO4	L	L	L	L	L	L	L	L	L	M	M	H
B21DA0303	**CO1**	L	L	L	L	M	M	H	H	H	H	L	M
	CO2	L	L	L	L	L	M	H	M	H	M	H	L
	CO3	L	L	L	L	M	H	H	H	M	M	H	L
	CO4	L	L	L	L	L	H	H	H	H	M	H	L
B21DAS311	**CO1**	L	L	L	L	M	H	M	M	H	H	H	L
	CO2	L	L	L	L	M	M	H	M	H	M	M	M
	CO3	L	L	L	L	H	H	H	H	M	L	M	H
	CO4	L	L	L	L	H	M	H	H	M	L	M	M
B21DAS312	**CO1**	L	L	L	L	L	L	L	L	H	H	H	L
	CO2	L	L	L	L	L	L	L	L	H	H	L	L
	CO3	L	L	L	L	L	L	L	L	H	M	L	H
	CO4	L	L	L	L	L	L	L	L	H	L	L	H
B21DAS313	**CO1**	H	H	M	L	L	L	M	M	L	L	M	H
	CO2	L	M	M	L	L	L	M	M	L	M	M	M
	CO3	L	L	M	L	H	L	M	M	L	M	M	L
	CO4	L	M	H	L	M	L	M	M	L	L	M	M
B21DA0304	**CO1**	M	M	H	L	M	L	L	L	L	L	L	H
	CO2	H	H	H	L	M	L	L	L	L	L	M	H
	CO3	M	H	L	L	L	L	L	L	L	L	M	H
	CO4	M	L	L	L	L	L	L	L	L	L	M	H
B21DA0305	**CO1**	H	H	H	M	M	L	M	L	L	L	M	L
	CO2	H	H	H	M	H	L	M	L	M	M	M	M
	CO3	M	H	H	M	M	L	L	L	M	M	M	M
	CO4	M	H	H	M	H	L	L	L	L	L	H	M
B21AHK402	**CO1**	H	H	M	M	L	L	M	H	M	L	L	M
	CO2	H	H	M	M	L	L	M	H	M	L	M	M
	CO3	H	L	M	M	L	M	M	H	L	L	M	M
	CO4	H	H	H	H	L	H	L	L	L	M	M	H
	CO5	H	H	H	H	M	H	L	L	L	M	M	H
B21AHH402	**CO1**	H	M	L	M	M	L	L	M	H	M	L	L
	CO2	H	M	H	L	M	M	M	M	H	H	H	H
	CO3	H	M	H	L	M	M	H	M	H	H	H	H
	CO4	H	M	M	M	M	M	M	M	H	H	M	M
B21AHA401	**CO1**	H	M	M	L	M	L	L	L	L	M	L	L

	CO2	M	H	H	M	H	L	L	L	L	L	L	L
	CO3	M	H	H	L	M	L	L	L	L	L	L	L
	CO4	H	H	H	M	H	L	L	L	L	L	L	L
B21DA0401	**CO1**	H	H	L	L	L	L	L	L	H	L	L	L
	CO2	L	H	H	L	L	L	L	L	H	L	L	L
	CO3	L	H	H	H	H	L	L	L	H	H	H	H
	CO4	H	H	H	L	H	L	L	L	H	L	L	H
B21DA0402	**CO1**	M	M	H	L	M	L	L	L	H	H	H	M
	CO2	H	H	L	H	M	l	L	L	H	H	H	H
	CO3	H	M	H	H	M	L	L	L	H	H	H	M
	CO4	H	H	H	M	M	M	L	L	H	M	H	H
B21DA0403	**CO1**	H	H	H	H	M	L	H	H	M	H	M	M
	CO2	H	H	H	H	H	M	H	L	L	H	H	L
	CO3	H	H	H	M	M	M	H	M	H	M	H	M
	CO4	M	M	H	H	H	L	M	H	H	L	H	M
B21DAS411	**CO1**	H	H	H	H	H	L	H	H	H	M	L	M
	CO2	L	H	H	L	M	L	H	H	H	L	M	H
	CO3	M	H	H	H	L	M	M	H	L	H	L	H
	CO4	M	H	L	H	M	L	H	M	M	M	L	L
B21DAS412	**CO1**	M	H	H	M	M	M	M	L	H	M	L	M
	CO2	M	M	H	M	H	M	H	H	M	H	H	L
	CO3	M	H	M	M	H	L	M	H	H	H	H	L
	CO4	M	H	H	L	H	H	M	M	M	M	M	M
B21DAS413	**CO1**	M	M	H	L	M	L	L	L	H	H	M	M
	CO2	H	H	L	H	M	l	L	L	H	H	H	H
	CO3	H	M	H	H	M	L	L	L	H	H	H	H
	CO4	H	H	H	M	M	M	L	L	H	H	H	H
B21DAS421	**CO1**	M	M	H	L	M	L	L	L	H	H	M	M
	CO2	M	H	H	M	H	M	H	H	H	H	H	H
	CO3	H	H	H	M	M	M	L	L	H	H	H	H
	CO4	M	M	H	H	M	L	L	L	H	H	H	H
B21DAS422	**CO1**	M	M	H	M	M	L	M	L	L	M	M	M
	CO2	M	H	H	H	H	L	M	L	M	H	M	M
	CO3	L	H	H	L	M	L	M	L	H	H	M	M
	CO4	L	M	H	L	M	L	M	L	H	H	M	M
B21DAS423	**CO1**	M	M	M	L	M	L	M	M	M	L	L	L
	CO2	H	H	H	L	H	L	L	L	H	M	M	M
	CO3	M	H	H	L	H	L	L	L	H	M	M	M
	CO4	H	H	H	L	H	L	L	L	H	M	M	M
B21DA0404	**CO1**	M	H	H	L	H	L	L	L	M	M	H	L
	CO2	M	H	H	L	M	L	L	L	H	L	M	L
	CO3	M	H	M	L	H	L	L	L	M	L	H	H
	CO4	M	M	H	L	M	L	L	L	M	L	L	M
B21DA0405	**CO1**	M	M	H	L	M	L	H	L	M	L	M	L
	CO2	M	M	L	L	L	L	H	H	M	L	M	L
	CO3	M	M	H	H	M	L	H	H	M	L	M	H
	CO4	L	L	H	H	L	L	H	L	L	L	M	H
B21DA0501	**CO1**	M	M	H	L	M	L	L	L	L	M	L	H
	CO2	H	H	H	L	M	L	L	L	L	M	L	H

	CO3	M	H	L	L	L	L	L	L	L	M	L	H
	CO4	M	L	L	L	L	L	L	L	L	M	L	H
B21DA0502	**CO1**	M	H	M	L	L	L	H	L	H	H	L	L
	CO2	L	M	H	L	L	L	H	L	H	H	L	L
	CO3	L	L	L	L	H	L	H	L	H	M	M	H
	CO4	L	L	M	L	M	L	H	L	H	H	M	H
B21DA0503	**CO1**	L	M	H	L	L	L	L	M	M	H	M	H
	CO2	H	H	H	M	L	L	L	L	L	L	M	H
	CO3	L	M	M	M	M	L	L	M	L	L	H	H
	CO4	M	H	H	L	M	L	M	M	H	L	H	H
B21DAS511	**CO1**	M	H	H	M	M	M	M	L	H	M	L	M
	CO2	M	M	H	M	H	M	H	H	M	H	H	L
	CO3	M	H	M	M	H	L	M	H	H	H	H	L
	CO4	M	H	H	L	H	H	M	M	M	M	M	M
B21DAS512	**CO1**	M	M	H	L	L	L	L	L	L	H	M	H
	CO2	H	L	L	M	H	L	M	M	M	L	L	M
	CO3	L	M	H	H	H	H	L	M	M	L	L	L
	CO4	M	H	H	L	H	M	M	M	M	L	H	M
B21DAS513	**CO1**	M	M	M	M	M	L	M	M	L	M	H	M
	CO2	M	H	H	M	M	M	H	M	M	M	H	H
	CO3	H	H	H	M	M	M	M	M	H	M	H	M
	CO4	M	M	H	M	M	L	H	M	M	H	M	M
B21DAS521	**CO1**	H	H	H	M	M	M	L	L	H	M	M	M
	CO2	M	H	H	M	M	M	M	L	H	M	L	L
	CO3	H	H	H	M	H	M	L	M	L	H	M	H
	CO4	H	H	H	M	M	M	L	L	H	M	M	M
B21DAS522	**CO1**	M	H	L	M	L	L	L	L	H	L	L	L
	CO2	H	H	H	L	L	L	L	M	H	L	L	L
	CO3	L	H	H	H	H	L	L	L	H	H	M	H
	CO4	M	H	H	L	H	L	M	L	H	L	L	M
B21DAS523	**CO1**	M	M	H	L	M	L	L	L	H	H	H	M
	CO2	H	H	L	H	M	l	L	L	H	H	H	H
	CO3	M	M	H	H	M	L	L	L	H	H	H	M
	CO4	M	H	H	M	M	M	L	L	H	M	H	H
B21DA0504	**CO1**	L	H	H	H	M	L	H	H	M	H	M	M
	CO2	H	M	H	M	H	M	H	L	L	H	H	L
	CO3	H	H	H	M	M	L	H	M	H	M	H	M
	CO4	M	M	H	H	H	L	M	H	H	L	H	M
B21DA0505	**CO1**	H	H	H	H	H	L	H	H	H	M	L	M
	CO2	L	H	H	L	M	L	H	H	H	L	M	H
	CO3	H	H	H	H	L	M	M	H	L	H	L	H
	CO4	M	H	L	H	M	L	H	M	M	M	L	L
B21DA0601	**CO1**	H	H	H	M	M	M	M	L	H	M	L	M
	CO2	M	M	H	M	H	M	H	H	M	H	H	L
	CO3	H	H	M	M	H	L	M	H	H	H	H	L
	CO4	M	H	H	L	H	H	M	M	M	M	M	M
B21DAS611	**CO1**	M	M	H	L	M	L	L	L	H	H	M	M
	CO2	H	H	L	H	M	L	L	L	H	H	H	H
	CO3	H	M	H	H	M	L	L	L	H	H	H	H

	CO4	H	H	H	M	M	M	L	L	H	H	H	H
B21DAS612	**CO1**	M	M	H	L	M	L	L	L	L	M	L	H
	CO2	H	H	H	L	M	L	L	L	L	M	L	H
	CO3	M	H	L	L	L	L	L	L	L	M	L	H
	CO4	M	L	L	L	L	L	L	L	L	M	L	H
B21DAS621	**CO1**	M	H	M	L	L	L	H	L	H	H	L	L
	CO2	L	M	H	L	L	L	H	L	H	H	L	L
	CO3	L	L	L	L	H	L	H	L	H	M	M	H
	CO4	L	L	M	L	M	L	H	L	H	H	M	H
B21DAS622	**CO1**	L	M	H	L	L	L	L	M	M	H	M	M
	CO2	H	H	H	M	L	L	L	L	L	L	M	M
	CO3	L	M	M	M	M	L	L	M	L	L	H	H
	CO4	M	H	H	L	M	L	M	M	H	L	H	H

Mapping of PEOS with Respect POs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
PEO1	M	M	M	M	M	L	M	M	L	M	H	M	L	H	M
PEO2	M	H	H	M	M	M	H	M	M	M	H	H	M	M	L
PEO3	H	H	H	M	M	M	M	M	H	M	H	M	H	H	M
PEO4	M	M	H	M	M	L	H	M	M	H	M	M	M	M	H

REVA UNIVERSITY
Bengaluru, India

SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS

Bachelor of Computer Applications (BCA) Program
Scheme of Instruction - 2021

FIRST SEMESTER

Sl. No	Code	Title	HC/SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1.	B21AHK102	Language –I: Kannada	FC	1	1	0	2	3
	B21AHH102	Language –I: Hindi						
	B21AHA101	Language –I: Additional English						
2.	B21AHE101	Communicative English_I	FC	1	1	0	2	3
3.	B21DA0101	Basic Mathematics	HC	4	0	0	4	4
4.	B21DA0102	Digital Logic and Computer Architecture	HC	2	1	0	3	4
5.	B21DA0103	Problem solving using C	HC	2	1	0	3	4
Practical Courses								
6.	B21DA0104	C Programming Lab	HC	0	0	2	2	4
7.	B21DA0105	Digital Logic Lab	HC	0	0	2	2	4
***Mandatory - (Non Creditable Courses)**								
8.	B21ASM101	Environmental Studies						
9.	B21DAM102	Skill Development Program						
Total				**10**	**4**	**4**	**18**	**26**

SECOND SEMESTER

Sl. No	Code	Title	HC/SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1.	B21AHK202	Language –II: Kannada	FC	1	1	0	2	3
	B21AHH202	Language –II: Hindi						
	B21AHA201	Language –II: Additional English						
2.	B21AHE201	Communicative English – II	FC	1	1	0	2	3
3.	B21DA0201	Computer Networks	HC	4	0	0	4	4
4.	B21DA0202	Data Structures using C	HC	2	1	0	3	4
5.	B21DA0203	Object Oriented Programming using C++	HC	2	1	0	3	4
Practical Courses								
6.	B21DA0204	Data Structures Lab	HC	0	0	2	2	4
7.	B21DA0205	C++ Programming Lab	HC	0	0	2	2	4
***Mandatory - (Non Creditable Courses)**								
8.	B21LSM201	Indian Constitution & Professional Ethics						
9.	B21DAM202	Skill Development Program						
Total				**10**	**4**	**4**	**18**	**26**

THIRD SEMESTER

Sl. No	Code	Title	HC /SC /FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1.	B21AHK302	Language –III : Kannada	FC	1	1	0	2	3
	B21AHH302	Language – III: Hindi						
	B21AHA301	Language –III: Additional English						
2.	B21DA0301	Software Engineering	HC	4	0	0	4	4
3.	B21DA0302	Java Programming	HC	2	1	0	3	4
4.	B21DA0303	Relational DBMS	HC	2	1	0	3	4
5.	B21DAS311	E-Commerce	SC	2	0	1	3	4
	B21DAS312	Design & Analysis of Algorithms						
	B21DAS313	Enterprise Resource Planning						
Practical Courses								
6.	B21DA0304	Java programming Lab	HC	0	0	2	2	4
7.	B21DA0305	RDBMS Lab	HC	0	0	2	2	4
***Mandatory - (Non Creditable Courses)**								
8.	B21PTM301/ B21DAM301	Soft Skills		0	0	0	0	2
9.	B21DAM302	Skill Development Program						
Total				11	3	5	19	29

FOURTH SEMESTER

Sl. No	Code	Title	HC/ SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1.	B21AHK402	Language –IV : Kannada	FC	1	1	0	2	3
	B21AHH402	Language – IV: Hindi						
	B21AHA401	Language –IV: Additional English						
2	B21DA0401	Data Mining & Data Warehousing	HC	4	0	0	4	4
3	B21DA0402	Operating Systems with Linux	HC	2	1	0	3	4
4	B21DA0403	Python Programming	HC	4	0	0	4	4
5	B21DAS411	Mobile Computing	SC	2	1	0	3	4
	B21DAS412	Computer Graphics						
	B21DAS413	Artificial Intelligence						
6	B21DAS421	Cyber Security	SC	2	1	0	3	4
	B21DAS422	Advanced Computer Networks						
	B21DAS423	Advanced Java Programming						
Practical Courses								
7	B21DA0404	Linux Lab	HC	0	0	2	2	4
8	B21DA0405	Python Programming Lab	HC	0	0	2	2	4
***Mandatory - (Non Creditable Courses)**								
9	B21PTM401/ B21DAM401	Soft Skills		0	0	0	0	2
10	B21DAM402	Skill Development Program						
Total				**15**	**4**	**4**	**23**	**33**

FIFTH SEMESTER

Sl. No	Code	Title	HC/SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1.	B21DA0501	.NET Programming using C#	HC	2	1	0	3	4
2.	B21DA0502	Web Technology	HC	2	1	0	3	4
3	B21DA0503	Cloud Computing	HC	2	1	0	3	4
4.	B21DAS511	Mobile App Development	SC	2	0	1	3	4
	B21DAS512	Computer Animation						
	B21DAS513	Machine Learning						
5.	B21DAS521	Software Testing & Quality Assurance	SC	2	1	0	3	4
	B21DAS522	Network Administration						
	B21DAS523	Ethical Hacking						
6.	***	**Open Elective**	**OE**	**3**	**0**	**0**	**3**	**4**
Practical Courses								
7.	B21DA0504	.NET Programming Lab	HC	0	0	2	2	4
8.	B21DA0505	Web Technology Lab	HC	0	0	2	2	4
***Mandatory - (Non Creditable Courses)**								
9.	B21PTM501/ B21DAM501	Soft Skills		0	0	0	0	2
10	B21DAM502	Skill Development Program						
Total				**12**	**4**	**6**	**22**	**34**

***** Open Elective offered to other Schools**

B21DAO501	**Open Elective - Fundamentals of Computer Programming & Office Automation**	**OE**	**3**	**0**	**0**	**3**	**3**

SIXTH SEMESTER

Sl. No	Code	Title	HC/SC/FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	B21DA0601	Data Analytics using R	HC	3	0	1	4	4
2	B21DAS611	OOAD Using UML	SC	2	0	1	3	4
	B21DAS612	Advanced Web Technologies						
3	B21DAS621	Internet Of Things	SC	2	1	0	3	4
	B21DAS622	Digital Marketing						
4	B21DA0602	Project Work	HC	0	0	10	10	20
***Mandatory - (Non Creditable Courses)**								
5	B21PTM601/ B21DAM601	Soft Skills		0	0	0	0	2
6	B21DAM602	Skill Development Program						
Total				**7**	**1**	**12**	**20**	**32**

CREDIT SUMMARY

Semester	Credits
First	**18**
Second	**18**
Third	**19**
Fourth	**23**
Fifth	**22**
Sixth	**20**
Total	**120**

CREDIT DISTRIBUTION

Sem	Hard Core (HC)	Softcore Course (SC)	FC	Open Elective(OE)	Project	Total Credits
I	14	-	4	-	-	**18**
II	14	-	4	-	-	**18**
III	14	3	2	-	-	**19**
IV	15	6	2	-	-	**23**
V	13	6	-	03	-	**22**
VI	4	6	-	-	10	**20**
	74	**21**	**12**	**3**	**10**	**120**

Detailed Syllabus

FIRST SEMESTER

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B21AHK102	**Language – I: Kannada**	**FC**	**1**	**1**	**0**	**2**	**3**

Course Description:

¨sÁµÉAiÀÄ£ÀÄß ªÀiÁvÀ£ÁqÀÄªÀ §gÉAiÀÄÄªÀ PË±À®å, ¸Á»vÀåzÀ §UÉÎ ¸ÀÆÜ®ªÁV ¥ÀjZÀ¬Ä¸ÀÄªÀ ªÀÄÆ®PÀ «zÁåyðUÀ¼À ªÀåQÛvÀé «PÁ¸À ºÁUÀÄ ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ¼À£ÀÄß UÀªÀÄ£ÀzÀ°èlÄÖPÉÆAqÀÄ, ¥Àæ¸ÀÄÛvÀ ¸ÀAzÀ¨sÀðPÉÌ «zÁåyðUÀ¼À£ÀÄß ¸ÀdÄÓUÉÆ½¸À®Ä ¥ÀoÀåªÀ£ÀÄß gÀÆ¦¸À¯ÁVzÉ. ¸Á»vÀå, PÀ¯É, ªÁtÂdå, DqÀ½vÁvÀäPÀ ªÀÄvÀÄÛ «eÁÕ£ÀzÀ «ZÁgÀUÀ½UÉ MvÀÛ£ÀÄß ¤ÃqÀ¯ÁVzÉ. EzÀÄ ªÉÆzÀ® JgÀqÀÄ ¸É«Ä¸ÀÖgï ªÀÄÆgÀÄ PÉærmïUÀ¼À£ÀÄß; ªÀÄÆgÀÄ ªÀÄvÀÄÛ £Á®Ì£ÉÃ ¸É«Ä¸ÀÖgï JgÀqÀÄ PÉærmïUÀ¼À£ÀÄß ºÉÆA¢zÉ.

Prerequisites:

- PÀ£ÀßqÀ ¨sÁµÉAiÀÄ §UÉUÉ ¥ÁæxÀ«ÄPÀ w¼ÀÄªÀ½PÉ CUÀvÀå..
- ¨sÁµÉAiÀÄ£ÀÄß NzÀ®Ä ªÀÄvÀÄÛ §gÉAiÀÄ®Ä w½¢gÀ¨ÉÃPÀÄ.
- ¥ÀzÀ« ¥ÀÆªÀð ²PÀëtzÀ°è PÀ£ÀßqÀ ¨sÁµÉAiÀÄ£ÀÄß N¢gÀ¨ÉÃPÀÄ.

Pedagogy:

- Direct method
- ICT and Digital support
- Collaborative and Cooperative learning
- Differentiated Instruction
- Flipped Classroom

Course Objectives:

£Á®ÄÌ ¸É«Ä¸ÀÖgïUÀ¼À°è ¸ÀªÀÄUÀæ PÀ£ÀßqÀ ¸Á»vÀåªÀ£ÀÄß ¥ÀjZÀ¬Ä¸ÀÄªÀ GzÉÝÃ±ÀªÀ£ÀÄß ºÉÆA¢zÉ. CzÀgÀAvÉ ªÉÆzÀ®£ÉAiÀÄ ¸É«Ä¸ÀÖgï£À°è d£À¥ÀzÀ, ¥ÁæaÃ£À, ªÀÄzsÀåPÁ°Ã£À PÁªÀåUÀ¼ÀÄ, ºÉÆ¸ÀUÀ£ÀßqÀzÀ ¸ÀtÚPÀxÉUÀ¼ÀÄ ºÁUÀÄ £ÁlPÀ ¸Á»vÀåªÀ£ÀÄß ¥ÀoÀåªÀ£ÁßV DAiÉÄÌ ªÀiÁrPÉÆAqÀÄ, «zÁåyðUÀ¼À°è ¸Á»vÀåzÀ §UÉÎ ¸ÀzÀ©ügÀÄaAiÀÄ£ÀÄß ªÀÄÆr¸À¯ÁUÀÄvÀÛzÉ. ¸ÁA¸ÀÌøwPÀ w¼ÀÄªÀ½PÉAiÀÄ eÉÆvÉUÉ ªÀåQÛvÀé «PÀ¸À£ÀzÀ PÀqÉUÉ UÀªÀÄ£À ¤ÃqÀ¯ÁUÀÄvÀÛzÉ.

- ¨sÁµÉ, ¸Á»vÀå, EwºÁ¸À ªÀÄvÀÄÛ ¸ÀA¸ÀÌøwUÀ¼À£ÀÄß PÀ£ÀßqÀ, PÀ£ÁðlPÀPÉÌ ¸ÀA§A¢ü¹zÀAvÉ ¥ÀjZÀ¬Ä¸À¯ÁUÀÄvÀÛzÉ.
- «zÁåyðUÀ¼À ¸ÀªÀðvÉÆÃªÀÄÄR ¨É¼ÀªÀtÂUÉUÉ C£ÀÄªÁUÀÄªÀAvÉ ºÁUÀÆ CªÀgÀ°è ªÀiÁ£ÀªÀ ¸ÀA§AzsÀUÀ¼À §UÉÎ UËgÀªÀ, ¸ÀªÀiÁ£ÀvÉ ªÀÄÆr¹, ¨É¼É¸ÀÄªÀ ¤nÖ£À°è ¥ÀoÀåUÀ¼À DAiÉÄÌAiÀiÁVzÉ.
- CªÀgÀ°è ¸ÀÈd£À²Ã®vÉ, ±ÀÄzÀÞ ¨sÁµÉ, GvÀÛªÀÄ «ªÀÄ±Áð UÀÄt, ¤gÀUÀð¼À ¸ÀA¨sÁµÀuÉ, ¨sÁµÀt PÀ¯É ºÁUÀÆ §gÀºÀ PË±À®åUÀ¼À£ÀÄß ¨É¼É¸ÀÄªÀÅzÀÄ UÀÄjAiÀiÁVzÉ
- ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ½UÉ C£ÀÄPÀÆ®ªÁUÀÄªÀAvÀºÀ «µÀAiÀÄUÀ¼À£ÀÄß UÀªÀÄ£ÀzÀ°èèlÄÖPÉÆAqÀÄ ¸ÀÆPÀÛ ¥ÀoÀåUÀ¼À£ÀÄß DAiÉÄÌ ªÀiÁrPÉÆ¼Àî¯ÁVzÉ.

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Course Outcomes:

d£À¥ÀzÀ, ¥ÁæaÃ£À, ªÀÄzsÀåPÁ°Ã£ÀzÀ ««zsÀ ¥ÀæPÁgÀzÀ PÁªÀåUÀ¼ÀÄ, ºÉÆ¸ÀUÀ£ÀßqÀzÀ ¸ÀtÚPÀxÉUÀ¼ÀÄ ºÁUÀÄ £ÁlPÀ ¸Á»vÀå PÀ°PÉAiÀÄ ªÀÄÆ®PÀ PÁ®zÀ ¹ÜvÀåAvÀgÀUÀ¼À£ÀÄß CzÀgÀ M¼À£ÉÆÃlUÀ¼À£ÀÄß ¨É¼É¸ÀÄvÀÛzÉ.

- ¸ÁªÀiÁfPÀ, gÁdQÃAiÀÄ, zsÁ«ÄðPÀ, ¸ÁA¸ÀÌøwPÀ, ¥Àj¸ÀgÀ ºÁUÀÆ °AUÀ¸ÀA§A¢ü «ZÁgÀUÀ¼ÉqÉ UÀªÀÄ£À ºÀj¸ÀÄªÀÅzÀgÉÆA¢UÉ «zÁåyðUÀ¼À°è ZÀZÁð ªÀÄ£ÉÆÃ¨sÁªÀªÀÅ ¨É¼ÉAiÀÄÄvÀÛzÉ.
- fÃªÀ£ÀzÀ°è §gÀÄªÀ C©ü¥ÁæAiÀÄ ¨ÉÃzsÀUÀ¼ÀÄ, ¸ÀªÀÄ¸ÉåUÀ¼À£ÀÄß DzsÀĤPÀ ¸ÀAzÀ¨sÀðzÀ°è ªÀiÁ£À«ÃAiÀÄvÉAiÉÆA¢UÉ ¤ªÀð»¸ÀÄªÀAvÉ ¥ÉæÃgÉÃ¦¸ÀÄvÀÛzÉ.
- GvÀÛªÀÄ ¸ÀAªÀºÀ£À PÀ¯ÉAiÀÄ£ÀÄß ¨É¼É¸ÀÄªÀ GzÉÝÃ±ÀªÀ£ÀÄß FqÉÃj¸ÀÄvÀÛzÉ.
- ¸ÀA±ÉÆÃzÀ£Á ªÀÄ£ÉÆÃ¨sÁªÀ ªÀÄvÀÄÛ ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ½UÉ «zÁåyðUÀ¼À£ÀÄß ¸ÀdÄÓUÉÆ½¸ÀÄvÀÛzÉ.

Course Contents:

Unit-I **7 Hours**

1. d£À¥ÀzÀ: PÉgÉUÉ ºÁgÀ
2. ¥ÀA¥À: ¸ÁªÀiÁ£ÀåªÉÄ §UÉAiÉÄ ¨sÀªÀvÉÌÃ±À¥Á±À ¥Àæ¥ÀAZÀA?
3. d£Àß: ¥ÉÆ®èªÉÄAiÉÄ ¯ÉÃ¸ÀÄ £À®ègÀ ªÉÄAiÉÆå¼ï

Unit-II **7 Hours**

1. £ÁUÀZÀAzÀæ: £À¼ÀPÀÆ§gÀ£À ¥Àæ¸ÀAUÀ
2. DAiÀÄÝ ªÀZÀ£ÀUÀ¼ÀÄ
3. ºÀjºÀgÀ: E¼ÉAiÀiÁAqÀ UÀÄrªÀiÁgÀ£À gÀUÀ¼É

Unit-III **6 Hours**

1. ¤gÀAd£À: PÉÆ£ÉAiÀÄ VgÁQ
2. ¨É¸ÀUÀgÀºÀ½î gÁªÀÄtÚ: ¥ÀæeÁ¥Àæ¨sÀÄvÀé ªÀÄvÀÄÛ ªÀÄÆgÀÄ ªÀÄAUÀUÀ¼ÀÄ
3. «dAiÀÄ ºÀÆUÁgÀ: ¨ÉAzÀPÁ¼ÀÆgÀÄ

Unit-IV **6 Hours**

1. d®UÁgÀ : PÀÄªÉA¥ÀÄ

¥ÀgÁªÀÄ±Àð£À UÀæAxÀUÀ¼ÀÄ :

1. ªÀÄÄUÀ½ gÀA.²æÃ., PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ, ¥ÀæPÁ±ÀPÀgÀÄ VÃvÁ §ÄPï ºË¸ï, ªÉÄÊ¸ÀÆgÀÄ. 2014
2. ¸ÀAUÀæºÀ. £ÁUÉÃUËqÀ JZï.J¯ï., ZÁjwæPÀ d£À¥ÀzÀ PÀxÀ£À PÁªÀåUÀ¼ÀÄ, ¥ÀæPÁ±ÀPÀgÀÄ PÀ£ÁðlPÀ eÁ£À¥ÀzÀ ¥ÀjµÀvÀÄÛ, ¨ÉAUÀ¼ÀÆgÀÄ. 2008
3. ¹ÃªÀiÁwÃvÀ PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ ¸ÀA¥ÀÄl 1,2,3,4,5 ªÀÄvÀÄÛ 6, PÀÄªÉA¥ÀÄ PÀ£ÀßqÀ CzsÀåAiÀÄ£À ¸ÀA¸ÉÜ, ªÉÄÊ¸ÀÆgÀÄ «±Àé«zÁå¤®AiÀÄ, ªÉÄÊ¸ÀÆgÀÄ. 2014
4. ¸ÀAUÀæºÀ. £ÁUÉÃUËqÀ JZï.J¯ï., PÀ£ÀßqÀ d£À¥ÀzÀ PÀxÀ£À PÁªÀåUÀ¼ÀÄ, ¥ÀæPÁ±ÀPÀgÀÄ PÀ£ÁðlPÀ eÁ£À¥ÀzÀ ¥ÀjµÀvÀÄÛ, ¨ÉAUÀ¼ÀÆgÀÄ. 2007
5. £ÁgÁAiÀÄt ¦.«, ZÀA¥ÀÆ PÀ«UÀ¼ÀÄ, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2010
6. PÁ¼ÉÃUËqÀ £ÁUÀªÁgÀ, wæ¥À¢, gÀUÀ¼É ªÀÄvÀÄÛ eÁ£À¥ÀzÀ ¸Á»vÀå, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2010
7. ¸ÀA. ¨É£ÀUÀ¯ï gÁªÀÄ gÁªï ªÀÄvÀÄÛ ¥Á£ÀåA ¸ÀÄAzÀgÀ ±Á¹ÛçÃ, ¥ÀÄgÁt £ÁªÀÄ ZÀÆqÁªÀÄtÂ, ¥ÀæPÁ±ÀPÀgÀÄ ¥Àæ¸ÁgÁAUÀ, ªÉÄÊ¸ÀÆgÀÄ «±Àé«zÁå¤®AiÀÄ. 2010
8. qÁ. azÁ£ÀAzÀ ªÀÄÆwð, ªÀZÀ£À ¸Á»vÀå, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2013
9. ¸ÀA ªÀÄgÀÄ¼À¹zÀÝ¥Àà PÉ, £ÁUÀgÁd Q.gÀA. ªÀZÀ£À PÀªÀÄäl, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2016
10. ªÀÄgÀÄ¼À¹zÀÝ¥Àà PÉ, µÀlà¢ ¸Á»vÀå, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2010
11. ¸ÀA. ¸ÉÃvÀÄgÁªÀÄ gÁªï C.gÁ., ²æÃ ®QëöäÃ±À£À eÉÊ«Ä¤ ¨sÁgÀvÀ(ªÀÄÆ®-vÁvÀàAiÀÄð-¸ÀavÀæ), ¥ÀæPÁ±ÀPÀgÀÄ PÁªÀÄzsÉÃ£ÀÄ ¥ÀÄ¸ÀÛPÀ ¨sÀªÀ£À, ¨ÉAUÀ¼ÀÆgÀÄ. 2010
12. ¸ÀA. ¸ÉÃvÀÄgÁªÀÄ gÁªï C.gÁ., ²±ÀÄ£Á¼À ±ÀjÃ¥sÀgÀ £ÀÆgÁgÀÄ vÀvÀé¥ÀzÀUÀ¼ÀÄ, ¥ÀæPÁ±ÀPÀgÀÄ PÁªÀÄzsÉÃ£ÀÄ ¥ÀÄ¸ÀÛPÀ ¨sÀªÀ£À, ¨ÉAUÀ¼ÀÆgÀÄ. 2007
13. ¸ÀA. f.J¸ï.¨sÀmï., PÀÄªÀiÁgÀªÁå¸À£À PÀuÁðl ¨sÁgÀvÀ PÀxÁªÀÄAdj ¥ÀæªÉÃ±À, ¥ÀæPÁ±ÀPÀgÀÄ CPÀëgÀ ¥ÀæPÁ±À£À, ºÉUÉÆÎÃqÀÄ, ¸ÁUÀgÀ. 2006
14. gÀAeÁ£ï zÀUÁð, ±ÀgÀtgÀ ¸ÀªÀÄUÀæ PÁæAw, ¥ÀæPÁ±ÀPÀgÀÄ. ¯ÉÆÃ»AiÀiÁ ¥ÀæPÁ±À£À, §¼Áîj. 2015

15. QÃvÀð£ÁxÀ PÀÄvÀðPÉÆÃn, PÀ£ÀßqÀ ¸Á»vÀå ¸ÀAUÁw, ¥ÀæPÁ±ÀPÀgÀÄ PÀÄvÀðPÉÆÃn ªÉÄªÉÆÃjAiÀÄ¯ï læ¸ïÖ, zsÁgÀªÁqÀ. 2009
16. ±ÁªÀÄgÁAiÀÄ vÀ.¸ÀÄ., PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ, ¥ÀæPÁ±ÀPÀgÀÄ vÀ¼ÀÄQ£À

Course code	Course Title	Course Type	L	T	P	C	Hrs./Wk.
B21AHH102	**Language I: Hindi**	**FC**	**1**	**1**	**0**	**2**	**3**

ªÉAPÀtÚAiÀÄå ¸ÁägÀPÀ UÀæAxÀªÀiÁ¯É, ªÉÄÊ¸ÀÆgÀÄ -2014
17. ²ªÀgÀÄzÀæ¥Àà f.J¸ï. PÀ£ÀßqÀ ¸Á»vÀå ¸À«ÄÃPÉë, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2013
18. ¸ÀA.f.J¸ï.CªÀÄÆgÀ, PÀ£ÀßqÀ ¸ÀtÚ PÀxÉUÀ¼ÀÄ, £ÁµÀ£À¯ï §ÄPï læ¸ïÖ, £ÀªÀzÉºÀ°, 2000
19. ¸ÀA. qÁ. ¨ÉÊgÀªÀÄAUÀ® gÁªÉÄÃUËqÀ, ªÀvÀðªÀiÁ£ÀzÀ PÀxÉUÀ¼ÀÄ, PÀ£ÀßqÀ ¸Á»vÀå ¥ÀjµÀvÀÄÛ, ¨ÉAUÀ¼ÀÆgÀÄ 2011
20. ¸ÀA. qÁ. gÁªÀÄ°AUÀ¥Àà n. ¨ÉÃUÀÆgÀÄ, ªÀvÀðªÀiÁ£ÀzÀ PÀxÉUÀ¼ÀÄ, PÀté ¥ÀæPÁ±À£À, ¨ÉAUÀ¼ÀÆgÀÄ, 2013

Course Description:

यह पाठ्यक्रम नासिखया अपनी भाषा ,का क्षमता का विकास करने हेतु तथा विभिन्न साहित्यक प्राक्रयाओ द्वारा समाज| संस्कृति एवं जीवन के मूल्यों को समझने हेतु अभिकल्पित है ,

Prerequisites:

- अध्येता, पी.यु.सी के स्तर पर द्वितीय भाषा के रूप में हिन्दी का अध्ययन करना चाहिए |
- हिन्दी साहित्य के इतिहास का संक्षिप्त ज्ञान की आवश्यकता है |
- हिन्दी व्याकरण का अवबोधन आवश्यक है |
- अंग्रेज़ी – हिन्दी अनुवाद से संबंधित जानकारी जरुरी है |

Course Objectives:

1. संदर्भानुसार उचित भाषा का प्रयोग करने की दक्षता को छात्रों में उत्पन्न करना |
2. साहित्य के माध्यम से समाज एवं मानवीय मूल्यों को समझाकर, उन मूल्यों की रक्षा हेतु प्रेरित करना |
3. छात्रों में पुस्तक पठन एवं लेखन की अकृतिम प्रवृत्ति स्थापित करना |
4. अध्येताओं में साहित्य के माध्यम से प्रभावी एवं कुशल संचार का विकास करना |

Course Outcomes:

अध्ययन की समाप्ति पर अध्येता –

1. सामाजिक मूल्य एवं नैतिक जवाबदेही को स्वीकार कर सकता है |
2. साहित्य की प्रासंगिकता को जीवन में समझने की दक्षता रखता है |
3. समाज में अंतर्निहित पद्दतियाँ एवं विचारधाराओं का व्याख्यान करने में सक्षम बन सकता है |
4. साहित्य के माध्यम से प्रभावी एवं कुशल संचार का विकास करसकता है |

Course Contents:

Unit – 1: **[7 Hours]**

1 कहानी – तावान – प्रेमचंद

2 कहानी – उसकी रोटी – मोहन राकेश

3 व्यंग्य रचना – वैष्णव की फिसलन – हरीशंकर परसाई

Unit – 2: **[7 Hours]**

4 कहानी – वापसी - उषा प्रियंवदा

5. कहानी – तीसरी बेटी के नाम - सुधा अरोड़ा

6. निबंध – अच्छी हिन्दी – रवीन्द्रनाथ त्यागी

Unit –3: **[6 Hours]**

7 कहानी – जल्लाद – पांडेय बेचन शर्मा 'उग्र'

8 रेखाचित्र – बुधिया कब आएगा – ज्ञानचंद मर्मज्ञ

9 एकांकी – अंधेर नगरी – भारतेन्दु हरिश्चंद्र

Unit -4: **[6 Hours]**

अनुवाद अनुच्छेद (अंग्रेजी से हिन्दी में)

संक्षेपण

सूचना : प्रत्येक इकाई 25 अंक के लिए निर्धारित है |

Text Books:

- हिन्दी पाठ्य पुस्तक – रेवा विश्वविद्यालय |

Reference Book:

1. सुबोध व्यवहारिक हिन्दी – डॉ. कुलदीप गुप्त
2. अभिनव व्यवहारिक हिन्दी – डॉ.परमानन्द गुप्त
3. हिन्दी साहित्य का इतिहास - डॉ. नागेन्द्र
4. आधुनिक हिन्दी साहित्य का इतिहास - डॉ. बच्चन सिंह
5. हिन्दी साहित्य का नवीन इतिहास - डॉ. लाल साहब सिंह
6. शुद्ध हिन्दी कैसे बोले कैसे लिखे- पृथ्वीनाथ पाण्डे
7. कार्यालय अनुवाद निदेशिका
8. संक्षेपण और पल्लवन - के.सी.भाटिया&तुमन सिंग
9. हिन्दी निबंध लेखन – प्रो. विराज
10. निबंध माला – योगेशचंद जैन

Course code	Course Tittle	Course Type	L	T	P	C	Hrs./Wk.
B21AHA101	**Language I: Additional English**	**FC**	**1**	**1**	**0**	**2**	**3**

Course Description:

This is a 2-credit course designed to help the learner gain competency in language through the introduction of various genres of literature. The course aims to inculcate a critical view among learners while sensitizing them to the contemporary issues around. It facilitates creative learning and helps to appreciate, assimilate and research on the various dimensions of society, culture and life.

Prerequisites:

The student must possess fundamentals of language skills and be aware of social issues.

Pedagogy: Direct method / ICT / Collaborative Learning / Flipped Classroom.

Course Objectives:

- To develop linguistic prowess of the students.
- To appraise different genres of literature.
- To illustrate the fundamentals of creative language.

- To enhance consistent reading habits.

Course Outcome:

On completion of the course, learners will be able to:

- Demonstrate a thorough understanding of sensitive and critical social issues.
- Develop reading skills and a wide range of vocabulary.
- Critically analyze a piece of prose or poetry.
- Explain their opinion in a coherent and communicable manner.

Course Contents:

Unit-I: Values & Ethics **7 hours**

Literature: Rabindranath Tagore - Where the Mind is Without Fear
Saki – The Lumber-room
William Shakespeare – Extract from Julius Caesar (Mark Antony's Speech)
Language: Vocabulary Building

Unit-II: Natural & Supernatural **6 hours**

Literature: John Keats – La Belle Dame Sans Merci
Charles Dickens – The Signal Man
Hans Christian Anderson - The Fir Tree
Language: Collective Nouns

Unit-III: Travel & Adventure **7 hours**

Literature: R.L. Stevenson – Travel
H.G. Wells – The Magic Shop
Jonathan Swift – Excerpt from Gulliver's Travels Book – I
Writing Skills: Travelogue

Unit-IV: Success Stories **6 hours**

Literature: Emily Dickinson – Success is Counted Sweetest
Dr. Martin Luther King - I Have a Dream
Helen Keller – Excerpt from The Story of My Life
Writing Skills: Brochure & Leaflet

Reference Books:

- Tagore, Rabindranath. Gitanjali. Rupa Publications, 2002.
- Wordsworth, William. The Complete Works of William Wordsworth. Andesite Press, 2017.
- Munro, Hector Hugh. The Complete Works of Saki. Rupa Publications, 2000.
- Shakespeare, William. The Complete Works of William Shakespeare. Sagwan Press, 2015.
- Chindhade, Shirish. Five Indian English Poets: Nissim Ezekiel, A.K. Ramanujan, Arun Kolatkar, Dilip Chitre, R. Parthasarathy. Atlantic Publications, 2011.
- Dickens, Charles. The Signalman and Other Horrors: The Best Victorian Ghost Stories of Charles Dickens: Volume 2. Createspace Independent Publications, 2015.
- Anderson, Hans Christian. The Fir Tree. Dreamland Publications, 2011.
- Colvin, Sidney (ed). The Works of R. L. Stevenson. (Edinburgh Edition). British Library, Historical Prints Edition, 2011.
- Bishop, Elizabeth. Poems. Farrar, Straus and Giroux, 2011.

- Swift, Jonathan. Gulliver's Travels. Penguin, 2003.
- Dickinson, Emily. The Complete Poems of Emily Dickinson. Createspace Independent Publications, 2016.
- Brooke, Rupert. The Complete Poems of Rupert Brooke. Andesite Press, 2017.
- King, Martin Luther Jr. &James M. Washington. I Have a Dream: Writings And Speeches That Changed The World. Harper Collins, 1992.
- Keller, Helen. The Story of My Life. Fingerprint Publishing, 2016.
- Green, David. Contemporary English Grammar Structures and Composition. New Delhi: MacMillan Publishers, 2010.
- Thorpe, Edgar and Showick Thorpe. Basic Vocabulary. Pearson Education India, 2012.
- Leech, Geoffrey and Jan Svartvik. A Communicative Grammar of English. Longman, 2003.
- Murphy, Raymond. Murphy's English Grammar with CD. Cambridge University Press, 2004.

Course Code	Course Tittle	Course Type	L	T	P	C	Hrs./Wk.
B21AHE101	**Communicative English – I**	**FC**	**1**	**1**	**0**	**2**	**3**

Course Description:

This 2-credit course focuses on improving the spoken and written communication of the learners. The course develops personal, inter-personal and group skills among learners. It also addresses the functional aspects of language usage while providing specific linguistic tools through professional language learning software. The widespread reach of this course makes it highly practical and applicable.

Prerequisites:

The student must have knowledge of intermediate English Grammar and LSRW skills.

Pedagogy: Direct method, ICT, Collaborative learning, Flipped Classroom.

Course Objectives:

- To enhance functional communication skills.
- To develop functional use of language in professional contexts.
- To utilize oral presentations in multiple contexts.
- To apply effective written skills in formal communication.

Course Outcomes:

After the completion of the course, students will be able to:

- Identify pressing issues relating to society, environment and media.
- Develop a process-oriented approach to writing.
- Apply the grammatical skills developed during the course aptly.
- Demonstrate a good command over language usage and refined interpersonal skills.

Course Contents:

Unit-I: Functional English **7 Hours**

Remedial Grammar: Past Simple; Past Continuous; Irregular Verbs
Writing Skills: Paragraph Writing
Activities: Conversations; Leaving Phone Messages
Literature: Chief Seattle – The End of Leaving and Beginning of Survival

Unit-II: Interpersonal Skills **6 Hours**

Remedial Grammar: Present Simple & Present Continuous; Activity & State Verbs
Writing Skills: Official Letters
Activities: Making Apologies; Invitations & Making Arrangements
Literature: Ruskin Bond – Tiger in the Tunnel

Unit-III- Multitasking Skills **7 Hours**

Remedial Grammar: Present Perfect; For, Since & How Long; -ed & -ing adjectives; Prefix & Opposites of Adjectives
Writing Skills: Note Making
Activities: Agreeing & Disagreeing with Opinions
Literature: Jesse Owens - My Greatest Olympic Prize

Unit-IV: Communication Skills **6 Hours**

Remedial Grammar: Collocations; Prepositions
Writing Skills: Precise Writing
Activities: Offers, Suggestions & Requests
Literature: Avijit Pathak – Onscreen Magic

Reference Books:

1. Green, David. *Contemporary English Grammar Structures and Composition*. New Delhi: MacMillan Publishers, 2010.
2. Thorpe, Edgar and Showick Thorpe. *Basic Vocabulary*. Pearson Education India, 2012.
3. Leech, Geoffrey and Jan Svartvik. *A Communicative Grammar of English*. Longman, 2003.
4. Murphy, Raymond. *Murphy's English Grammar with CD*. Cambridge University Press, 2004.
5. Rizvi, M. Ashraf. *Effective Technical Communication*. New Delhi: Tata McGraw-Hill, 2005.
6. Riordan, Daniel. Technical Communication. New Delhi: Cengage Publications, 2011.
7. Sen et al. Communication and Language Skills. Cambridge University Press, 2015.

B21DA0101	Basic Mathematics	L	T	P	C
Duration :14 Wks		4	0	0	4

Course Description:

This course, provides an introduction to the basic concepts and techniques of matrices, differential calculus, vectors and set theory, emphasizing their inter-relationships and applications to engineering, the sciences and financial areas, introduces students to the use of computers in mathematics, and develops problem solving skills with both theoretical and practical problems.

Prerequisites:

Number System, Algebraic and Logarithmic concepts, and system of equations solving techniques

Course Objectives:

The objectives of this course are to:

1. Impart students with an understanding of matrices and determinants, differential calculus, vectors, set theory and functions
2. Enable them to work on problems relative any aspect of matrices, determinants etc
3. Equip students to solve given problems using set theory concepts.

Course Outcomes:

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

1. Compute with the characteristic polynomial, eigenvectors and eigenvalues as well as the algebraic multiplicities of an eigenvalue and solve systems of linear equations by use of the matrix
2. Recognize, apply and interpret multiple representations differentiate among diverse cultures through the history of mathematics and solve applied problems by using differentiation
3. Represent vectors analytically and geometrically, and compute dot and cross products for presentations of lines and planes, critical thinking to arrive at conclusions from Venn Diagrams, syllogistic forms and prove elementary results involving sets
4. Demonstrate the ability to apply analytical and theoretical skills to model and solve mathematical problems.

Course Contents:

Unit – 1: **[13 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 equations using Cramer's rule and matrix inversion method.

Unit – 2: **[13 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 –3: **[13 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 -4: **[13 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, "Discrete and Combinational Mathematics", Pearson Education, Singapore, 2003.
2. Rao, G. Shanker, "Mathematics for Computer Science", Kalyani Publishers, New Delhi, 1999.
3. Thomas and Finney, "Calculus with Analytical Geometry", Narosa Publishing House, 6th edition, 1998.
4. S Narayan and T K Manicavachogam Pillai, "Calculus"- Vol I and Vol II, S.V.Publishers, 2009 Edition.

Reference Book:

1. K.D.Joshi : "Foundations of Discrete Mathematics", 1989 edition, Wiley Eastern Ltd.,

B21DA0102	Digital Logic and Computer Architecture	L	T	P	C
Duration :14 Wks		2	1	0	3

Course Description:

Digital Electronics Circuit Design is a very important course for Electronics engineers as it deals with the fundamental aspects of digital circuits design. Both The Combinational and the sequential circuit realization and implementations are studied. This course opens with an introduction to combinational logic, logic gates, minimization techniques, arithmetic circuits. It then moves to deal with sequential circuits: flip-flops, synthesis of sequential circuits, and case studies, including counters, registers. State machines will then be introduced. Different representations of truth table, logic gate, timing diagram, switch representation, state diagram, and state equations,

Prerequisites:

Before starting this course, the learner should have elementary knowledge in electronics and the core concepts of computer.

Course Objectives:

The objectives of this course are to:

1. Enable students to acquire basic knowledge of digital logic levels and application of
2. Impart knowledge of understanding digital electronics circuits.

3. Equip with the skill of performing analysis and design of various digital electronic circuits.

Course Outcomes:

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

1. Understand and explain the fundamental concepts, techniques used in Digital electronics and examine the structure of various number systems and it's Application in digital design.
2. Comprehend the basic gates, define and design the digital logic circuits.
3. Analyze and design various combinational and sequential Logic Circuits.
4. Identify and demonstrate the basic operational concepts of computer system.

Course Contents:

UNIT – 1: [10 Hours]

Introduction to Digital Electronics, Number systems, Operations and codes: What is Digital circuit, where are digital circuits are used, why use digital circuits. Decimal numbers, Binary numbers, Decimal-to-Binary conversion, Binary Arithmetic, 1's and 2's Complements of Binary Numbers, signed numbers, Arithmetic operations with signed numbers, Hexadecimal Numbers, Octal numbers, Binary Coded Decimal(BCD), Digital Codes.

UNIT – 2: [10 Hours]

Logic Gates, Boolean Algebra and Logic Simplification: The Inverter, the AND Gate, the OR gate, the NAND Gate, the NOR Gate, the Exclusive-OR and Exclusive-NOR Gates, Basics of Digital Integrated Circuits.Boolean Operations and Expressions, Laws and Rules of Boolean Algebra, DE Morgan's Theorems, Boolean Analysis of Logic Circuits, Simplification Using Boolean Algebra, Standard Forms of Boolean Expressions, Boolean Expressions and Truth Tables, The Karnaugh Map, karnaugh Map SOP Minimization, POS Minimization.

UNIT – 3: [10 Hours]

Combinational Logic, Sequential Logic, Registers: Combinational Logic: Introduction, Design Procedure, Adders, sub tractors. Sequential Logic: Introduction, Flip-Flops. Registers: Introduction, Registers, and Shift Registers.

UNIT – 4: [09 Hours]

Basic Structure of Computers and the Memory System: Computer types, Functional Units, Basic Operational Concepts, Bus Structures, and Performance. Some Basic Concepts, Semiconductor RAM Memories and Read-Only Memories.

Text Books:

1. Tokheim "Digital Electronics Principles and Applications", 6th Edition, McGraw-Hill, 2014. Chapter 1 (1.1, 1.2, 1.3).
2. Thomos L. Floyd, "Digital Fundamentals", Tenth Edition, Pearson, 2015.Chapters (2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10 and 2.11), Chapters (3.1 to 3.7) and (4.1 to 4.9).
3. M. Morris Mano " Digital Logic and Computer Design", Pearson, 2013. Chapters (4.1 to 4.4, 6.1 to 6.2 and 7.1 to 7.3).

4. Hamacher, Vranesic and Zaky, "Computer Organization", Fifth Edition, Tata Mcgraw-Hill, 2015.Chapters (1.1, 1.2, 1.3, 1.4 and 1.6), Chapters (5.1 to 5.3)

Reference Books:

1. Digital Electronics: An Introduction To Theory And Practice By William Gothman, Second Edition, PHI Publisher, 2015.
2. Digital Electronics by John Morris, Fifth Edition, 2016.
3. Fundamentals of Digital Circuits by Anand Kumar, Fourth Edition, 2014.
4. Digital Electronics Principles and Integrated Circuits by Anil K. Maini, second Edition, 2013.
5. Computer Organization and Design by David A. Patterson, John L. Hennessy, Fifth Edition, Morgan Kaufmann.

B21DA0103	Problem solving using C	L	T	P	C
Duration:14 Wks		2	1	0	3

Course Description:

Designed to introduce the student the basics of computer concepts and various programming concepts of the C language using the Microsoft Visual C++. Programs, using the console application feature, will be coded and executed to demonstrate the use of variables, constants, control flow, arithmetic, functions, input/output, and dynamic memory allocation. The student will also be introduced to the various library functions available for use within the language compiler.

Prerequisites:

To start with C programming you should have a basic understanding of Computer Programming terminologies and some knowledge about programming languages.

Course Objectives:

The objectives of this course are to:

1. Explain the basic programming concepts.
2. Illustrate the importance of Algorithm to write the Program (in small steps).
3. Describe how a good program design can reduce coding and debugging time.
4. Explain the concepts of Files for application data maintenance
5. Equip with detailed understanding of control statements, function and arrays.
6. Illustrate the use of pointers and Strings.

Course Outcomes:

By the end of the course, the students will be able to

1. Design Algorithms and Draw Flowcharts to model solving real world problems.List various data types and operators and develop programs to evaluate arithmetic expressions and mathematical functions.
2. Analyze various data types and operators and develop programs to evaluate arithmetic expressions and solving mathematical functions using library functions.
3. Identify and analyze the suitable control statements and apply logical reasoning to implement the solution for any mathematical and logical problem
4. Analyze different data structures such as arrays (1D and 2D) and its derived data structures to handle list of data such as string (text) processing.
5. Compare and Apply different categories of user defined functions to solve problems and to implement the concept of procedural and modular programming
6. Explore pointers in implementing programs, especially in memory management and file handling for faster execution of programs

Course Contents:

UNIT -1: [10 Hours]

Computer Problem-Solving& Fundamental Algorithms: Computer Basics, Introduction To Computer Problem-Solving, Fundamental Algorithms: Introduction, Exchanging the Values of Two variables, Counting, Summation of a Set of Numbers, Factorial Computation, Generation of the Fibonacci Sequence.

Basics Of C Programming: Overview of C: History of C, Importance of C, Basic Structure of C Programs, Constants, Variables and Data Types-: Introduction, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Declaration of Storage Class, Assigning Values to Variables .

UNIT – 2: [10 Hours]

Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operator, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators.**StructuredConstructs:**Decision Making and Branching, Decision Making and Looping.

UNIT– 3: [10 Hours]

Arrays &Functions: Arrays: Introduction, One-Dimensional Arrays, Initialization of One-Dimensional Arrays, Two Dimensional Arrays, Initializing Two Dimensional Arrays, Multi Dimensional Arrays, Character Arrays and Strings: Introduction, Declaring and Initializing String Variables, Reading Strings from Screen, Writing Strings to Screen, String-Handling Functions.

User-Defined Functions: Introduction, Need for User defined Functions-Elements of User defined Functions, Definition of Functions, Return Values and their types, Function Calls, Function Declaration, Category of Functions, No arguments and No return values, Arguments but No return values, Arguments with return values, No arguments but returns a value, Recursion.

UNIT-4: [09 Hours]

User Defined Data Types: Structures and Unions :Introduction, Defining a Structure, Declaring Structure Variables, Accessing Structure Members, Structure Initialization, Copying and Comparing Structure

Variables, Operations on Individual Members, Arrays of Structures, Arrays with Structures, Structures within Structures, Unions. Introduction to Pointers: Introduction and Understanding pointers, Accessing the address of a variable, Declaring pointer variables, Initialization of pointer variables, Accessing a variable through its pointer. File Management in C: Introduction, Defining and Opening a File, Closing a File, Input/ Output Operations on Files

Text Books:

1. V. Rajaraman, NeeharikaAdabala, "Fundamentals of Computers", 6th Edition, PHI, 2015. (Chapter 1)
2. R.F Dromey, "How to Solve it by Computer" Pearson, Fourteenth Impression, 2013. (Chapter 1 & 2)
3. E. Balaguruswamy, "Programming In ANSI C", 3rd edition, McGraw Hill Education, 2006. (Chapter 1 to 12).

References Books:

1. Mahapatra, "Thinking in C", PHI Publications, 1998.
2. YashwantKanetkar, "Let Us C", 13th Edition, PHP, 2013.
3. Ashok N. Kamthane, "Programming with ANSI and Turbo C", Pearson Education, 6th Impression, 2009.
4. Anami, Angadi, and Manvi, "Computer Concepts and C Programming – A Holistic approach", PHI - 2008.

B21DA0104	C Programming Lab	L	T	P	C
Duration :14 Wks		0	0	2	2

Prerequisites:

To start with C programming one should have a basic understanding of Computer Programming terminologies and some knowledge about programming languages

Course Objectives:

The objectives of this course are to:

1. Advance structured and procedural programming understating and to improve C programming Skills.
2. Provide students with understanding of code organization and functional hierarchical decomposition with using complex data types

Course Outcomes:

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

1. Understanding a functional hierarchical code organization.
2. Define and manage data structures based on problem subject domain.
3. Use textual information, characters and strings.
4. Work with arrays of complex objects.
5. Illustrate the concept of object thinking within the framework of functional model and functional hierarchical code organization.
6. Identify and troubleshoot the possible errors during program execution.

Lab Experiments

Part –A

1. Write a C program to exchange the values of two variables.
2. Write a C program to check whether the given integer is odd or even.
3. Write a C program to find the largest of three numbers.
4. Write a C program to find the area of a circle.
5. Write a C program to simulate a simple calculator using switch case statement.
6. Write a C program to compute the factorial of a number.
7. Write a C program to find the sum of 'N' natural numbers.
8. Write a C program to generate and display the first 'N' Fibonacci numbers.

Part-B

1. Write a C program to solve the roots of quadratic equation.
2. Write a C program to reverse a given integer.
3. Write a C program to sort 'N' numbers.
4. Write a C program to search a given number from an array.
5. Write a C program to add two numbers using function.
6. Write a C program to define a structure 'STUDENT'. Also read and display 'N' student details.
7. Write a C Program to read and write character using file.

B21DA0105	Digital Logic Lab	L	T	P	C
Duration:14 Wks		0	0	2	2

Prerequisites:

Before starting this course, the learner should have elementary knowledge in electronics and the core concepts of computer.

Course Objectives:

The objectives of this course are to:

1. Acquire the basic knowledge of digital logic levels and application of
2. Impart the knowledge to understand digital electronics circuits.
3. Perform the analysis and design of various digital electronic circuits.

Course Outcomes:

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

1. Use Boolean algebra and simplify simple Boolean functions by using basic Boolean properties.
1. Design of combinational circuits such as MUX, DEMUX, Encoder and Decoder etc.
2. Illustrate the design of sequential Circuits such as Flip-Flops, Registers, and Counters.

3. Perform the analysis and design of Complex Digital Electronic Circuits.

Lab Experiments

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 / Sub tractor using NAND Gates.
4. Design and Realization of Full Adder using Logic Gates.
5. Design and Realization of 4 bit Adder / Sub tractor 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

11. PC Hardware lab - Components of PC, Assembling and installation.
12. Install and configure nfs server
13. Configure nfs client and work on mount points
14. Work on Linux desktop interface
15. Configure DNS server
16. Install and configure web server

B21ASM101	Environmental Studies
Duration:14 Wks	

Course Objectives:

The objectives of this course are to:

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

Course Outcomes:

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

1. Analyze the environmental conditions and protect it.
2. Observe the role of individual, government and NGO in environmental protection.
3. Search for new renewable energy resources with high efficiency through active research.
4. Analyze the ecological imbalances and protect it.
5. List the causes of environmental pollution & find ways to overcome them.
6. Design pollution controlled products.

Course Contents:

UNIT – 1: **[10 Hours]**

Introduction: Multidisciplinary nature of environmental studies – Definition -Scope and importance-Need for public awareness.

UNIT – 2: **[10 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 – 3: **[10 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 – 4: **[09 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.

Text Books:

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

B21DAM102	**Skill Development Program**
Duration:14 Wks	

SECOND SEMESTER

Course code	Course Title	Course Type	L	T	P	C	Hrs./Wk.
B21AHK202	Language II: Kannada	FC	1	1	0	2	3

Course Description:

¨sÁµÉAiÀÄ£ÀÄß ªÀiÁvÀ£ÁqÀÄªÀ §gÉAiÀÄÄªÀ PË±À®å, ¸Á»vÀåzÀ §UÉÎ ¸ÀÆÜ®ªÁV ¥ÀjZÀ¬Ä¸ÀÄªÀ ªÀÄÆ®PÀ «zÁåyðUÀ¼À ªÀåQÛvÀé «PÁ¸À ºÁUÀÄ ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ¼À£ÀÄß UÀªÀÄ£ÀzÀ°èlÄÖPÉÆAqÀÄ, ¥Àæ¸ÀÄÛvÀ ¸ÀAzÀ¨sÀðPÉÌ «zÁåyðUÀ¼À£ÀÄß ¸ÀdÄÓUÉÆ½¸À®Ä ¥ÀoÀåªÀ£ÀÄß gÀÆ¦¸À¯ÁVzÉ. ¸Á»vÀå, PÀ¯É, ªÁtÂdå, DqÀ½vÁvÀäPÀ ªÀÄvÀÄÛ «eÁÕ£ÀzÀ «ZÁgÀUÀ½UÉ MvÀÛ£ÀÄß ¤ÃqÀ¯ÁVzÉ. EzÀÄ ªÉÆzÀ® JgÀqÀÄ ¸É«Ä¸ÀÖgï ªÀÄÆgÀÄ PÉærmïUÀ¼À£ÀÄß; ªÀÄÆgÀÄ ªÀÄvÀÄÛ £Á®Ì£ÉÃ ¸É«Ä¸ÀÖgï JgÀqÀÄ PÉærmïUÀ¼À£ÀÄß ºÉÆA¢zÉ.

Prerequisites:

- PÀ£ÀßqÀ ¨sÁµÉAiÀÄ §UÉUÉ ¥ÁæxÀ«ÄPÀ w¼ÀÄªÀ½PÉ CUÀvÀå..

- ¨sÁµÉAiÀÄ£ÀÄß NzÀ®Ä ªÀÄvÀÄÛ §gÉAiÀÄ®Ä w½¢gÀ¨ÉÃPÀÄ.
- ¥ÀzÀ« ¥ÀÆªÀð ²PÀëtzÀ°è PÀ£ÀßqÀ ¨sÁµÉAiÀÄ£ÀÄß N¢gÀ¨ÉÃPÀÄ.

Pedagogy:

- Direct method
- ICT and Digital support
- Collaborative and Cooperative learning
- Differentiated Instruction
- Flipped Classroom

Course Objectives:

£Á®ÄÌ ¸É«Ä¸ÀÖgïUÀ¼À°è ¸ÀªÀÄUÀæ PÀ£ÀßqÀ ¸Á»vÀåªÀ£ÀÄß ¥ÀjZÀ¬Ä¸ÀÄªÀ GzÉÝÃ±ÀªÀ£ÀÄß ºÉÆA¢zÉ. CzÀgÀAvÉ JgÀqÀ£ÉAiÀÄ ¸É«Ä¸ÀÖgï£À°è ªÀÄzsÀåPÁ°Ã£À PÁªÀåUÀ¼ÀÄ, ¯ÉÃR£ÀUÀ¼ÀÄ ºÁUÀÄ ¸ÀAQÃtð ¸Á»vÀåªÀ£ÀÄß ¥ÀoÀåªÀ£ÁßV DAiÉÄÌ ªÀiÁrPÉÆAqÀÄ, «zÁåyðUÀ¼À°è ¸Á»vÀåzÀ §UÉÎ ¸ÀzÀ©ügÀÄaAiÀÄ£ÀÄß ªÀÄÆr¸À¯ÁUÀÄvÀÛzÉ. ¸ÁA¸ÀÌøwPÀ w¼ÀÄªÀ½PÉAiÀÄ eÉÆvÉUÉ ªÀåQÛvÀé «PÀ¸À£ÀzÀ PÀqÉUÉ UÀªÀÄ£À ¤ÃqÀ¯ÁUÀÄvÀÛzÉ.

- ¨sÁµÉ, ¸Á»vÀå, EwºÁ¸À ªÀÄvÀÄÛ ¸ÀA¸ÀÌøwUÀ¼À£ÀÄß PÀ£ÀßqÀ, PÀ£ÁðlPÀPÉÌ ¸ÀA§A¢ü¹zÀAvÉ ¥ÀjZÀ¬Ä¸À¯ÁUÀÄvÀÛzÉ.
- «zÁåyðUÀ¼À ¸ÀªÀðvÉÆÃªÀÄÄR ¨É¼ÀªÀtÂUÉUÉ C£ÀÄªÁUÀÄªÀAvÉ ºÁUÀÆ CªÀgÀ°è ªÀiÁ£ÀªÀ ¸ÀA§AzsÀUÀ¼À §UÉÎ UËgÀªÀ, ¸ÀªÀiÁ£ÀvÉ ªÀÄÆr¹, ¨É¼É¸ÀÄªÀ ¤nÖ£À°è ¥ÀoÀåUÀ¼À DAiÉÄÌAiÀiÁVzÉ.
- CªÀgÀ°è ¸ÀÈd£À²Ã®vÉ, ±ÀÄzÀÞ ¨sÁµÉ, GvÀÛªÀÄ «ªÀÄ±Áð UÀÄt, ¤gÀUÀð¼À ¸ÀA¨sÁµÀuÉ, ¨sÁµÀt PÀ¯É ºÁUÀÆ §gÀºÀ PË±À®åUÀ¼À£ÀÄß ¨É¼É¸ÀÄªÀÅzÀÄ UÀÄjAiÀiÁVzÉ
- ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ½UÉ C£ÀÄPÀÆ®ªÁUÀÄªÀAvÀºÀ «µÀAiÀÄUÀ¼À£ÀÄß UÀªÀÄ£ÀzÀ°èèlÄÖPÉÆAqÀÄ ¸ÀÆPÀÛ ¥ÀoÀåUÀ¼À£ÀÄß DAiÉÄÌ ªÀiÁrPÉÆ¼Àî¯ÁVzÉ.

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Course Outcomes:

ªÀÄzsÀåPÁ°Ã£ÀzÀ ««zsÀ ¥ÀæPÁgÀzÀ PÁªÀåUÀ¼ÀÄ, ¯ÉÃR£ÀUÀ¼ÀÄ ªÀÄvÀÄÛ ¸ÀAQÃtð §gÀºÀ ¸Á»vÀå PÀ°PÉAiÀÄ ªÀÄÆ®PÀ PÁ®zÀ ¹ÜvÀåAvÀgÀUÀ¼À£ÀÄß CzÀgÀ M¼À£ÉÆÃlUÀ¼À£ÀÄß ¨É¼É¸ÀÄvÀÛzÉ.

- ¸ÁªÀiÁfPÀ, gÁdQÃAiÀÄ, zsÁ«ÄðPÀ, ¸ÁA¸ÀÌøwPÀ, ¥Àj¸ÀgÀ ºÁUÀÆ °AUÀ¸ÀA§A¢ü «ZÁgÀUÀ¼ÉqÉ UÀªÀÄ£À ºÀj¸ÀÄªÀÅzÀgÉÆA¢UÉ «zÁåyðUÀ¼À°è ZÀZÁð ªÀÄ£ÉÆÃ¨sÁªÀªÀÅ ¨É¼ÉAiÀÄÄvÀÛzÉ.
- fÃªÀ£ÀzÀ°è §gÀÄªÀ C©ü¥ÁæAiÀÄ ¨ÉÃzsÀUÀ¼ÀÄ, ¸ÀªÀÄ¸ÉåUÀ¼À£ÀÄß DzsÀÄ¤PÀ ¸ÀAzÀ¨sÀðzÀ°è ªÀiÁ£À«ÃAiÀÄvÉAiÉÆA¢UÉ ¤ªÀð»¸ÀÄªÀAvÉ ¥ÉæÃgÉÃ¦¸ÀÄvÀÛzÉ.

- GvÀÛªÀÄ ¸ÀAªÀºÀ£À PÀ¯ÉAiÀÄ£ÀÄß ¨É¼É¸ÀÄªÀ GzÉÝÃ±ÀªÀ£ÀÄß FqÉÃj¸ÀÄvÀÛzÉ.
- ¸ÀA±ÉÆÃzÀ£Á ªÀÄ£ÉÆÃ¨sÁªÀ ªÀÄvÀÄÛ ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ½UÉ «zÁåyðUÀ¼À£ÀÄß ¸ÀdÄÓUÉÆ½¸ÀÄvÀÛzÉ.

Course Contents:

Unit –I **7 Hours**

1. gÁWÀªÁAPÀ: UÁ£ÀgÁtÂAiÀÄgÀ ¸ÀAªÁzÀ
2. PÀÄªÀiÁgÀªÁå¸À: ¹qÀ® ¥ÉÆlÖt PÀnÖ ¸ÉÃRªÀ PÉÆqÀÄªÀgÉ
3. ¸ÀªÀðdÕ£À ªÀZÀ£ÀUÀ¼ÀÄ

Unit –II **7 Hours**

1. ¥ÀÄgÀAzÀgÀzÁ¸À: V½AiÀÄÄ ¥ÀAdgÀzÉÆ½®è
2. PÀ£ÀPÀzÁ¸À: J¯ÁègÀÄ ªÀiÁqÀÄªÀÅzÀÄ
3. ²±ÀÄ£Á¼À ±ÀjÃ¥sÀ: J®ègÀAvÀªÀ£À®è £À£ÀUÀAqÀ

Unit –III **6 Hours**

1. J.¦.eÉ.C§ÄÝ¯ï PÀ¯ÁA: ¥ÉÊ¥ÉÆÃnUÉ ¸ÀeÁÓUÀÄwÛgÀÄªÀ zÉÃ±À
2. ©.J.²æÃzsÀgÀ: ¨Á¥ÀÄ aAvÀ£É
3. zÉÃªÀ£ÀÆgÀÄ ªÀÄºÀzÉÃªÀ: ¨sÁgÀvÀ ¸ÀA«zsÁ£ÀPÉÌ '¨sÀÆvÀ' ZÉÃµÉÖ

Unit –VI **6 Hours**

1. ¥ÀÆtðZÀAzÀæ vÉÃd¹é: ¸ÀºÀd PÀÈ¶ (DAiÀÄÝ ¨sÁUÀ)

¥ÀgÁªÀÄ±Àð£À UÀæAxÀUÀ¼ÀÄ :

1. ªÀÄÄUÀ½ gÀA.²æÃ., PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ, ¥ÀæPÁ±ÀPÀgÀÄ VÃvÁ §ÄPï ºË¸ï, ªÉÄÊ¸ÀÆgÀÄ. 2014
2. ¸ÀAUÀæºÀ. £ÁUÉÃUËqÀ JZï.J¯ï., ZÁjwæPÀ d£À¥ÀzÀ PÀxÀ£À PÁªÀåUÀ¼ÀÄ, ¥ÀæPÁ±ÀPÀgÀÄ PÀ£ÁðlPÀ eÁ£À¥ÀzÀ ¥ÀjµÀvÀÄÛ, ¨ÉAUÀ¼ÀÆgÀÄ. 2008
3. ¹ÃªÀiÁwÃvÀ PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ ¸ÀA¥ÀÄl 1,2,3,4,5 ªÀÄvÀÄÛ 6, PÀÄªÉA¥ÀÄ PÀ£ÀßqÀ CzsÀåAiÀÄ£À ¸ÀA¸ÉÜ, ªÉÄÊ¸ÀÆgÀÄ «±Àé«zÁå¤®AiÀÄ, ªÉÄÊ¸ÀÆgÀÄ. 2014
4. ¸ÀAUÀæºÀ. £ÁUÉÃUËqÀ JZï.J¯ï., PÀ£ÀßqÀ d£À¥ÀzÀ PÀxÀ£À PÁªÀåUÀ¼ÀÄ, ¥ÀæPÁ±ÀPÀgÀÄ PÀ£ÁðlPÀ eÁ£À¥ÀzÀ ¥ÀjµÀvÀÄÛ, ¨ÉAUÀ¼ÀÆgÀÄ. 2007
5. £ÁgÁAiÀÄt ¦.«, ZÀA¥ÀÆ PÀ«UÀ¼ÀÄ, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2010
6. PÁ¼ÉÃUËqÀ £ÁUÀªÁgÀ, wæ¥À¢, gÀUÀ¼É ªÀÄvÀÄÛ eÁ£À¥ÀzÀ ¸Á»vÀå, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2010

Course code	Course Title	Course Type	L	T	P	C	Hrs./Wk.
B21AHH202	Language II: Hindi	FC	1	1	0	2	3

7. ¸ÀA. ¨É£ÀUÀ¯ï gÁªÀÄ gÁªï ªÀÄvÀÄÛ ¥Á£ÀåA ¸ÀÄAzÀgÀ ±Á¹ÛçÃ, ¥ÀÄgÁt £ÁªÀÄ ZÀÆqÁªÀÄtÂ, ¥ÀæPÁ±ÀPÀgÀÄ ¥Àæ¸ÁgÁAUÀ, ªÉÄÊ¸ÀÆgÀÄ «±Àé«zÁå¤®AiÀÄ. 2010
8. qÁ. azÁ£ÀAzÀ ªÀÄÆwð, ªÀZÀ£À ¸Á»vÀå, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2013
9. ¸ÀA ªÀÄgÀÄ¼À¹zÀÝ¥Àà PÉ, £ÁUÀgÁd Q.gÀA. ªÀZÀ£À PÀªÀÄäl, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2016
10. ªÀÄgÀÄ¼À¹zÀÝ¥Àà PÉ, µÀlà¢ ¸Á»vÀå, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2010
11. ¸ÀA. ¸ÉÃvÀÄgÁªÀÄ gÁªï C.gÁ., ²æÃ ®QëöäÃ±À£À eÉÊ«Ä¤ ¨sÁgÀvÀ(ªÀÄÆ®-vÁvÀàAiÀÄð-¸ÀavÀæ), ¥ÀæPÁ±ÀPÀgÀÄ PÁªÀÄzsÉÃ£ÀÄ ¥ÀÄ¸ÀÛPÀ ¨sÀªÀ£À, ¨ÉAUÀ¼ÀÆgÀÄ. 2010
12. ¸ÀA. ¸ÉÃvÀÄgÁªÀÄ gÁªï C.gÁ., ²±ÀÄ£Á¼À ±ÀjÃ¥sÀgÀ £ÀÆgÁgÀÄ vÀvÀé¥ÀzÀUÀ¼ÀÄ, ¥ÀæPÁ±ÀPÀgÀÄ PÁªÀÄzsÉÃ£ÀÄ ¥ÀÄ¸ÀÛPÀ ¨sÀªÀ£À, ¨ÉAUÀ¼ÀÆgÀÄ. 2007
13. ¸ÀA. f.J¸ï.¨sÀmï., PÀÄªÀiÁgÀªÁå¸À£À PÀuÁðl ¨sÁgÀvÀ PÀxÁªÀÄAdj ¥ÀæªÉÃ±À, ¥ÀæPÁ±ÀPÀgÀÄ CPÀëgÀ ¥ÀæPÁ±À£À, ºÉUÉÆÎÃqÀÄ, ¸ÁUÀgÀ. 2006
14. gÀAeÁ£ï zÀUÁð, ±ÀgÀtgÀ ¸ÀªÀÄUÀæ PÁæAw, ¥ÀæPÁ±ÀPÀgÀÄ. ¯ÉÆÃ»AiÀiÁ ¥ÀæPÁ±À£À, §¼Áîj. 2015
15. QÃvÀð£ÁxÀ PÀÄvÀðPÉÆÃn, PÀ£ÀßqÀ ¸Á»vÀå ¸ÀAUÁw, ¥ÀæPÁ±ÀPÀgÀÄ PÀÄvÀðPÉÆÃn ªÉÄªÉÆÃjAiÀÄ¯ï læ¸ïÖ, zsÁgÀªÁqÀ. 2009
16. ±ÁªÀÄgÁAiÀÄ vÀ.¸ÀÄ., PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ, ¥ÀæPÁ±ÀPÀgÀÄ vÀ¼ÀÄQ£À ªÉAPÀtÚAiÀÄå ¸ÁägÀPÀ UÀæAxÀªÀiÁ¯É, ªÉÄÊ¸ÀÆgÀÄ -2014
17. ²ªÀgÀÄzÀæ¥Àà f.J¸ï. PÀ£ÀßqÀ ¸Á»vÀå ¸À«ÃÃPÉë, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2013

Course Description:

यह पाठ्यक्रम नौसिखियाअपनी भाषा की क्षमता का विकास करने हेतु तथा विभिन्न साहित्यिक प्रक्रियाओं द्वारा , संस्कृति एवं जीवन के ,समाजमूल्यों को समझने हेतु अभिकल्पित है |

Prerequisites:

- अध्येता, पी.यु.सी के स्तर पर द्वितीय भाषा के रूप में हिन्दी का अध्ययन करना चाहिए |
- हिन्दी साहित्य के इतिहास का संक्षिप्त ज्ञान की आवश्यकता है |
- हिन्दी व्याकरण का अवबोधन आवश्यक है |
- अंग्रेज़ी – हिन्दी अनुवाद से संबंधित जानकारी जरुरी है

Course Objectives:

1. संदर्भानुसार उचित भाषा का प्रयोग करने की दक्षता को छात्रों में उत्पन्न करना |
2. साहित्य के माध्यम से समाज एवं मानवीय मूल्यों को समझाकर, उन मूल्यों की रक्षा हेतु प्रेरित करना|
3. छात्रों में पुस्तक पठन एवं लेखन की अकृतिम प्रवृत्ति स्थापित करना |
4. अध्येताओं में साहित्य के माध्यम से प्रभावी एवं कुशल संचार का विकास करना |

Course Outcomes:

अध्ययन की समाप्ति पर अध्येता –

1. सामाजिक मूल्य एवं नैतिक जवाबदेही को स्वीकार कर सकता है |
2. साहित्य की प्रासंगिकता को जीवन में समझने की दक्षता रखता है |
3. समाज में अंतर्निहित पद्दतियाँ एवं विचारधाराओं का व्याख्यान करने में सक्षम बन सकता है
4. साहित्य के माध्यम से प्रभावी एवं कुशल संचार का विकास करसकता है |

Course Contents:

Unit – 1: **[7 Hours]**

1 कबीरदास के दोहे – कबीरदास

2 कविता – अर्जुन की प्रतिज्ञा - मैथिलीशरण गुप्त

3 कविता – वीरों का कैसा हो बसंत – सुभद्रकुमारी चौहान

Unit – 2: **[7 Hours]**

4 तुलसीदास के पद –तुलसीदास

5 कविता – संध्या सुंदरी – सूर्यकांत त्रिपाठी 'निराला'

6 कविता – करमवीर – अयोध्या सिंह उपाध्याय 'हरिऔंध'

Unit –3: **[6 Hours]**

7 मीराबाई के पद – मीराबाई

8 कविता – मधुशाला – हरिवंशराय बच्चन

9 कविता – हम झुक नहीं सकते – अतलबिहारी बाजपाई

Unit -4: **[6 Hours]**

अनुवाद अनुछेद (हिन्दी से अंग्रेजी)

सृजनात्मक व्यक्तित्व

अ महादेवी वर्मा, प्रेमचंद

आ महात्मा गांधी, अब्दुल कलाम

सूचना : प्रत्येक इकाई 25 अंक के लिए निर्धारित है |

Text Books:

- हिन्दी पाठ्य पुस्तक – रेवा विश्वविद्यालय |

Reference Book:

1 सुबोध व्यवहारिक हिन्दी – डॉ. कुलदीप गुप्त
2 अभिनव व्यवहारिक हिन्दी – डॉ.परमानन्द गुप्त
3 हिन्दी साहित्य का इतिहास - डॉ. नागेन्द्र
4 आधुनिक हिन्दी साहित्य का इतिहास - डॉ. बच्चन सिंह
5 हिन्दी साहित्य का नवीन इतिहास - डॉ. लाल साहब सिंह
6 शुद्ध हिन्दी कैसे बोले कैसे लिखे- पृथ्वीनाथ पाण्डे
7 कार्यालय अनुवाद निदेशिका
8 संक्षेपण और पल्लवन - के.सी.भाटिया&तुमन सिंग

Course Code	Course Tittle	Course Type	L	T	P	C	Hrs./Wk.
B21AHA201	**Language II: Additional English**	**FC**	**1**	**1**	**0**	**2**	**3**

Course Description:

This is a 2-credit course designed to help the learner gain competency in language through an exploration to the various genres of literature. The syllabus is designed to encourage critical ability of the learner to guide them towards career opportunities. This course is intended to develop the capacity to appreciate and assess the various dimensions of society, culture and life.
Prerequisites: The student must possess fair knowledge of language and literature.
Pedagogy: Direct method / ICT / Collaborative Learning / Flipped Classroom.

Course Objectives:

- To assess ecological and environmental concerns through literature.
- To identify the inequal structures of power in society.
- To compare and relate the position of men and women in society.
- To interpret the representation of society in popular culture.

Course Outcome:

On completion of the course, learners will be able to:

- Demonstrate a thorough understanding of sensitive and critical ecological and environmental issues.
- Analyze the rigid structure of center and margin in our society.
- Criticize the subordinate position of women in society.
- Justify the depiction of society in popular culture.

Course Contents:

Unit-I: Ecology & Environment **7 hours**
Literature: Toru Dutt - Casuarina Tree
Gordon J.L. Ramen – Daffodils No More
C.V. Raman – Water – The Elixir of Life
Language: Degrees of Comparison

Unit-II: Voices from the Margin **6 hours**
Literature: Tadeusz Rozewicz – Pigtail
Jyoti Lanjewar – Mother
Harriet Jacobs – Excerpt from Incidents in the Life of a Slave Girl
Language: Prefix and Suffix

Unit-III: Women & Society **7 hours**
Literature: Kamala Das – An Introduction
Rabindranath Tagore – The Exercise Book
Jamaica Kincaid – Girl
Writing Skills: Dialogue Writing

Unit-IV: Popular Culture **6 hours**
Literature: Rudyard Kipling – The Absent-minded Beggar
Sir Arthur Conan Doyle – The Adventure of Lion's Mane
Aldous Huxley – The Beauty Industry
Writing Skills: Story Writing

Reference Books:

- Agrawal, K.A. *Toru Dutt the Pioneer Spirit of Indian English Poetry - A Critical Study*. Atlantic Publications, 2009.
- Latham, Edward Connery (ed). *The Poetry of Robert Frost*. Holt Paperbacks, 2002.
- Gale, Cengage Learning. *A Study Guide for Tomas Rivera's The Harvest*. Gale, Study Guides, 2017.
- Basu, Tejan Kumar. *The Life and Times of C.V. Ram*an. Prabhat Prakashan, 2016.
- Rozewicz, Tadeusz. *New Poems*. Archipelago, 2007.
- Manohar, Murli. *Critical Essays on Dalit Literature*. Atlantic Publishers, 2013.
- Hansda, Sowvendra Shekhar. *The Adivasi Will Not Dance: Stories*. Speaking Tiger Publishing Private Limited, 2017.
- Jacobs, Harriet. *Incidents in the Life of a Slave Girl*. Createspace Independent Publication, 2014.
- Das, Kamala. *Selected Poems*. Penguin Books India, 2014.
- Tagore, Rabindranath. *Selected Short Stories of Rabindranath Tagore*. Maple Press, 2012.
- Gale, Cengage Learning. *A Study Guide for Jamaica Kincaid's Girl*. Gale, Study Guides, 2017.
- Kipling, Rudyard. *The Absent-Minded Beggar*. Hardpress Publishing, 2013.
- Doyle, Arthur Conan. *The Hound of the Baskervilles*. General Press, 2017.
- Dixson, Robert J. *Everyday Dialogues in English*. Prentice Hall India Pvt Ltd., 1988.
- Turton, Nigel D. *ABC of Common Errors*. Mac Millan Publishers, 1995.
- Samson, T. (ed.) *Innovate with English.* Cambridge University Press, 2010.
- Kumar, E Suresh, J. Savitri and P Sreehari (ed). *Effective English*. Pearson Education, 2009.

Course code	Course Title	Course Type	L	T	P	C	Hrs./Wk.
B21AHE201	**Communicative English – II**	**FC**	**1**	**1**	**0**	**2**	**3**

Course Description:

This 2-credit course focuses on enhancing written proficiency required for professional enhancement. It also polishes the spoken skills of the learners to make them effective and confident presenters. It also addresses the functional aspects of language usage while providing specific linguistic tools through professional language learning software. The practical components discussed in this course enable a fruitful transition from academia to the industry of their choice.

Prerequisites: The student must possess functional knowledge of LSRW skills.
Pedagogy: Direct method, ICT, Collaborative learning, Flipped Classroom.

Course Objectives:

- To build skills essential for corporate communication.
- To enhance context specific language skills.
- To discover the creative linguistic potential through language and literature.

- To develop communication skills necessary for employability.

Course Outcomes:

After the completion of the course, students will be able to:

- Apply acquired skills to communicate effectively in a corporate scenario.
- Demonstrate command over rhetoric of language.
- Develop critical and creative thinking through assimilated language skills.
- Utilize the communication skills learnt to match industry standards.

Course Contents:

Unit-I: Language Acquisition **7 Hours**
Remedial Grammar: Questions& Negatives; Questions Tags
Writing Skills: Email Writing
Activities: Group Discussions
Literature: Alphonse Daudet - The Last Lesson

Unit-II: Persuasive Skills **6 Hours**
Remedial Grammar: Past Simple & Past Perfect
Writing Skills: Report Writing
Activities: Book & Movie Reviews
Literature: Lord Alfred Tennyson – Ulysses

Unit-III: Cognitive Skills **7 Hours**
Remedial Grammar: Present & Past Passive; Conditionals
Writing Skills: Creative Writing
Activities: Role Plays
Literature: O. Henry – The Gift of the Magi

Unit-IV: Employability Skills **6 Hours** Remedial
Grammar: Reported Speech; Idioms
Writing Skills: Cover Letter & CV
Activities: Exchanging Information
Literature: Saki – The Open Window

Reference Books:

1. Bansal, R.K. and J.B. Harrison. *Spoken English*. Orient Blackswan, 2013.
2. Raman, Meenakshi and Sangeeta Sharma. *Technical Communication*. Oxford University Press, 2015.
3. Thorpe, Edgar and Showick Thorpe. *Objective English*. Pearson Education, 2013.
4. Dixson, Robert J. *Everyday Dialogues in English*. Prentice Hall India Pvt Ltd., 1988.
5. Turton, Nigel D. *ABC of Common Errors*. Mac Millan Publishers, 1995.
6. Samson, T. (ed.) *Innovate with English.* Cambridge University Press, 2010.
7. Kumar, E Suresh, J. Savitri and P Sreehari (ed). *Effective English*. Pearson Education, 2009.
8. Goodale, Malcolm. *Professional Presentation*. Cambridge University Press, 2013.

B21DA0201	Computer Networks	L	T	P	C
Duration : 14 WKS		4	0	0	4

Course Description:

The main emphasis of this course is introduction to fundamental network architecture concepts and their application in existing and emerging networks. It also covers the explanation of emerging network architecture. It provides a balanced view of all important elements and concepts of networking. The course includes the following topics: transmission media, Open Systems Interconnection (OSI) communication model, error detection and recovery, Routing algorithms and Elements of Transport protocols. On completion of the course, the student should be able in part to design, implement and maintain a typical computer network.

Prerequisites:

Knowledge about the fundamentals of how computer systems or devices communicate.

Course Objectives:

The objectives of this course are to:

1. Identify the different components and their respective roles in a communication System
2. Design an enterprise network employing the common LAN technologies and be able to evaluate the advantages and disadvantages
3. Describe the importance and functions of the OSI layers Physical, data link, network and transport layer

Course Outcomes:

On the successful completion of this course, Students shall be able to

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

Course Contents:

UNIT 1: **[13 Hours]**

Introduction: Uses of computer networks, Network Hardware, Network Software, Reference Models, Network Standardization.

The Physical Layer: Guided Transmission Media, Wireless Transmission, and Digital modulation and multiplexing, Switching: Circuit switching, packet switching. Mobile telephone system.

UNIT 2: **[13 Hours]**

The Data Link Layer: Data link layer design issues, Error Detection and Correction, Sliding window protocol, Example Data link protocols. MAC sub layer: channel allocation problem, Multiple Access Protocols, Ethernet, Wireless LANs, data link layer switching.

UNIT 3: **[13 Hours]**

The Network Layer: Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of Service, The network layer in the internet.

UNIT 4: **[13 Hours]**

Transport Layer: Elements of Transport protocols, UDP, TCP, Performance issues.
Application Layer: Domain Name system, Electronic Mail, WWW.

Text Books:

1. Andrew S Tanenbaim, David J Wetherall "Computer Networks", Pearson Education, 5th Edition, Elsevier Inc, 2014. (Chapter-1, 2, 3, 4, 5, 6, 7).

Reference Books:

2. Prakash C Guptha, "Data Communications and computer Network", Second Edition, PHI learning Pvt Ltd, Nov 2014.
3. BehrouzFerouzan, "Introduction to Data Communication & Networking" 5th Edition, McGraw Hill Education Pvt Ltd 2013
4. Larry &Peterson & Bruce S Davis, "Computer networks-A System Approach", 5th Edition, Elsevier Inc, 2014.

B21DA0202	Data Structures using C	L	T	P	C
Duration: 14Weeks		2	1	0	3

Course Description:

The purpose of this course is to provide the students with solid foundations in the basic concepts of programming: data structures using C. It offers the students a mixture of theoretical knowledge and practical experience. This course is used to 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. Also recognize which data structure is the best to use to solve a particular problem.

Prerequisites:

Familiarity with the Basics of Programming Languages and better knowledge in Logic building skills

Course Objectives:

The objectives of this course are to:

1. Assess how the choice of data structures and algorithm design methods.
2. Choose the appropriate data structure and algorithm design method for a specified application.

3. Write programs using function-oriented design principles.
4. 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 completion of this course the student will be able to

1. Design or select an appropriate data structures for a particular problem
2. Choose the appropriate data structure and design the algorithms and application methods on various data structures.
3. Apply their knowledge of data structures in writing more efficient programs in a programming language
4. Develop Applications using Linear and Non-Linear Data Structures.

Course Contents:

UNIT 1: [10 Hours]

Basics of Data Structures: Data Structures, Classifications (Primitive & Non Primitive), Data structure Operations, Review of Arrays-Inserting and deleting operations, String operations, Structures, Unions, Pointers and Dynamic Memory Allocation Functions.

UNIT 2: [10 Hours]

Linear Data Structures: Stack: Definition, Array representation, Linked list representation, Operations, Recursion, Towers of Hanoi, Applications of stack (Infix to postfix conversion, evaluation of expression).**Queue:**Definition, Array representation, Linked list representation, Operations, Applications; Types of queues: Simple queue, Circular queue, Double ended queue, Priority queue.

UNIT 3: [10 Hours]

Linked List: Definition, Singly linked list: Representation in memory, Traversing, Insertion, Deletion and Searching; Memory allocation; Garbage collection; Doubly linked list; Header linked list; Circular linked list.**Searching:**Linear and binary search.**Sorting:**Insertion, Selection, Bubble, Quick, Merge. Hashing: Hash table organizations, Hashing Functions, Static and Dynamic Hashing.

UNIT 4: [09 Hours]

Non Linear Data Structures: Need for non-linear structures, Trees and its representation, Binary Tree, types of Binary Trees, Binary tree traversals , applications of trees , Binary Search Tree, Introduction to Graph, Graph Traversal Techniques.

Text Books:

1. Ashok N Kamthane, “Introduction to Data Structures in C”, Pearson Education (S) Pvt Ltd., New Delhi: 2005. (Chapter 1 to 11)
2. YedidyahLangsam and Moshe J. Augenstein and Aaron M Tenanbanum, “Data Structures Uisng C and C++”, 2nd Edition, Pearson Education Asia, 2002. (Chapter 1 to 8)

Reference Books:

1. Jean-Paul Tremblay and Paul G Sorenson, “An Introduction to Data Structures with Applications”, Second Edition, Tata McGraw-Hill Publishing Company Lt., New Delhi: 1995.

2. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan (2008), Fundamentals of Data Structure in C, 2nd Edition, University Press, India.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education.
4. E. Balaguruswamy, "Data Structures using C", McGraw Hill Edition India Pvt. Ltd, 2013

B21DA0203	Object Oriented Programming using C++	L	T	P	C
Duration:14 Wks		2	1	0	3

Course Description:

This course provides in-depth coverage of object-oriented programming principles and techniques using C++. Topics include object, classes, operator overloading, data abstraction, information hiding, encapsulation, inheritance, polymorphism, templates and exception handling.

Prerequisites:

Before starting this course one should have a basic understanding of computer programs and computer programming language. If you know the concepts of C programming it will be much easier to understand this course

Course Objectives:

The objectives of this course are to:

1. Impart knowledge of object oriented programming concepts and implement them in C++.
2. Enable to differentiate procedure oriented and object-oriented concepts.
3. Equip with the knowledge of concept of Inheritance so that learner understands the need of inheritance.
4. Explain the importance of data hiding in object oriented programming

Course Outcomes:

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

1. Analyze the different Programming paradigm such as procedure oriented and object oriented programming methodology and conceptualize elements of OO methodology
2. Identify and Model real world objects and map it into programming objects for a legacy system
3. Explore the polymorphism , generalization and specialization relationship and solve problem using various OO methodology
4. Analyze and Interpretation of run time binding and solve run time errors and generalize solution to the problem using generic programming approach

Course Contents:

UNIT 1: **[10 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: Basic data types-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 2: **[10 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 3: ` **[10 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 4: **[09 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. (Unit I)
2. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill Publications, 2011.(Unit II,III &IV)

Reference Books:

1.HerbertSchildt, "C++: The Complete Reference" Osborne McGraw-Hill, Third edition, 1998.

2. P. B. Kotur, "Object Oriented Programming with C++" Eight Edition.

B21DA0204	Data Structures Lab	L	T	P	C
Duration: 14 Wks		0	0	2	2

Prerequisites:

Familiarity with the Basics of Programming Languages and better knowledge in Logic building skills

Course Objectives:

The objectives of this course are to:

1. To impart knowledge of efficient storage mechanisms of data for an easy access.
2. To design and implementation of various basic and advanced data structures.
3. To explain various techniques for representation of the data in the real world.
4. To develop application using data structures.
5. To equip with the concept of protection and management of data.

Course Outcomes:

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

1. Choose appropriate data structure as applied to specified problem definition.
2. Perform operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. Apply concepts learned in various domains like DBMS, compiler construction etc.
4. Use linear and non - linear data structures like stacks, queues, linked list etc.
5. Choose appropriate data structure as applied to specified problem definition.
6. Perform operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.

Lab Experiments

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.

B21DA0205	C++ Programming Lab	L	T	P	C
Duration: 14 Wks		0	0	2	2

Prerequisites:

Basic understanding of computer programs and computer programming language like C.

Course Objectives:

The objectives of this course are to:

1. To familiarize students with object - oriented concepts and their implementation in C++.
2. To facilitate students with the skills required to solve problems using object oriented concepts
3. To impart the knowledge required to write code with good coding practices.

Course Outcomes:

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

1. Explain the process of writing, compiling and executing programs in C++ using appropriate predefined functions in C++ .
2. Implement the object oriented concepts in developing application using C++.
3. Develop applications in C++ using the understanding of Inheritance and polymorphism.
4. Use exception handling while developing a C++ application.
5. Illustrate stream I/O, Files and usage of the available classes to handle stream objects in C++ language.
6. Develop complex applications by identifying the appropriate features of object oriented programming to solve real world problems using C++

Lab Experiments

PART – A

1. An electricity board charges the following rates to domestic users to discourage large consumption of energy:
   For the first 100 units – Rs.2 per unit
   For the first 200 units – Rs.4 per unit
   For the first 300 units – Rs. 6 per unit
   All users are charged a minimum of Rs. 50.00. If the total amount is more than Rs. 1000.00 then an additional surcharge of 15% is added.

Write a program to read the names of users and number of units consumed and print out the charges with names.

2. Define a class to represent a bank account. Include the following members:
   Data members:
   1. Name of the depositor.
   2. Account number.
   3. Type of account.
   4. Balance amount in the account.

   Member functions:
   1. To assign initial values.
   2. To deposit an amount.
   3. To withdraw an amount after checking the balance.
   4. To display the name and balance.

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

PART – B

Programs may be decided by External and Internal examiners.

B21LSM201	**Indian Constitution & Professional Ethics**
Duration :14 Wks	

Course Objectives:

The objectives of this course are to:

1. To impart knowledge on Constitution of India.
2. To facilitate the understanding of Fundamental Rights, Duties and other Rights which is been given by our law.
3. To facilitate the understanding of Constitution perspective and make them face the world as a bonafide citizen.
4. To attain knowledge about ethics and also know about professional ethics.
5. Explore ethical standards followed by different companies.

Course Outcomes:

On completion of the course, learners will be able to:

1. Explain the Indian constitutional provisions and follow them.
2. Demonstrate the fundamental rights and human rights.

3. Explain the duties and more importantly practice them in a right way.
4. Adopt the habit of raising their voice against a unconstitutionality of any laws and upon any legal discrimination as we have session of debates on Constitutional validity.
5. Demonstrate professional ethics and know about etiquettes about it.

Course Contents:

Unit -1: **[10 Hours]**

Constitution of India: Making of Indian Constitution, features 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 -2: **[10 Hours]**

Legislature and Executive: Organs of the Government; Legislature, Executive and Judiciary. Union and State Executives: President, Vice President, Prime Minister, Cabinet, Governor, Council of Ministers, Electoral process, Election Commission.

Unit -3: Judiciary **[06 Hours]**

Supreme Court of Indian, High Court, Right to Information Act 2005, Consumer Protection- Consumer Rights- Caveat Emptor and Caveat Venditor.

Unit 4: **[06 Hours]**

Professional Ethics: Definition Scope and need of Ethics for professional, Personal Ethics and Business Ethics, Ethical Standards, Duties of Employers and Employees. Due Care theory, Environmental Ethics, Ethical Code of Conduct in ethics. Best Ethical Companies in 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

B21DAM202	**Skill Development Program**
Duration :14 Weeks	

THIRD SEMESTER

Course code	Course Title	Course Type	L	T	P	C	Hrs./Wk.
B21AHK302	**Language III: Kannada**	**FC**	**1**	**1**	**0**	**2**	**3**

Course Description:

¨sÁµÉAiÀÄ£ÀÄß ªÀiÁvÀ£ÁqÀÄªÀ §gÉAiÀÄÄªÀ PË±À®å, ¸Á»vÀåzÀ §UÉÎ ¸ÀÆÜ®ªÁV ¥ÀjZÀ¬Ä¸ÀÄªÀ ªÀÄÄ®PÀ «zÁåyðUÀ¼À ªÀåQÛvÀé «PÁ¸À ºÁUÀÄ ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ¼À£ÀÄß UÀªÀÄ£ÀzÀ°èlÄÖPÉÆAqÀÄ, ¥Àæ¸ÀÄÛvÀ ¸ÀAzÀ¨sÀðPÉÌ «zÁåyðUÀ¼À£ÀÄß ¸ÀdÄÓUÉÆ½¸À®Ä ¥ÀoÀåªÀ£ÀÄß gÀÆ¦¸À¯ÁVzÉ. ¸Á»vÀå, PÀ¯É, ªÁtÂdå, DqÀ½vÁvÀäPÀ ªÀÄvÀÄÛ «eÁÕ£ÀzÀ «ZÁgÀUÀ½UÉ MvÀÛ£ÀÄß ¤ÃqÀ¯ÁVzÉ. EzÀÄ ªÉÆzÀ® JgÀqÀÄ ¸É«Ä¸ÀÖgï ªÀÄÆgÀÄ PÉærmïUÀ¼À£ÀÄß; ªÀÄÆgÀÄ ªÀÄvÀÄÛ £Á®Ì£ÉÃ ¸É«Ä¸ÀÖgï JgÀqÀÄ PÉærmïUÀ¼À£ÀÄß ºÉÆA¢zÉ.

Pre-requisite:

- PÀ£ÀßqÀ ¨sÁµÉAiÀÄ §UÉUÉ ¥ÁæxÀ«ÄPÀ w¼ÀÄªÀ½PÉ CUÀvÀå..
- ¨sÁµÉAiÀÄ£ÀÄß NzÀ®Ä ªÀÄvÀÄÛ §gÉAiÀÄ®Ä w½¢gÀ¨ÉÃPÀÄ.
- ¥ÀzÀ« ¥ÀÆªÀð ²PÀëtzÀ°è PÀ£ÀßqÀ ¨sÁµÉAiÀÄ£ÀÄß N¢gÀ¨ÉÃPÀÄ.

Pedagogy:

- Direct method
- ICT and Digital support
- Collaborative and Cooperative learning
- Differentiated Instruction
- Flipped Classroom

Course Objectives:

£Á®ÄÌ ¸É«Ä¸ÀÖgïUÀ¼À°è ¸ÀªÀÄUÀæ PÀ£ÀßqÀ ¸Á»vÀåªÀ£ÀÄß ¥ÀjZÀ¬Ä¸ÀÄªÀ GzÉÝÃ±ÀªÀ£ÀÄß ºÉÆA¢zÉ. CzÀgÀAvÉ ªÀÄÆgÀ£ÉAiÀÄ ¸É«Ä¸ÀÖgï£À°è £ÀªÉÇÃzÀAiÀÄ PÁªÀå, £ÀªÀå PÁªÀå, ªÁtÂdå PÀ£ÀßqÀ, ªÉÊeÁÕ¤PÀ ¯ÉÃR£ÀUÀ¼ÀÄ ªÀÄvÀÄÛ KPÁAPÀ ¸Á»vÀåªÀ£ÀÄß ¥ÀoÀåªÀ£ÁßV DAiÉÄÌ ªÀiÁrPÉÆAqÀÄ, «zÁåyðUÀ¼À°è ¸Á»vÀåzÀ §UÉÎ ¸ÀzÀ©ügÀÄaAiÀÄ£ÀÄß ªÀÄÆr¸À¯ÁUÀÄvÀÛzÉ. ¸ÁA¸ÀÌøwPÀ w¼ÀÄªÀ½PÉAiÀÄ eÉÆvÉUÉ ªÀåQÛvÀé «PÀ¸À£ÀzÀ PÀqÉUÉ UÀªÀÄ£À ¤ÃqÀ¯ÁUÀÄvÀÛzÉ.

- ¨sÁµÉ, ¸Á»vÀå, EwºÁ¸À ªÀÄvÀÄÛ ¸ÀA¸ÀÌøwUÀ¼À£ÀÄß PÀ£ÀßqÀ, PÀ£ÁðlPÀPÉÌ ¸ÀA§A¢ü¹zÀAvÉ ¥ÀjZÀ¬Ä¸À¯ÁUÀÄvÀÛzÉ.
- «zÁåyðUÀ¼À ¸ÀªÀðvÉÆÃªÀÄÄR ¨É¼ÀªÀtÂUÉUÉ C£ÀÄªÁUÀÄªÀAvÉ ºÁUÀÆ CªÀgÀ°è ªÀiÁ£ÀªÀ ¸ÀA§AzsÀUÀ¼À §UÉÎ UËgÀªÀ, ¸ÀªÀiÁ£ÀvÉ ªÀÄÆr¹, ¨É¼É¸ÀÄªÀ ¤nÖ£À°è ¥ÀoÀåUÀ¼À DAiÉÄÌAiÀiÁVzÉ.
- CªÀgÀ°è ¸ÀÈd£À²Ã®vÉ, ±ÀÄzÀÞ ¨sÁµÉ, GvÀÛªÀÄ «ªÀÄ±Áð UÀÄt, ¤gÀUÀð¼À ¸ÀA¨sÁµÀuÉ, ¨sÁµÀt PÀ¯É ºÁUÀÆ §gÀºÀ PË±À®åUÀ¼À£ÀÄß ¨É¼É¸ÀÄªÀÅzÀÄ UÀÄjAiÀiÁVzÉ
- ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ½UÉ C£ÀÄPÀÆ®ªÁUÀÄªÀAvÀºÀ «µÀAiÀÄUÀ¼À£ÀÄß UÀªÀÄ£ÀzÀ°èèlÄÖPÉÆAqÀÄ ¸ÀÆPÀÛ ¥ÀoÀåUÀ¼À£ÀÄß DAiÉÄÌ ªÀiÁrPÉÆ¼Àî¯ÁVzÉ.

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Course Outcomes:

£ÀªÉÇÃzÀAiÀÄ PÁªÀå, £ÀªÀå PÁªÀå, ªÁtÂdå PÀ£ÀßqÀ, ªÉÊeÁÕ¤PÀ ¯ÉÃR£ÀUÀ¼ÀÄ ªÀÄvÀÄÛ KPÁAPÀ £ÁlPÀzÀ PÀ°PÉAiÀÄ ªÀÄÆ®PÀ PÁ®zÀ ¹ÜvÀåAvÀgÀUÀ¼À£ÀÄß CzÀgÀ M¼À£ÉÆÃlUÀ¼À£ÀÄß ¨É¼É¸ÀÄvÀÛzÉ.

- ¸ÁªÀiÁfPÀ, gÁdQÃAiÀÄ, zsÁ«ÄðPÀ, ¸ÁA¸ÀÌøwPÀ, ¥Àj¸ÀgÀ ºÁUÀÆ °AUÀ¸ÀA§A¢ü «ZÁgÀUÀ¼ÉqÉ UÀªÀÄ£À ºÀj¸ÀÄªÀÅzÀgÉÆA¢UÉ «zÁåyðUÀ¼À°è ZÀZÁð ªÀÄ£ÉÆÃ¨sÁªÀªÀÅ ¨É¼ÉAiÀÄÄvÀÛzÉ.
- fÃªÀ£ÀzÀ°è §gÀÄªÀ C©ü¥ÁæAiÀÄ ¨ÉÃzsÀUÀ¼ÀÄ, ¸ÀªÀÄ¸ÉåUÀ¼À£ÀÄß DzsÀÄ¤PÀ ¸ÀAzÀ¨sÀðzÀ°è ªÀiÁ£À«ÃAiÀÄvÉAiÉÆA¢UÉ ¤ªÀð»¸ÀÄªÀAvÉ ¥ÉæÃgÉÃ¦¸ÀÄvÀÛzÉ.
- GvÀÛªÀÄ ¸ÀAªÀºÀ£À PÀ¯ÉAiÀÄ£ÀÄß ¨É¼É¸ÀÄªÀ GzÉÝÃ±ÀªÀ£ÀÄß FqÉÃj¸ÀÄvÀÛzÉ.
- ¸ÀA±ÉÆÃzÀ£Á ªÀÄ£ÉÆÃ¨sÁªÀ ªÀÄvÀÄÛ ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ½UÉ «zÁåyðUÀ¼À£ÀÄß ¸ÀdÄÓUÉÆ½¸ÀÄvÀÛzÉ.

Course Contents:

Unit – I **7 Hours**

1. zÀ.gÁ.¨ÉÃAzÉæ: E½zÀÄ ¨Á vÁAiÉÄ
2. PÀÄªÉA¥ÀÄ: zÉÃªÀgÀÄ gÀÄdÄ ªÀiÁrzÀ£ÀÄ
3. ªÀÄzsÀÄgÀZÉ£Àß: £À£Àß £À®è

Unit – II **7 Hours**

1. UÉÆÃ¥Á® PÀÈµÀÚ CrUÀ: £É® ¸À¥Án®è
2. PÉ.J¸ï.£ÀgÀ¹AºÀ¸Áé«Ä: EqÀ¢gÀÄ £À£Àß ¤£Àß ¹AºÁ¸À£ÀzÀ ªÉÄÃ¯É
3. ¦.®APÉÃ±ï: CªÀé

Unit – III **6 Hours**

1. ªÀÄgÀ½ÃzsÀgÀ ©. PÀÄ®PÀtÂð : Cw ¸ÀtÚ, ¸ÀtÚ ¥ÀæªÀiÁtzÀ GzÀåªÀÄUÀ¼ÀÄ ºÁUÀÆ «±ÉÃµÀ DyðPÀ ªÀ®AiÀÄ (J¸ï.E.gÉhÄqï)
2. ªÀÄºÉÃ±ï ZÀAzÀæ: ªÉÆ¨ÉÊ¯ï ¨ÁåAQAUï §®Ä ¸ÀÄ®¨sÀ
3. qÁ. f. gÁªÀÄPÀÈµÀÚ: «eÁÕ£À ªÀÄvÀÄÛ zsÀªÀÄð

Unit – VI **6 Hours**

1. VjÃ±ï PÁ£Áðqï: ªÀiÁ¤µÁzÀ (DAiÀÄÝ zÀÈ±ÀåUÀ¼ÀÄ)

¥ÀgÁªÀÄ±Àð£À UÀæAxÀUÀ¼ÀÄ :

1. ªÀÄÄUÀ½ gÀA.²æÃ., PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ, ¥ÀæPÁ±ÀPÀgÀÄ VÃvÁ §ÄPï ºË¸ï, ªÉÄÊ¸ÀÆgÀÄ. 2014
2. ¹ÃªÀiÁwÃvÀ PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ ¸ÀA¥ÀÄl 1,2,3,4,5 ªÀÄvÀÄÛ 6, PÀÄªÉA¥ÀÄ PÀ£ÀßqÀ CzsÀåAiÀÄ£À ¸ÀA¸ÉÜ, ªÉÄÊ¸ÀÆgÀÄ «±Àé«zÁå¤®AiÀÄ, ªÉÄÊ¸ÀÆgÀÄ. 2014
3. qÁ. CgÀ«AzÀ ªÀiÁ®UÀwÛ, ¸Á»vÀå ¸ÀA¸ÀÌøw ªÀÄvÀÄÛ zÀ°vÀ ¥ÀæeÉÕ, ¥ÀæPÁ±ÀPÀgÀÄ PÀ£ÀßqÀ ¸Á»vÀå ¥ÀjµÀvÀÄÛ, ¨ÉAUÀ¼ÀÆgÀÄ. 2014

4. qÁ. F.J¸ï. DªÀÄÆgÀ, PÀ£ÀßqÀ PÀxÀ£À ¸Á»vÀå : PÁzÀA§j, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2016
5. zÉÃ±À¥ÁAqÉ J¸ï.J¯ï., ¨ÉÃAzÉæ ±ÀjÃ¥sÀgÀ PÁªÁåAiÀiÁ£À, ¥ÀæPÁ±ÀPÀgÀÄ zÉÃ¹ ¥ÀÄ¸ÀÛPÀ, ¨ÉAUÀ¼ÀÆgÀÄ. 2013
6. QÃvÀð£ÁxÀ PÀÄvÀðPÉÆÃn, PÀ£ÀßqÀ ¸Á»vÀå ¸ÀAUÁw, ¥ÀæPÁ±ÀPÀgÀÄ PÀÄvÀðPÉÆÃn ªÉÄªÉÆÃjAiÀÄ¯ï læ¸ïÖ, zsÁgÀªÁqÀ. 2009
7. ±ÁªÀÄgÁAiÀÄ vÀ.¸ÀÄ., PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ, ¥ÀæPÁ±ÀPÀgÀÄ vÀ¼ÀÄQ£À ªÉAPÀtÚAiÀÄå ¸ÁägÀPÀ UÀæAxÀªÀiÁ¯É, ªÉÄÊ¸ÀÆgÀÄ -2014

Course code	Course Title	Course Type	L	T	P	C	Hrs./Wk.
B21AHH302	**Language III: Hindi**	**FC**	**1**	**1**	**0**	**2**	**3**

8. ¸ÀA. qÁ! ¹. Dgï. ZÀAzÀæ±ÉÃRgï, ªÀÄÄAzÁ¼ÀÄvÀ£ÀzÀ ®PÀëtUÀ¼À£ÀÄß ¨É¼É¹PÉÆ¼ÀÄîªÀÅzÀÄ ºÉÃUÉ?, ¥ÀæPÁ±ÀPÀgÀÄ £ÀªÀPÀ£ÁðlPÀ ¥À©èPÉÃµÀ£îì ¥ÉæöÊªÉmï °«ÄmÉqï. 2010
9. DzsÀÄ¤PÀ PÀ£ÀßqÀ PÁªÀå ¨sÁUÀ-2, PÀÄªÉA¥ÀÄ PÀ£ÀßqÀ CzsÀåAiÀÄ£À ¸ÀA¸ÉÜ, ªÉÄÊ¸ÀÆgÀÄ «±Àé«zÁå¤®AiÀÄ, ªÉÄÊ¸ÀÆgÀÄ. 2004
10. ²ªÀgÀÄzÀæ¥Àà f.J¸ï. PÀ£ÀßqÀ ¸Á»vÀå ¸À«ÄÃPÉë, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2013

Course Description:

यह पाठ्यक्रम नौसिखियाअपनी भाषा की क्षमता का विकास करने हेतु तथा विभिन्न साहित्यिक प्रक्रियाओं द्वारा , | संस्कृति एवं जीवन के मूल्यों को समझने हेतु अभिकल्पित है ,समाज

Prerequisites:

- अध्येता, पी.यु.सी के स्तर पर द्वितीय भाषा के रूप में हिन्दी का अध्ययन करना चाहिए |
- हिन्दी साहित्य के इतिहास का संक्षिप्त ज्ञान की आवश्यकता है |
- हिन्दी व्याकरण का अवबोधन आवश्यक है |
- अंग्रेज़ी – हिन्दी अनुवाद से संबंधित जानकारी जरुरी है |

Course Objectives:

1. संदर्भानुसार उचित भाषा का प्रयोग करने की दक्षता को छात्रों में उत्पन्न करना |
2. साहित्य के माध्यम से समाज एवं मानवीय मूल्यों को समझाकर, उन मूल्यों की रक्षा हेतु प्रेरित करना|
3. छात्रों में पुस्तक पठन एवं लेखन की अकृतिम प्रवृत्ति स्थापित करना |
4. अध्येताओं में साहित्य के माध्यम से प्रभावी एवं कुशल संचार का विकास करना |

Course Outcomes:

अध्ययन की समाप्ति पर अध्येता –

1. सामाजिक मूल्य एवं नैतिक जवाबदेही को स्वीकार कर सकता है |
2. साहित्य की प्रासंगिकता को जीवन में समझने की दक्षता रखता है |
3. समाज में अंतर्निहित पद्धतियाँ एवं विचारधाराओं का व्याख्यान करने में सक्षम बन सकता है |
4. साहित्य के माध्यम से प्रभावी एवं कुशल संचार का विकास करसकता है |

Course Contents:

Unit – 1: **[7 Hours]**

नाटक -आधे – अधूरे - मोहन राकेश
नाटक विधा का परिचय
आधे – अधूरे - प्रथम अंक

Unit – 2: **[7 Hours]**

नाटक -आधे – अधूरे - मोहन राकेश
आधे – अधूरे - द्वितीय अंक

Unit –3: **[6 Hours]**

नाटक -आधे – अधूरे - मोहन राकेश
आधे – अधूरे -तृतीय अंक

Unit -4: **[6 Hours]**

नगदी रहित व्यवहार

अ कम्प्युटर इंटरनेट प्रणाली द्वारा भुगतान.1
आ भ्रमणध्वनि द्वारा भुगतान
इ विभिन्न बैंकों के एप द्वारा भुगतान

सूचना : प्रत्येक इकाई 25 अंक के लिए निर्धारित है |

Text Books:

- नाटक -आधे – अधूरे - मोहन राकेश

Reference Book:

1. हिन्दी नाटक उद्भव और विकास –दशरथ ओझा
2. .हिन्दी साहित्य का इतिहास – डॉ.नागेन्द्र
3. आधुनिक हिन्दी साहित्य का इतिहास डॉ. बच्चन सिंह
4. हिन्दी साहित्य का नवीन इतिहास – डॉ. लालसाहब सिंह
5. शुद्ध हिन्दी कैसे बोले कैसे लिखे– पृथ्वीनाथ पांडे
6. हिन्दी नाटक और रंगमंच – डॉ.रामकुमार वर्मा
7. कंप्यूटर सूचना प्रणाली विकास – रामबंसल वाज्ञाचर्या
8. कंप्यूटर के भाषिक अनुपयोग - विजयकुमार मल्होत्रा

Course Code	Course Tittle	Course Type	L	T	P	C	Hrs./Wk.
B21AHA301	**Language III: Additional English**	**FC**	**1**	**1**	**0**	**2**	**3**

Course Description:

This 2-credit course allows the learners to explore the various socio-political aspects represented in literature. The concepts discussed in the course provide learning exposure to real life scenarios. The course is designed to develop critical thinking ability among learners, through the socio-political aspects discussed in literature. Thus, the aim is to produce responsible and sensitive individuals.
Prerequisites: The student must possess fair knowledge of language, literature and society.
Pedagogy: Direct method / ICT / Collaborative Learning / Flipped Classroom.

Course Objectives:

- To outline the global and local concerns of gender and identity.
- To identify the complexities of human emotions through literature.
- To assess the struggles of human survival throughout history.
- To compare and contrast between the various dimensions of childhood.

Course Outcome:

On completion of the course, learners will be able to:

- Evaluate the pressing gender issues within our society.
- Criticize human actions through a humane and tolerant approach.
- Perceive the human conflicts with an empathetic perspective.
- Disprove the assumption of a privileged childhood.

Course Contents:

Unit-I: Gender & Identity **7 hours**

Anne Sexton – Consorting with Angels
Eugene Field – The Doll's Wooing
Vijay Dan Detha – Double Life
Charlotte Perkins Gilman – The Yellow Wallpaper

Unit-II: Love & Romance **6 hours**

Alfred Noyes – The Highway Man
William Shakespeare – Sonnet 116
Frank Richard Stockton – The Lady or the Tiger?
Oscar Wilde – The Nightingale and the Rose

Unit-III: War & Trauma **7 hours**

Lord Alfred Tennyson – The Charge of the Light Brigade
Taufiq Rafat – The Medal
Guy de Maupassant – Two Friends
Sadaat Hasan Manto – Toba Tek Singh

Unit-IV: Children's Literature **6 hours**

William Blake – The Chimney Sweeper
D.H. Lawrence – Discord in Childhood
Anna Sewell – The Black Beauty (Extract)
Rudyard Kipling – The Jungle Book (Extract)

Reference Books:

- Sexton, Anne. *The Complete Poems*. Houghton Mifflin, 1999.
- Namjoshi, Suniti. *Feminist Fables*. Spinifex Press, 1998.
- Vanita, Ruth & Saleem Kidwai (ed.) *Same Sex Love in India*. Penguin India, 2008.
- Gilman, Charlotte Perkins. *The Yellow Wallpaper*. Rockland Press, 2017.
- Gale, Cengage Learning. *A Study Guide for Alfred Noyes's "The Highwayman"*. Gale, Study Guides, 2017. (Kindle Edition Available)
- Shakespeare, William. *Poems and Sonnets of William Shakespeare*. Cosimo Classics, 2007.
- Stockton, Frank Richard. *The Lady, or the Tiger?* Createspace Independent Publications, 2017.
- Wilde, Oscar. *The Collected Works of Oscar Wilde*. Wordsworth Editions Ltd., 1997.
- Tennyson, Lord Alfred. *The Complete Works of Alfred Tennyson*. Forgotten Books, 2017.
- Blake, William Erdman, David V. (ed.). *The Complete Poetry and Prose* (Newly revised ed.). Anchor Books, (1988).
- Maupassant, Guy de. *Guy de Maupassant-The Complete Short Stories*. Projapati, 2015.
- Manto, Sadaat Hasan. *Manto: Selected Short Stories*. RHI, 2012.
- Ricks, Christopher. *Metaphysical Poetry*. Penguin, 2006.
- Sewell, Anna. *The Black Beauty*. Maple Press, 2014.
- Kipling, Rudyard. *The Jungle Book*. Amazing Reads, 2018.

B21DA0301	Software Engineering	L	T	P	C
Duration:14 Weeks		4	0	0	4

Course Description:

This course is aimed at helping students build up an understanding of how to develop a software system from scratch by guiding them through the development process and giving them the fundamental principles of system development. The course will initiate students to the different software process models, project management, software requirements engineering process, systems analysis and design as a problem-solving activity, key elements of analysis and design, and the place of the analysis and design phases within the system development life cycle.

Prerequisites:

Basic knowledge of computer fundamentals, software systems, and software development processes.

Course Objectives:

The objectives of this course are to:

1. To classify the various Software Process Models.
2. To analyze a given problem and identify requirements.
3. To design a software using standard software engineering techniques.
4. To apply well defined software testing strategies to produce quality software.

Course Outcomes:

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

1. Define and understand the concepts, technologies used in the field of software engineering and various types of Models in software engineering.
2. Explain and analyze the different types of requirements which are gathered and model them based on various methods which are available.
3. Apply and identify the solutions through domain knowledge using the different design concepts which are available.
4. Understand, analyze, apply the software tools used for software quality assurance and software testing.

Course Contents:

UNIT 1: [13 Hours]

Introduction: The Nature of Software, Software Engineering, the Software Process, and Process Models: A Generic Process Model: Defining a Framework Activity, Identifying a Task Set. Process Assessment and Improvement, Perspective Process Models: The Waterfall Model, Incremental Process Model, Evolutionary Process Models.

Agile Development: What is Agility? Agility and the Cost of Change, Agile Process: Agility Principles, Human Factors, Extreme Programming (XP), Other Agile Process Models: Adaptive Software Development (ASD), Scrum, Dynamic System Development Method(DSDM), Crystal, Feature Driven Development(FDD).

UNIT 2: [13 Hours]

Requirements Modeling: Understanding Requirements: SRS Template (Example Case Study) ,Developing Use Case, Requirements Modeling: Requirements Analysis, Scenario Based Methods, UML Models That

Supplement the Use Case, Class-Based Methods, Behavior, Flow oriented models – DFD's and Web/Mobile Apps.

UNIT 3: **[13 Hours]**

Design Concepts: Design Concepts: The Design Process, Design Concepts, The Design Model, User Interface Design: The Golden Rules, User Interface Design Patterns. WebApp Design: Design Goals, A design pyramid for web app, WebApp interface design.

UNIT 4: **[13 Hours]**

Software Quality Assurance and Software Testing: Elements of Software Quality Assurance, SQA Tasks, Goals, and Metrics, Six Sigma for Software Engineering, Software Reliability.

Software Testing: Humans and Errors, Bugs, Faults and Failures, Purpose of Software Testing, Testing Techniques, Types of Testing, Basic Concepts and definitions. Testing life Cycle, Software Testing Verification and Validation Techniques, Static Testing, Testing Tool: Introduction, Automation Testing Framework, Types of automation tools, Case Study, Test Planning.

Text Books:

1. Roger S. Pressman, "SOFTWARE ENGINEERING, A PRACTITIONER'S APPROACH", 7th Edition, McGRAW-HILL Publication, 2010. (Unit I – IV) (Chapters: 1, 2, 3, 5, 6, 7, 8, 11, 13, 16)
2. Sandeep Desai, Abhishek Srivastava,"SOFTWARE TESTING : A PRACTICAL APPROACH", 2nd Edition, PHI Learning Pvt Ltd, 2016 (Unit IV –Software Testing) (Chapters: 1, 2, 3, 4, 6, 7)

Reference Books:

1. Ian Somerville,"SOFTWARE ENGINEERING", 9th edition, Pearson education.
2. Stephen Schach, "SOFTWARE ENGINEERING", 7th ed, McGraw-Hill, 2007.

Case Study for SRS:

The railway reservation system functions as follows;

The passenger is required to fill in a reservation form giving detail of his journey. The counter clerk ensures whether the place is available. If so, entries arc made in i register, tickets are prepared, amount is computed and cash is accepted. A booking statement is prepared in triplicate format from the reservation register. One copy of it is retained as office copy; the other is pasted on compartment and third is passed on to the train conductor. Besides booking statement, cash statement is prepared at the end of each shift.Prepare SRS and system specification for above system.

B21DA0302	**Java Programming**	**L**	**T**	**P**	**C**
Duration :14Wks		**2**	**1**	**0**	**3**

Course Description:

Java was designed to have the look and feel of the C++ programming language, but is simpler to use and enforces an object-oriented programming model. Java can be used to create complete applications that may run on a single computer or be distributed among servers and clients in a network.

Prerequisites:

Basic understanding of the C/C++ programming language.

Course Objectives:

The objectives of this course are to:

1. Relate the fundamentals of programming concepts such as variables, conditional and iterative execution, methods, etc.
2. Explore the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
3. Be able to use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes:

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

1. Knowledge of the structure and model of the Java programming language, using fundamentals and existed functionality of java programming (knowledge).
2. Identify and formulate the members of the Java class. Use the Java programming language for solving various programming technologies (understanding).
3. Evaluate user requirements for software functionality (required to decide whether the Java programming language can meet user requirements) and Develop software using techniques and functionalities available in the Java programming language, (application, analysis).
4. As a responsible student in the society with ethical values, propose the use of certain technologies by implementing them in the Java programming language to solve the given problem for the betterment of society. (Synthesis).
5. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (Evaluation).

Course Contents:

UNIT 1: **[10 Hours]**

Introduction to Java: JAVA Evolution: Java History, Java Features, How Java Differs from C and C++, Java Environment. Overview of JAVA Language: Introduction, Java Program structure, Java Tokens, Java Statements, Java Virtual Machine, Command Line Arguments, Constants, Variables, and Data Types Scope of variables, Type Casting, Operators and Expressions; Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type conversion and associability, Mathematical Functions. Decision Making and Branching: Decision Making Statement and Looping: while, do, for Statement.

UNIT 2: **[10 Hours]**

Classes, Arrays, Strings and Vectors: Classes, Objects and Methods: Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class Overriding Methods, Final Variables and Methods, Finalizer methods, Abstract Methods and Classes, Visibility Control. Arrays, Strings and Vectors: Arrays, One – dimensional Arrays, Creating an Array, Two– dimensional Arrays, Strings, Vectors, Wrapper Classes.

UNIT 3: **[10 Hours]**

Interfaces, Packages, and Multithreaded Programming: Interfaces: Multiple inheritance, Defining Interfaces, Extending Interfaces, Implementing Interfaces, and Accessing Interface Variables. Packages: Putting Classes together, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes. Multithreaded Programming, Creating Threads, Extending the Thread Class, Stopping and Blocking a thread, Life Cycle of a thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface.

UNIT 4: **[09 Hours]**

Managing Exceptions, Applet Programming: Managing Errors and Exception: Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging. Applet Programming: How Applets Differ from Applications, Preparing to Write Applets, Applet Life Cycle, Creating Executable applet, Applet Tag, Adding Applet to HTML File, running the Applet, More about Applet Tag, Passing Parameters to Applet, Aligning the Display, More HTML Tags, Getting Input from User.

Text Books:

1. E Balaguruswamy,"Programming with JAVA" , A Primer, TMH, Fourth Edition 2010.
2. Herbert Schildt, Dale Skrien, "Java Fundamentals, A comprehensive Introduction" ,Tata McGraw Hill Edition, 2013.
   (Chapters:1,2,3,4,5,6,7,8,9,10,11,12,13,15,22,23,24,25,26)

Reference Books:

1. Hari Mohan Pandey, "Java Programming", Pearson Education, 2012.
2. KoGenT, "Java 6 Programming, Black Book", Dream tech Press, 2012.

B21DA0303	Relational DBMS	L	T	P	C
Duration :14Wks		2	1	0	3

Course Description:

The course, Relational Database Management System, provides an introduction to the management of database systems. The course emphasizes the understanding of the fundamentals of relational systems including data

models, database architectures, and database manipulations. The course also provides an understanding of new developments and trends such as Internet database environment and data warehousing. The course uses a problem-basedapproachtolearning.

Prerequisites:

Basic knowledge of Database

Course Objectives:

The objectives of this course are:

1. To introduce the basic concepts in Database Systems and Relational Databases.
2. To expose the students to the steps in building E-R Diagrams and Normalization.
3. To train the students in the practical skills using Oracle9i software to develop and alter tables.
4. To equip the students with skills to manipulate tables using updation, deletion and arithmetic operations.
5. To provide the basic understanding to group data using built-in functions and join multiple tables.

Course Outcomes:

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

1. Understanding basic concepts of Database Systems and relate the knowledge of mathematical operations in databases.
2. Analyse and design the decomposed relational schema by using dependency algorithms.
3. Understanding the various features of Oracle 9i software tool and programming the various database languages.
4. Applying the knowledge of databases languages to find the solutions for real world database relatedapplications.

Course Contents:

UNIT 1: [10 Hours]

Introduction: Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Databases Design, Data Storage and Querying, Transaction Management, Database Architecture, Database Users and Administrator.

Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

UNIT 2: [10 Hours]

Database Design: Overview, Entity-Relationship Model, Constraints, Removing Redundant Attributes, E-R Diagrams, Reduction to Relational Schemas, E-R Design Issues, and Extended E-R Features.

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Functional-Dependency Theory, and algorithms for Decomposition, Decomposition using Multi valued Dependencies, More Normal Forms.

UNIT 3: **[10 Hours]**

Oracle9i: Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL *Plus Environment – SQL – Logging into SQL *Plus - SQL *Plus Commands – Errors & Help – Alternate Text Editors - SQL *Plus Worksheet - iSQL *Plus.

Oracle Tables:DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types – Spooling – Error codes.

UNIT 4: **[09 Hours]**

Working with Table: Data Management and Retrieval: DML –adding a new Row/Record – Customized Prompts – Updating and Deleting an Existing Rows/Records – retrieving Data from Table – Arithmetic Operations – restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure.

Functions and Grouping: Built-in functions – Grouping Data. Multiple Tables: Join – Set operations.

Text Books:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill. (Units 1 and 2).
2. Nilesh Shah, "Database Systems Using Oracle", 2nd edition, PHI. (Units 3 and 4)

Reference Books:

1. ArunMajumdar&Pritimoy Bhattacharya, "Database Management Systems", 2007, TMH.
2. Gerald V. Post, "Database Management Systems", 3rd edition, TMH.

B21DAS311	E-Commerce	L	T	P	C
Duration:14 Weeks		2	0	1	3

Course Description:

The subject of E-commerce basic concepts and technologies used in the field of E-Commerce, E-Payment systems, Inter Organizational and Intra Organizational E-Commerce, Advertising and Marketing on Internet, Apply compression and decompression techniques and codec required for Video Conferencing, Follow ethics in the usage of Smart Card and Digital Token, Demonstrate and analyze the difference between functional testing and structural testing, Analyze the performance of fault based testing, planning and Monitoring the process.

Prerequisites:

Need business model and technologies, social innovation and marketing strategies

Course Objectives:

The objectives of this course are to:

1. Acquaint students with a fundamental understanding of the environment and strategies in the New Economy.
2. Provide analytical tools to understand opportunities in unserved or underserved New Economy markets.
3. Provide a fundamental understanding of the different types and key components on business models in the New Economy.
4. Provide guiding principles behind the design and strategy of the customer web interface.
5. Provide insights on how to implement strategy in the New Economy.

Course Outcomes:

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

1. Gain Knowledge on:
   - The basic concepts and technologies used in the field of E-Commerce.
   - E-Payment systems.
   - Inter Organizational and Intra Organizational E-Commerce.
   - Advertising and Marketing on Internet.
2. Apply compression and decompression techniques and codec required for Video Conferencing.
3. Follow ethics in the usage of Smart Card and Digital Token.
4. Demonstrate and analyze the difference between functional testing and structural testing.
5. Analyze the performance of fault based testing, planning and Monitoring the process.

Course Contents:

UNIT 1: [10 Hours]

Introduction: Electronic Commerce and physical commerce, The DIGITAL phenomenon, Different types of Ecommerce, examples, E-Commerce scenarios, Advantages of E-Commerce, Myths about E-commerce.

Technologies (Fundamentals): Internet and WWW, web system architecture, URL, An overview of the internet, overview of HTTP, HTTP.

UNIT 2: [10 Hours]

Internet payment systems: Characteristics of payment systems, 4C payment methods, SET protocol for credit card payment, E –Cash, E-Check, Micropayment system, Overview of smart card, MONDEX.

Consumer oriented E-Commerce: Traditional retailing and e-retailing, Benefits of e-retailing, Key success factors, Models of e-retailing, Features of e-retailing.

UNIT 3: [10 Hours]

Business oriented E- Commerce: Features of B2B e-commerce, Business models, Integration. E-Services: Categories of e-services, Web-enables services, Matchmaking services.

UNIT 4: [09 Hours]

Web advertising and web publishing: Traditional versus internet advertising, Internet advertising techniques and strategies, Business models for advertising and their revenue streams, Pricing model and measurement of the effectiveness of advertisements, Web publishing-goals and criteria, web site development

methodologies, logical design of the user interface I-abstract user interface object, logical design of the user interface-II flow of interaction, Usability testing and quality assurance, Web presence and visibility

Text Books:

1. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, "E-Commerce, fundamentals and Applications" by, WILEY Edition.(Chapters: 01, 02, 10 to 14).

Reference Books:

1. Ravi Kalakota, Andrew B. Whinston, "Frontiers of Electronic Commerce", Pearson Education, 2009.
2. S.Jaiswal, Galgotia, "E-Commerce", revised edition, 2008.

B21DAS312	Design & Analysis of Algorithms	L	T	P	C
Duration:14 Weeks		2	0	1	3

Course Description:

Algorithms are essential to the study of computer science and are increasingly important in the natural sciences, social sciences and industry. In this course the student will learn how to effectively construct algorithms for different problems and apply techniques for analyzing algorithms including sorting, searching, and selection. Gain an understanding of algorithm design technique and work on algorithms for fundamental graph problems including depth-first search, worst and average case analysis, connected components, and shortest paths.

Prerequisites:

Basic knowledge of programming and mathematics. The students should know data structure very well.

Course Objectives:

The objectives of this course are to:

1. Analyze the asymptotic performance, prove the correctness and analyze the running time of the basic algorithms.
2. Design algorithms using the dynamic programming, greedy method and recite algorithms that employ this strategy.
3. Demonstrate Tree and graph traversal techniques.
4. Evaluation of Backtracking algorithms.

Course Outcomes:

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

1. Analyze the fundamental principles underlying algorithm analysis and design and be able to apply them in specific instances

2. Validate algorithms asymptotically and compute the performance analysis of algorithms with the same functionality.
3. Design an efficient algorithm and realize essentiality of the different techniques such as divide-and conquer, dynamic programming and the greedy methods and many of its applications
4. Implement various algorithms on graph data structures, including finding the minimum spanning tree and shortest path.

Course Contents:

UNIT 1: **[10 Hours]**

Introduction and Divide & Conquer technique: Definition of algorithm, Characteristics of algorithm, Important problem types, Fundamentals of Algorithmic Problem Solving using flow chart, Different methods to find the GCD of two integers, Order of Growth, Basic efficiency classes, Asymptotic Notations, Time and space complexity of an algorithms.**Divide and Conquer:**General Method, Binary Search, Merge Sort and Quick Sort.

UNIT 2: **[10 Hours]**

Greedy Method: General method, Fractional Knapsack Problem, Job Sequencing with deadline, Spanning trees, Minimum cost spanning trees: Prim's algorithm, Kruskal's Algorithm, Single Source Shortest Paths problems-Dijkstra's algorithm.

UNIT 3: **[10 Hours]**

Dynamic Programming: Introduction to Graphs, Types of graphs, Representation of graphs, Terms related to graph, General Method, Multi stage Graphs, Warshall's Algorithm for Transitive Closure, All pair ShortestPaths,0/1–knapsack, Flow Shop Scheduling.

UNIT 4: **[09 Hours]**

Traversal Techniques for Trees: Binary Tree, Properties of Binary Tree, Types of Binary Tree, Binary Tree Traversal Techniques: Pre-order traversal, In-order traversal and post-order traversal. Search techniques for graphs: Breadth First Search (BFS), Depth First Search (DFS).

Backtracking: General method, 4-Queens Problem, Sum of Subset Problem, Graph Coloring, Hamiltonian Circuit Problem.

Text Books:

1. SaraBaase, Allen Van Gelder, "Computer Algorithms, Introduction to design and Analysis", 3rdedition Pearson Publication, 2006 (Chapters 4, 5, 7, 8 and 9).
2. Horowitz E, Sahani S, Rajasekharan S, "Fundamentals of Computer Algorithms", Galgotia Publication 2005(Chapters 1, 3- 6 and 7).
3. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, "Fundamentals of Computer algorithm", 2005 (Chapters 1, 3, 4, 5, 6 and 7).

Reference Books:

1. A. M Padma Reddy, "Design and Analysis of Algorithms", Sri nandi Publications, 2017(Chapters 1-9).

2. Srikanth S, “Design and Analysis of Algorithms”, Skyward Publishers, 2015 (Chapter 1-8).
3. Chitra Ravi, “Design and Analysis of Algorithms”, Subhas Publishers, 2015 (Chapter 1-8).

B21DAS313	Enterprise Resource Planning	L	T	P	C
Duration :16Wks		2	0	1	3

Course Description:

Enterprise resource planning (ERP) is defined as the ability to deliver an integrated suite of business applications. This course will introduce about enterprise systems and show how organizations use enterprise systems to run their operations more efficiently and effectively.

Prerequisites:

Fundamentals of enterprise resource planning (ERP) systems concepts, and the importance of integrated information systems in an organization.

Course Objectives:

The objectives of this course are to:

1. Build an understanding of the fundamental concepts of ERP systems, their architecture, and working of different modules in ERP.
2. Learn various components of an application software that help computerize functioning of an enterprise such as sales, materials, production, financial , customer relationship AND supply chain modules.
3. Provide a contemporary and forward - looking on the theory and practice of Enterprise Resource Planning Technology.
4. Develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.
5. Prepare the students technological competitive and make them ready to self - upgrade with the higher technical skills.

Course Outcomes:

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

1. Describe the fundamentals of Enterprise software, express ideas its role in integrating business functions and analyze the strategic options for ERP identification and adoption.
2. Design the ERP implementation strategies using ERP tools to solve problems in different areas.
3. Interpret different modules of ERP applications, analyse and discover new Methodologies.
4. Predict the future directions and trends in ERP that adheres to business principles and values.

Course Contents:

UNIT 1: [10 Hours]

Introduction to ERP: Enterprise an Overview – Introduction to ERP - Basic ERP concepts – Justifying ERP investments - Risks of ERP- Benefits of ERP.

UNIT 2: [10 Hours]

ERP Technology:ERP and Related Technologies – Business Intelligence – E-Commerce and E-Business - Business Process Reengineering – Data Warehousing – Data Mining – OLAP – Supply Chain Management – Customer Relationship Management.

UNIT 3: [10 Hours]

ERP Implementation: Implementation Challenges, Implementation Strategies, Implementation Life Cycle, Implementation Methodologies, Project Management and Monitoring, Post Implementation activities.

ERP Business modules & Market: Business Modules of an ERP Package, Finance, Manufacturing, Human Resource, Quality Management, Marketing, Sales, Distribution and Service. ERP Marketplace and Marketplace Dynamics, SAP AG, Oracle Corporation, PeopleSoft.

UNIT 4: [09 Hours]

ERP Present and Future: Turbo Charge the ERP System, Enterprise Application Integration, ERP , Internet and WWW - ERP II – ERP and Total Quality Management - Future directions and Trends in ERP.

Text Books:

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, 1999.(Part I to III, V to VII)

Reference Books:

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

B21DA0304	Java programming Lab	L	T	P	C
Duration :16Wks		0	0	2	2

Lab Experiments:

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 Rhombus pattern reading the limit form user.
5. Write a program to implement all string operations.
6. Write a program to find area of geometrical figures using method.
7. Write a program to implement constructor overloading by passing different number of parameter of different types. .
8. Write a program to calculate bonus for different departments using method overriding.

Part - B

1. Write a program to implement mouse events.
2. Write a program to implement keyboard events.
3. Write a Applet program to demonstrate Applet Skelton.
4 Write a simple program that sets foreground and background colors and outputs a string.
5. Write a java program to demonstrate creation and importing packages.
6. Write a java program to demonstrate Interface concept in java.
7. Write a java program to demonstrate of creating new thread and starts running.
8. Demonstrate multiple thread concepts in java with help of program.
9. Implement program to handle Exceptions in java programming.

B21DA0305	RDBMS Lab	L	T	P	C
Duration :16Wks		0	0	2	2

Lab Experiments:

Practical List - 1

1. Create the following Tables and Insert the below data.

Salesmen

SNUM	SNAME	CITY	COMMISSION
1001	Piyush	London	12 %

1002	Sejal	Surat	13 %
1004	Miti	London	11 %
1007	Rajesh	Baroda	15 %
1003	Anand	New Delhi	10 %

SNUM : A unique number assigned to each salesman.

SNAME : The name of salesman.

CITY : The location of salesmen.

COMMISSION: The Salesmen's commission on orders.

Customers

CNUM	CNAME	CITY	RATING	SNUM
2001	Harsh	London	100	1001
2002	Gita	Rome	200	1003
2003	Lalit	Surat	200	1002
2004	Govind	Bombay	300	1002
2006	Chirag	London	100	1001
2008	Chinmay	Surat	300	1007
2007	Pratik	Rome	100	1004

CNUM : A unique number assigned to each customer.
CNAME: The name of the customer.

CITY : The location of the customer.

RATING: A level of preference indicator given to this customer.

SNUM : The number of salesman assigned to this customer.

Orders

ONUM	AMOUNT	ODATE	CNUM	SNUM
3001	18.69	10/03/97	2008	1007
3003	767.19	10/03/97	2001	1001
3002	1900.10	10/03/97	2007	1004
3005	5160.45	10/03/97	2003	1002
3006	1098.16	10/03/97	2008	1007

3009	1713.23	10/04/97	2002	1003
3007	75.75	10/04/97	2004	1002
3008	4723.00	10/05/97	2006	1001
3010	1309.95	10/06/97	2004	1002
3011	9891.88	10/06/97	2006	1001

ONUM : A unique number assigned to each order.
AMOUNT: The amount of an order.

ODATE: The date of an order.

CNUM : The number of customer making the order.

SNUM : The number of salesman credited with the sale.

Practical List - 2

1) Alter salesman table by setting snum as primary key.

2) Alter customer table by setting cnum as primary key.

3) Alter orders table by setting onum as primary key.

4) Alter orders table by adding snum and cnum as foreign keys

5) Alter customer table by adding snum as foreign keys

6) Insert any five records in customers table.

7) Update the name of the customer in the customers table from Lalit to Girish

8) Remove all orders from customer Chirag from the orders table.

Practical List - 3

1. Produce the order no, amount and date of all orders.
2. Give all the information about all the customers with salesman number 1001.
3. Display the following information in the order of city, sname,snum and commission.
4. List of rating followed by the name of each customer in Surat.
5. List of all orders for more than Rs. 1000.
6. List all customers whose names begins with letter 'A' to 'G'.
7. List of names and cities of all salesmen in London with commission above 10%.

8. List all customers excluding those with rating <= 100 unless they are located in Rome.

9. List all orders for more than Rs.1000 except the orders of snum<1006 of 10/03/97.

10. List all orders with zero or NULL amount.

Practical List - 4

1) Display cnum, cname, city from customer details table.

2) Display all snum without duplicates from all orders.

3) Display names and commissions of all salespeople in London.

4) All customers who were either located in Rome or had a rating above 200.

5) All customers with NULL values in city column.

6) All orders taken on Oct 3Rd and Oct 4th 1997.

7) Largest order taken by each salesperson with order value more than $3000.

8) Select each customer's smallest order.

9) Count the number of salespeople currently listing orders in the order table.

10) All customers serviced by Piyush or Miti.

Practical List - 5

Solve the following using PL/SQL Block.

1) Reverse of a Number
2) Factorial of a number
3) Write a PL/SQL to update the rate field by 20% more than the current rate in inventory table which has the following fields: Prono, ProName and Rate. After updating the table a new field (Alter) called for Number of item and place for values for the new field without using PL/SQL block.
4) Write a PL/SQL to split the student table into two tables based on result (One table for ―Pass‖ and another for ―Fail‖). Use cursor for handling records of student table. Assume necessary fields and create a student details table.

B21PTM301/ B21DAM301	**Soft Skills**
Duration :16Wks	

B21DAM302	**Skill Development Program**

Duration :16Wks	

FOURTH SEMESTER

Course code	Course Title	Course Type	L	T	P	C	Hrs./Wk.
B21AHK402	Language IV: Kannada	FC	1	1	0	2	3

Course Description

¨sÁµÉAiÀÄ£ÀÄß ªÀiÁvÀ£ÁqÀÄªÀ §gÉAiÀÄÄªÀ PË±À®å, ¸Á»vÀåzÀ §UÉÎ ¸ÀÆÜ®ªÁV ¥ÀjZÀ¬Ä¸ÀÄªÀ ªÀÄÆ®PÀ «zÁåyðUÀ¼À ªÀåQÛvÀé «PÁ¸À ºÁUÀÄ ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ¼À£ÀÄß UÀªÀÄ£ÀzÀ°èlÄÖPÉÆAqÀÄ, ¥Àæ¸ÀÄÛvÀ ¸ÀAzÀ¨sÀðPÉÌ «zÁåyðUÀ¼À£ÀÄß ¸ÀdÄÓUÉÆ½¸À®Ä ¥ÀoÀåªÀ£ÀÄß gÀÆ¦¸À¯ÁVzÉ. ¸Á»vÀå, PÀ¯É, ªÁtÂdå, DqÀ½vÁvÀäPÀ ªÀÄvÀÄÛ «eÁÕ£ÀzÀ «ZÁgÀUÀ½UÉ MvÀÛ£ÀÄß ¤ÃqÀ¯ÁVzÉ. EzÀÄ ªÉÆzÀ® JgÀqÀÄ ¸É«Ä¸ÀÖgï ªÀÄÆgÀÄ PÉærmïUÀ¼À£ÀÄß; ªÀÄÆgÀÄ ªÀÄvÀÄÛ £Á®Ì£ÉÃ ¸É«Ä¸ÀÖgï JgÀqÀÄ PÉærmïUÀ¼À£ÀÄß ºÉÆA¢zÉ.

Pre-requisite:

- PÀ£ÀßqÀ ¨sÁµÉAiÀÄ §UÉUÉ ¥ÁæxÀ«ÄPÀ w¼ÀÄªÀ½PÉ CUÀvÀå..
- ¨sÁµÉAiÀÄ£ÀÄß NzÀ®Ä ªÀÄvÀÄÛ §gÉAiÀÄ®Ä w½¢gÀ¨ÉÃPÀÄ.
- ¥ÀzÀ« ¥ÀÆªÀð ²PÀëtzÀ°è PÀ£ÀßqÀ ¨sÁµÉAiÀÄ£ÀÄß N¢gÀ¨ÉÃPÀÄ.

Pedagogy:

- Direct method
- ICT and Digital support (Links attached)
- Collaborative and Cooperative learning
- Differentiated Instruction

- Flipped Classroom

Course Objectives:

£Á®ÄÌ ¸É«Ä¸ÀÖgïUÀ¼À°è ¸ÀªÀÄUÀæ PÀ£ÀßqÀ ¸Á»vÀåªÀ£ÀÄß ¥ÀjZÀ¬Ä¸ÀÄªÀ GzÉÝÃ±ÀªÀ£ÀÄß ºÉÆA¢zÉ. CzÀgÀAvÉ £Á®Ì£ÉÃ ¸É«Ä¸ÀÖgï£À°è zÀ°vÀ - §AqÁAiÀÄ PÁªÀå, ¹ÛçÃªÁ¢ PÁªÀå, ¸ÀªÀÄPÁ°Ã£À PÁªÀå, DqÀ½vÁvÀäPÀ PÀ£ÀßqÀ, ªÉÊeÁÕ¤PÀ ¯ÉÃR£ÀUÀ¼ÀÄ ªÀÄvÀÄÛ PÁzÀA§j ¸Á»vÀåªÀ£ÀÄß ¥ÀoÀåªÀ£ÁßV DAiÉÄÌ ªÀiÁrPÉÆAqÀÄ, «zÁåyðUÀ¼À°è ¸Á»vÀåzÀ §UÉÎ ¸ÀzÀ©ügÀÄaAiÀÄ£ÀÄß ªÀÄÆr¸À¯ÁUÀÄvÀÛzÉ. ¸ÁA¸ÀÌøwPÀ w¼ÀÄªÀ½PÉAiÀÄ eÉÆvÉUÉ ªÀåQÛvÀé «PÀ¸À£ÀzÀ PÀqÉUÉ UÀªÀÄ£À ¤ÃqÀ¯ÁUÀÄvÀÛzÉ.

- ¨sÁµÉ, ¸Á»vÀå, EwºÁ¸À ªÀÄvÀÄÛ ¸ÀA¸ÀÌøwUÀ¼À£ÀÄß PÀ£ÀßqÀ, PÀ£ÁðlPÀPÉÌ ¸ÀA§A¢ü¹zÀAvÉ ¥ÀjZÀ¬Ä¸À¯ÁUÀÄvÀÛzÉ.
- «zÁåyðUÀ¼À ¸ÀªÀðvÉÆÃªÀÄÄR ¨É¼ÀªÀtÂUÉUÉ C£ÀÄªÁUÀÄªÀAvÉ ºÁUÀÆ CªÀgÀ°è ªÀiÁ£ÀªÀ ¸ÀA§AzsÀUÀ¼À §UÉÎ UËgÀªÀ, ¸ÀªÀiÁ£ÀvÉ ªÀÄÆr¹, ¨É¼É¸ÀÄªÀ ¤nÖ£À°è ¥ÀoÀåUÀ¼À DAiÉÄÌAiÀiÁVzÉ.
- CªÀgÀ°è ¸ÀÈd£À²Ã®vÉ, ±ÀÄzÀÞ ¨sÁµÉ, GvÀÛªÀÄ «ªÀÄ±Áð UÀÄt, ¤gÀUÀð¼À ¸ÀA¨sÁµÀuÉ, ¨sÁµÀt PÀ¯É ºÁUÀÆ §gÀºÀ PË±À®åUÀ¼À£ÀÄß ¨É¼É¸ÀÄªÀÅzÀÄ UÀÄjAiÀiÁVzÉ
- ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ½UÉ C£ÀÄPÀÆ®ªÁUÀÄªÀAvÀºÀ «µÀAiÀÄUÀ¼À£ÀÄß UÀªÀÄ£ÀzÀ°èèlÄÖPÉÆAqÀÄ ¸ÀÆPÀÛ ¥ÀoÀåUÀ¼À£ÀÄß DAiÉÄÌ ªÀiÁrPÉÆ¼Àî¯ÁVzÉ.

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Course Outcomes:

zÀ°vÀ - §AqÁAiÀÄ PÁªÀå, ¹ÛçÃªÁ¢ PÁªÀå, ¸ÀªÀÄPÁ°Ã£À PÁªÀå, DqÀ½vÁvÀäPÀ PÀ£ÀßqÀ, ªÉÊeÁÕ¤PÀ ¯ÉÃR£ÀUÀ¼ÀÄ ªÀÄvÀÄÛ PÁzÀA§jAiÀÄ ¸Á»vÀå PÀ°PÉAiÀÄ ªÀÄÆ®PÀ PÁ®zÀ ¹ÜvÀåAvÀgÀUÀ¼À£ÀÄß CzÀgÀ M¼À£ÉÆÃlUÀ¼À£ÀÄß ¨É¼É¸ÀÄvÀÛzÉ.

- ¸ÁªÀiÁfPÀ, gÁdQÃAiÀÄ, zsÁ«ÄðPÀ, ¸ÁA¸ÀÌøwPÀ, ¥Àj¸ÀgÀ ºÁUÀÆ °AUÀ¸ÀA§A¢ü «ZÁgÀUÀ¼ÉqÉ UÀªÀÄ£À ºÀj¸ÀÄªÀÅzÀgÉÆA¢UÉ «zÁåyðUÀ¼À°è ZÀZÁð ªÀÄ£ÉÆÃ¨sÁªÀªÀÅ ¨É¼ÉAiÀÄÄvÀÛzÉ.
- fÃªÀ£ÀzÀ°è §gÀÄªÀ C©ü¥ÁæAiÀÄ ¨ÉÃzsÀUÀ¼ÀÄ, ¸ÀªÀÄ¸ÉåUÀ¼À£ÀÄß DzsÀÄ¤PÀ ¸ÀAzÀ¨sÀðzÀ°è ªÀiÁ£À«ÃAiÀÄvÉAiÉÆA¢UÉ ¤ªÀð»¸ÀÄªÀAvÉ ¥ÉæÃgÉÃ¦¸ÀÄvÀÛzÉ.
- GvÀÛªÀÄ ¸ÀAªÀºÀ£À PÀ¯ÉAiÀÄ£ÀÄß ¨É¼É¸ÀÄªÀ GzÉÝÃ±ÀªÀ£ÀÄß FqÉÃj¸ÀÄvÀÛzÉ.
- ¸ÀA±ÉÆÃzÀ£Á ªÀÄ£ÉÆÃ¨sÁªÀ ªÀÄvÀÄÛ ¸ÀàzsÁðvÀäPÀ ¥ÀjÃPÉëUÀ½UÉ «zÁåyðUÀ¼À£ÀÄß ¸ÀdÄÓUÉÆ½¸ÀÄvÀÛzÉ.

COURSE CONTENT

Unit – I **7 Hours**

1. ¹zÀÞ°AUÀAiÀÄå: ZÉÆÃªÀÄ£À ªÀÄPÀÌ¼À ºÁqÀÄ
2. «Ã.aPÀÌ«ÃgÀAiÀÄå: E®è ©qÀÄUÀqÉ £ÀªÀÄUÉ
3. ºÉZï.J¸ï.²ªÀ¥ÀæPÁ±ï: ªÀÄUÀÄ ªÀÄvÀÄÛ ºÀtÄÚUÀ¼ÀÄ

Unit – II **7 Hours**

1. ZÀ.¸ÀªÀðªÀÄAUÀ®: vÀqÉ
2. «.Dgï.PÁ¥ÉðAlgï: zsÁå£À¸ÀÛ §AUÀ¯ÉUÀ¼ÀÄ
3. ¨sÀÄªÀ£À »gÉÃªÀÄoÀ: læAiÀÄ¯ï gÀÆ«Ä£À C¥ÀìgÉAiÀÄgÀÄ

Unit – III **6 Hours**

1. ¥ÀvÀæ¯ÉÃR£À ªÀÄvÀÄÛ ªÀgÀ¢UÀ¼À vÀAiÀiÁj
2. n.f.²æÃ¤ü:«eÁÕ£À ¸ÀAªÀ£ÀPÉÌ DzsÀÄ¤PÀ vÀAvÀæeÁÕ£ÀzÀ ¸ÀªÀ®vÀÄÛUÀ¼ÀÄ
3. ºÉZï.ªÀÄgÀ¹AºÀAiÀÄå: «eÁÕ£À ªÀÄvÀÄÛ ¸ÀªÀiÁd

Unit – VI **6 Hours**

1. ²æÃPÀÈµÀÚ D®£ÀºÀ½î: PÁqÀÄ (DAiÀÄÝ ¨sÁUÀ)

¥ÀgÁªÀÄ±Àð£À UÀæAxÀUÀ¼ÀÄ :

1. ªÀÄÄUÀ½ gÀA.²æÃ., PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ, ¥ÀæPÁ±ÀPÀgÀÄ VÃvÁ §ÄPï ºË¸ï, ªÉÄÊ¸ÀÆgÀÄ. 2014
2. ¹ÃªÀiÁwÃvÀ PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ ¸ÀA¥ÀÄl 1,2,3,4,5 ªÀÄvÀÄÛ 6, PÀÄªÉA¥ÀÄ PÀ£ÀßqÀ CzsÀåAiÀÄ£À ¸ÀA¸ÉÜ, ªÉÄÊ¸ÀÆgÀÄ «±Àé«zÁå¤®AiÀÄ, ªÉÄÊ¸ÀÆgÀÄ. 2014
3. qÁ. CgÀ«AzÀ ªÀiÁ®UÀwÛ, ¸Á»vÀå ¸ÀA¸ÀÌøw ªÀÄvÀÄÛ zÀ°vÀ ¥ÀæeÉÕ, ¥ÀæPÁ±ÀPÀgÀÄ PÀ£ÀßqÀ ¸Á»vÀå ¥ÀjµÀvÀÄÛ, ¨ÉAUÀ¼ÀÆgÀÄ. 2014
4. qÁ. F.J¸ï. DªÀÄÄÆgÀ, PÀ£ÀßqÀ PÀxÀ£À ¸Á»vÀå : PÁzÀA§j, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2016
5. zÉÃ±À¥ÁAqÉ J¸ï.J¯ï., ¨ÉÃAzÉæ ±ÀjÃ¥sÀgÀ PÁªÁåAiÀiÁ£À, ¥ÀæPÁ±ÀPÀgÀÄ zÉÃ¹ ¥ÀÄ¸ÀÛPÀ, ¨ÉAUÀ¼ÀÆgÀÄ. 2013
6. QÃvÀð£ÁxÀ PÀÄvÀðPÉÆÃn, PÀ£ÀßqÀ ¸Á»vÀå ¸ÀAUÁw, ¥ÀæPÁ±ÀPÀgÀÄ PÀÄvÀðPÉÆÃn ªÉÄªÉÆÃjAiÀÄ¯ï læ¸ïÖ, zsÁgÀªÁqÀ. 2009
7. ±ÁªÀÄgÁAiÀÄ vÀ.¸ÀÄ., PÀ£ÀßqÀ ¸Á»vÀå ZÀjvÉæ, ¥ÀæPÁ±ÀPÀgÀÄ vÀ¼ÀÄQ£À ªÉAPÀtÚAiÀÄå ¸ÁägÀPÀ UÀæAxÀªÀiÁ¯É, ªÉÄÊ¸ÀÆgÀÄ -2014
8. ¸ÀA. qÁ! ¹. Dgï. ZÀAzÀæ±ÉÃRgï, ªÀÄÄAzÁ¼ÀÄvÀ£ÀzÀ ®PÀëtUÀ¼À£ÀÄß ¨É¼É¹PÉÆ¼ÀÄîªÀÅzÀÄ ºÉÃUÉ?, ¥ÀæPÁ±ÀPÀgÀÄ £ÀªÀPÀ£ÁðlPÀ ¥À©èPÉÃµÀ£ïì ¥ÉæöÊªÉmï °«ÄmÉqï. 2010
9. DzsÀÄ¤PÀ PÀ£ÀßqÀ PÁªÀå ¨sÁUÀ-2, PÀÄªÉA¥ÀÄ PÀ£ÀßqÀ CzsÀåAiÀÄ£À ¸ÀA¸ÉÜ, ªÉÄÊ¸ÀÆgÀÄ «±Àé«zÁå¤®AiÀÄ, ªÉÄÊ¸ÀÆgÀÄ. 2004

10. ²ªÀgÀÄzÀæ¥Àà f.J¸ï. PÀ£ÀßqÀ ¸Á»vÀå ¸À«ÄÃPÉë, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2013

Course Description:

यह पाठ्यक्रम नौसिखियाअपनी भाषा की क्षमता का विकास करने हेतु तथा विभिन्न साहित्यिक प्रक्रियाओं द्वारा , | संस्कृति एवं जीवन के मूल्यों को समझने हेतु अभिकल्पित है ,समाज

Prerequisites:

- अध्येता, पी.यु.सी के स्तर पर द्वितीय भाषा के रूप में हिन्दी का अध्ययन करना चाहिए |
- हिन्दी साहित्य के इतिहास का संक्षिप्त ज्ञान की आवश्यकता है |
- हिन्दी व्याकरण का अवबोधन आवश्यक है |
- अंग्रेज़ी – हिन्दी अनुवाद से संबंधित जानकारी जरुरी है |

Course Objectives:

Course code	Course Title	Course Type	L	T	P	C	Hrs./Wk.
B21AHH402	Language IV: Hindi	FC	1	1	0	2	3

1. संदर्भानुसार उचित भाषा का प्रयोग करने की दक्षता को छात्रों में उत्पन्न करना |
2. साहित्य के माध्यम से समाज एवं मानवीय मूल्यों को समझाकर, उन मूल्यों की रक्षा हेतु प्रेरित करना|
3. छात्रों में पुस्तक पठन एवं लेखन की अकृतिम प्रवृत्ति स्थापित करना |
4. अध्येताओं में साहित्य के माध्यम से प्रभावी एवं कुशल संचार का विकास करना |

Course Outcomes:

अध्ययन की समाप्ति पर अध्येता –

1. सामाजिक मूल्य एवं नैतिक जवाबदेही को स्वीकार कर सकता है |
2. साहित्य की प्रासंगिकता को जीवन में समझने की दक्षता रखता है |
3. समाज में अंतर्निहित पद्दतियाँ एवं विचारधाराओं का व्याख्यान करने में सक्षम बन सकता है |
4. साहित्य के माध्यम से प्रभावी एवं कुशल संचार का विकास करसकता है |

Course Contents:

Unit – 1: **[7 Hours]**

उपन्यास -दौड़ – ममता कालिया

Unit – 2: **[7 Hours]**

उपन्यास -दौड़ – ममता कालिया

Unit –3: **[6 Hours]**

उपन्यास -दौड़ – ममता कालिया

Unit -4: **[6 Hours]**

भाषाई कम्प्युटर

1 यूनिकोड की वर्तमान स्थिति

आ ब्लॉग लेखन

1 ब्लॉग लेखन का महत्व

2 हिन्दी मैं ब्लॉग लेखन की प्रविधि

सूचना : प्रत्येक इकाई 25 अंक के लिए निर्धारित है |

Text Books:

उपन्यास -दौड़ – ममता कालिया

Reference Book:

1. हिन्दी उपन्यास का विकास – मधुरेश
2. हिन्दी टंकण सिद्दांत – शिवनारायण चतुर्वेदी
3. हिन्दी साहित्य का इतिहास - डॉ. नागेन्द्र
4. आधुनिक हिन्दी साहित्य का इतिहास - डॉ. बच्चन सिंह
5. हिन्दी साहित्य का नवीन इतिहास - डॉ. लाल साहब सिंह
6. शुद्ध हिन्दी कैसे बोले कैसे लिखे- पृथ्वीनाथ पाण्डे
7. प्रयोजनमूलक हिन्दी – डॉ.अम्बादास देशमुख

8. कंप्यूटर के भाषिक अनुपयोग–विजयकुमार मलहोत्रा

Course Code	Course Tittle	Course Type	L	T	P	C	Hrs./Wk.
B21AHA401	**Language IV: Additional English**	**FC**	**1**	**1**	**0**	**2**	**3**

Course Description:

This 2-credit course helps the learner explore various socio-cultural issues through literature. The course provides insight on matters like education and culture that are pertinent in the contemporary society. The course also offers multi-dimensional perspective in the genres of literature and contributes for language enrichment.

Prerequisites: The student must possess fair knowledge of language, literature, culture and society.
Pedagogy: Collaborative Method, Flipped Classroom, Blended Learning

Course Objectives:

- To infer the myths from the contemporary perspective.
- To outline the idea of family represented in literature.
- To interpret horror and suspense as a genre of literature.
- To assess the impact of education in building a society.

Course Outcome:

On completion of the course, learners will be able to:

- Examine the relevance of myths and mythology.
- Demonstrate family values and ethics essential to live in the society.
- Analyze horror and suspense as a significant genre of literature.
- Evaluate the applicability of academic contribution in building a society.

Course Contents:

Unit-I: Myths & Mythology **6 hours**
John W. May – Narcissus
W.B. Yeats – The Second Coming
Devdutt Pattanaik - *Shikhandi and the Other Stories They Don't Tell you* (Extracts)

Unit-II: Family & Relationships **6 hours**
Nissim Ezekiel – Night of the Scorpion
Langston Hughes – Mother to Son
Kate Chopin – The Story of an Hour
Henrik Ibsen – A Doll's House (Extract)

Unit-III: Horror & Suspense **7 hours**
Edgar Allan Poe – The Raven
Bram Stoker – A Dream of Red Hands
Satyajit Ray – Adventures of Feluda (Extract)

Unit-IV: Education **7 hours**

The Dalai Lama – The Paradox of Our Times
Kamala Wijeratne – To a Student
Sudha Murthy – In Sahyadri Hills, a Lesson in Humility
Frigyes Karinthy – Refund

Reference Books:

- Finneran, Richard J. *The Collected Works of W.B. Yeats*(Volume I: The Poems: Revised Second Edition). Simon & Schuster, 1996.
- Pattanaik, Devdutt. *Shikhandi: Ánd Other 'Queer' Tales They Don't Tell You*. Penguin Books, 2014.
- Ezekiel, Nissim. *Collected Poems* (With A New Introduction By John Thieme). OUP, 2005.
- Hughes, Langston. *The Collected Poems of Langston Hughes*. Vintage, 1995.
- Chopin, Kate. *The Awakening and Selected Stories of Kate Chopin*. Simon & Schuster, 2004.
- Ibsen, Henrik. *A Doll's House*. Maple Press, 2011.
- Poe, Edgar Allan. *The Complete Poetry of Edgar Allan Poe*. Penguin USA, 2008.
- Stoker, Bram. *Dracula*. Fingerprint Publishing, 2013.
- Ray, Satyajit. *The Complete Adventures of Feluda* (Vol. 2). Penguin Books Ltd., 2015.
- Lama, Dalai. *Freedom In Exile: The Autobiography of the Dalai Lama of Tibet*. Little, Brown Book Group, 1998.
- Murthy, Sudha. *Wise and Otherwise: A Salute to Life*. Penguin India, 2006.

B21DA0401	Data Mining & Data Warehousing	L	T	P	C
Duration :16Wks		4	0	0	4

Course Description:

Data Mining studies algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data. The subject of data mining deals with methods for developing useful decision-making information from large databases. Using a combination of procedures from statistics, mathematics, and computer science, analysts "mine the data" in the warehouse to convert it into useful information, hence the name data mining.

Prerequisites:

Basic knowledge database and Data Warehousing concepts.

Course Objectives:

The objectives of this course are to:

1. Relate data Mining principles and techniques and introduce Data Mining as a cutting edge business intelligence.
2. Discover interesting patterns, to analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
3. Identify Applications and Trends of Data mining.
4. Expose the students to the concepts of Data Warehousing Architecture and Implementation.

Course Outcomes:

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

1. Discover and measure interesting patterns from different kinds of databases.
2. Evolve Multidimensional Intelligent model from typical system.
3. Discover the knowledge imbibed in the high dimensional system.
4. Evaluate various mining techniques on complex data objects.

Course Contents:

UNIT 1: **[13 Hours]**

Data Mining–Introduction - Basic data mining tasks – data mining versus knowledge discovery in databases – Data mining issues – Data mining metrics – Social implications of data mining – Data mining from a database perspective.

Data Mining Techniques: Introduction – A Statistical Perspective on data mining – Similarity Measures – Decision Trees.

UNIT 2: **[13 Hours]**

Classification: Introduction – Issues in Classification - Statistical – based algorithms - Distance – based algorithms – Decision tree - based algorithms.

Clustering: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms: Agglomerative Algorithms – Divisive Algorithms - Partitioned Algorithms: Minimum Spanning Tree – Squared Error Clustering algorithm – K-Means Clustering – Nearest neighbor algorithm.

UNIT 3: **[13 Hours]**

Association rules: Introduction - Large item sets - Basic algorithms: Apriori algorithm –Advanced Association Rules Techniques – Measuring the quality of rules.

Data Mining Applications: Data Mining for Financial Data Analysis - Data Mining for the Retail Industry - Data Mining for the Telecommunication Industry - Data Mining for Intrusion Detection.

UNIT 4: **[13 Hours]**

Data Warehouse Basic concepts : What is a Data Warehouse – Differences between operational database systems and Data Warehouses – Multi-tiered Architecture – Data Warehouse models – Extraction, Transformation and Loading – Metadata repository.

Data Warehouse modeling: Data Cube and OLAP – Data cube: A Multidimensional Data model – Schemas for multidimensional data models – Dimensions: The role of concept hierarchies – Measures: Their categorization and computation – Typical OLAP operations.

Text Books:

1. Margaret H. Dunham, "DATA MINING INTRODUCTORY AND ADVANCED TOPICS", Pearson education, 2003. (Units 1, 2 and 3)
2. Jiawei Han, Micheline Kamber& Jian Pei, "DATA MINING CONCEPTS AND TECHNIQUES", Morgan Kaufmaan Publishers, 2011. (Unit 3 and 4)

Reference Books:

1. ArunK.Pujari, "DATA MINING TECHNIQUES", Universities Press (India) Pvt. Ltd., 2003.
2. Alex Berson, Stephen J. Smith, "DATA WAREHOUSING, DATA MINING & OLAP", TMCH, 2001.
3. G. K. Gupta, "INTRODUCTION TO DATA MINING WITH CASE STUDIES", Easter Economy Edition, Prentice Hall of India, 2006.
2. 4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "INTRODUCTION TO DATA MINING", Pearson Education, 2007.

B21DA0402	Operating Systems with Linux	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

It provides a clear description of the concepts that underlie operating systems, what operating systems are, what they do, and how they are designed, constructed, process management and memory management. This Course also covers Linux development, shell programming, System administration. Linux is a family of multitasking, multiuser computer operating systems. The sheer existence of this operating system over the past three decades itself speaks for its strength. It offers word –processing capability, networking facility, information retrieval and processing, and much more.

Prerequisites:

Basics of Digital Logic, Data structures, programming languages, and computer architecture.

Course Objectives:

The objectives of this course are to:

1. Enabling Knowledge: the operation, implementation and performance of modern operating systems, and the relative merits and suitability of each for complex user applications
2. 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
3. Expose the design of the LINUX operating system.
4. Illustrate various commands of the LINUX OS.
5. Demonstrate the different types of filters used in LINUX.

Course Outcomes:

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

1. Identify the basic principles adopted in the design of modern operating systems.
2. Explain the objectives and functions of modern operating systems.
3. Describe how computing resources are used by application software and managed by system software.
4. Analyze, Design and interpret the concepts of shell programming.

Course Contents:

UNIT 1: **[10 Hours]**

Introduction: Batch Systems, Multiprogramming and Time Sharing, Parallel, Distributed and real time Systems, Operating System Structures, Components & Services, System calls,.

Process Management: Process Concept, Process Scheduling, Threads, Inter process communication, CPU Scheduling Criteria, Scheduling algorithm, Multiple Processor Scheduling,. The Critical Section Problem, Synchronization hardware, Semaphores, Classical problems of synchronization

UNIT 2: **[10 Hours]**

Dead locks – System model, Characterization, Dead lock prevention, avoidance and detection, Recovery from dead lock,. Memory Management: Logical and Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Virtual memory-Demand paging and its performance, Page replacement algorithms, Allocation of frames.

UNIT 3: **[10 Hours]**

Introduction and Interacting with shell and Desktop to Linux: Introduction and Installing of Red Hat and Ubuntu Linux Operating System, History, salient features, Linux system architecture, Linux command format, Linux internal and external commands, Directory commands, File related commands, Disk related commands, general utilities. 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.

UNIT 4: **[09 Hours]**

Basic Linux Administration : Conditional Control Structures-if statement, case statement Looping Control Structure-while, until, for, statements. Jumping Control Structures – break, continue, and exit. Special Tools

and Utilities: Filters, Stream editor SED and AWK, Linux System Communication: Introduction, write, read, wall commands, sending and handling mails. System Administration: Roles of a System Administrator,

Text Books:

1. Abraham Silberschatz and Peter Baer Galvin, "OPERATING SYSTEM CONCEPTS", 8th Edition, Pearson Education, 2002. [chapter : 1,2,3,4,5,6,7,8,]
2. M.G.Venkateshmurthy, "INTRODUCTION TO UNIX & SHELL PROGRAMMING", First Edition, Pearson Education, 2004. [chapter 8,9,12]
3. Richard Petersen, "THE COMPLETE REFERENCE LINUX " sixth Edition Petersen Tata McGraw Hill [chapter 1]
4. Kernighan B W & Robert B, "THE UNIX PROGRAMMING ENVIRONMENT".

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. Sumithaba Das, "UNIX: CONCEPTS AND APPLICATIONS"
4. ArchanaVerma, "UNIX AND SHELL PROGRAMMING", Firewall Media.

B21DA0403	Python Programming	L	T	P	C
Duration :16Wks		4	0	0	4

Course Description:

The Python course is intended to introduce the basics and features of Python Language and functions, classes and objects in python. The Students are suggested to install Python and also install any of the IDEs-Anaconda a Scientific environment for Python, if they wish to. Work with all the simple programs so that they get acquainted with the syntax of the various constructs in Python.

Prerequisites:

Basic knowledge of programming concepts and Computer Programming terminologies.

Course Objectives:

The objectives of this course are :

1. Define the implementation of Python Programming Language Features
2. Discuss various Programming Constructs in Python Language
3. Develop the solution for the given problem statement using the concept of Sub Programming
4. Demonstrate OOPs concept

Course Outcomes:

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

1. Understand the Basic Terminologies used in python programming
2. Comprehend Branching and Looping statements in Python Programming
3. Apply the concept of Functions in Problem solving.
4. Implement the concepts of Classes, Objects & Inheritance

Course Contents:

UNIT 1: **[13 Hours]**

Introduction to Python: 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.

UNIT2: **[13 Hours]**

Decision making in Python: 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 3: **[13 Hours]**

Functions in Python: Functions: Grouping Code under a Name, Describing a Function in the Function, Layers of Functions

UNIT 4 : **[13 Hours]**

Classes and Objects in Python: Classes and Objects: What is an Object, Defining a Class, Creating an Object from the Class, Objects and their Scope, Inheritance, Overriding a method, Writing simple programs using classes and object sin Python.

Text Books:

1. Bill Lubanovic, "Introducing Python", Oriely Publications, 1st Edition, (chapters 1-6).
2. Michael Dawson, "Python Programming for absolute beginners", Course Technology-A part of CENGAGE Learning, 3rd Edition.

B21DAS411	Mobile Computing	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

With the increasing popularity of mobile devices, mobile computing has become part of our daily life. This course will cover various topics of mobile computing, networking, and systems, including but not limited to: applications of smartphones, cellular networks, embedded sensor systems, localization systems, energy efficiency of mobile devices, wearable and vehicular mobile systems, mobile security, virtual reality and augmented reality.

Prerequisites:

General understanding of computer networks, basic programming skills, and interpreting skills in algorithms.

Course Objectives:

The objectives of this course are to:

1. Identify the basic concepts of mobile computing.
2. Familiar with the network protocol stack.
3. Illustrate the basics of mobile telecommunication system.
4. Exposed to Ad-Hoc networks.
5. Explore about different mobile platforms and application development.

Course Outcomes:

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

1. Explain the basics of mobile Computing
2. Describe the functionality of Mobile IP and Transport Layer
3. Classify different types of mobile telecommunication systems
4. Demonstrate the Adhoc networks concepts and its routing protocols
5. Make use of mobile operating systems in developing mobile applications

Course Contents:

UNIT 1: **[10Hours]**

Introduction: Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT 2: **[10 Hours]**

Mobile Internet Protocol and Transport Layer: Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT 3: **[10 Hours]**

Mobile Ad Hoc Networks:A Few Basics Concepts, How is an Ad Hoc Network Set Up without the Infrastructure Support- Why is Routing in a MANET a Complex Task? -Battery Basics - Characteristics of Mobile Ad Hoc Networks (MANETs) - MANET Operational Constraints - Applications of MANETs- MANET Design Issues- Routing - Essentials of Traditional Routing Protocols, Link State Protocols (LSP) - Distance Vector (DV) Protocols -Routing in MANETs: A Few Basic Concepts, Routing in MANETs vs. Routing in Traditional Networks- A Classification of Unicast MANET Routing Protocols - Features of MANET Routing Protocols -Security Issues in a MANET.

UNIT 4: **[09Hours]**

Mobile Platforms And Applications: Basic Concepts, Mobile Device Operating Systems – Special Constrains & Requirements ,A survey of Commercial Mobile Operating Systems –windows mobile, palm OS, Symbian,iOS, Android, BlackBerry, OS for Sensor Networks.

Text Book:

1. Prasant Kumar Pattnaik, Rajib Mall, "FUNDAMENTALS OF MOBILE COMPUTING", PHI Learning Pvt. Ltd, New Delhi – 2012.(unit 1 to 4)

References:

1. Jochen H. Schller, "MOBILE COMMUNICATIONS", Second Edition, Pearson Education, New Delhi, 2007.
2. Dharma PrakashAgarval, Qing and AnZeng, "INTRODUCTION TO WIRELESS AND MOBILE SYSTEMS", Thomson Asia Pvt Ltd, 2005.
3. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "PRINCIPLES OF MOBILE COMPUTING", Springer, 2003.
4. William.C.Y.Lee,"MOBILE CELLULAR TELECOMMUNICATIONS-ANALOG AND DIGITAL SYSTEMS", Second Edition, Tata McGraw Hill Edition ,2006.
5. C.K.Toh, "ADHOC MOBILE WIRELESS NETWORKS", First Edition, Pearson Education, 2002.
6. Android Developers : http://developer.android.com/index.html

B21DAS412	Computer Graphics	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

This 21st century is characterized as Knowledge based society where Computers plays vital role. Computer graphics is an interesting branch of computer applications. There exist voluminous amount of data to be visualized in Engineering, Science, Education, Business, Government, Industry, Agriculture, Medical…etc. These data is to be processed and depicted as pictorial representation using computers. Computers graphics deals with creation, manipulation , display and storage of pictures using digital computers.

Prerequisites:

Knowledge on C/C++/ Java programming , basic mathematics.

Course Objectives:

The objectives of this course are to:

1. Explain the procedure to design of graphics systems for Two Dimensional and Three dimensional graphics with their transformation, viewing and clipping techniques
2. Provide a comprehensive introduction to computer graphics with applications
3. Illustrate both graphics hardware and graphics software
4. Introduces 3D graphics display methods and object representation

Course Outcomes:

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

1. Recall basic algebra using mathematics and conceptualize the basics of computer graphics, analyze different graphics systems and applications of computer graphics
2. Implement and analyze various algorithms for creating geometric primitives and construct novel and complex geometric shapes
3. Compare and Apply various basic geometric transformations on graphics objects and their application in composite form and Extract scene with different clipping
4. Explore projections and visible surface detection techniques for display of 3D

Course Contents:

UNIT 1: **[10 Hours]**

A Survey of Computer Graphics, Overview of Graphics Systems: Video Display Devices, Refresh Cathode-Ray Tubes, Raster-Scan Displays, Random Scan Displays, Color CRT Monitors, Input Devices. Output Primitives: Points and Lines, Line-Drawing Algorithms, DDA Algorithm, Bresenham's Line Algorithm, Circle-Generating Algorithms, Properties of Circles, Midpoint Circle Algorithm.

UNIT 2: **[10 Hours]**

Two Dimensional Geometric Transformations: Basic Transformation, Matrix Representations and Homogeneous co-ordinates- Composite Transformations, Other Transformations

UNIT 3: **[10 Hours]**

Two Dimensional Viewing&Clipping: The Viewing Pipeline- Viewing Coordinate Reference Frame, Window-to-Viewport Coordinate Transformation, Clipping Operations, Point Clipping, Line Clipping: Cohen-Sutherland Line Clipping, Polygon Clipping: Sutherland-Hodgeman Polygon Clipping, Curve Clipping, Text Clipping, Exterior Clipping

UNIT 4: **[9 Hours]**

Three Dimensional Graphics: Three Dimensional Concepts: Three Dimensional Display Methods, Three Dimensional Object Representations: Polygon Surfaces, Polygon Tables, Plane Equations, Polygon Meshes, Bezier Curves and Surfaces, Octrees. Three Dimensional Geometric and Modeling Transformations

Textbook:

1. Donald Hearn & M. Pauline Baker, "COMPUTERGRAPHICS CVERSION", Second Edition, Pearson,

2013 (Chapter 1, 2,3,5,6,9,10& 11)

Reference Books:

1. YeshwantKanetkar, "GRAPHICS UNDERC", BPB publications, 2003.
2. J.D. Foley, A.V.Dam, S.K. Feiner& J.F. Hughes, "COMPUTERGRAPHICS", Addison Wesley ,1996
3. Cooley, "THEESSENCEOFCOMPUTERGRAPHICS", Prentice Hall, 2000.

B21DAS413	Artificial Intelligence	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

Artificial Intelligence is the second booming field after Data mining and Data Science. Although research on this carried out from 1956 after that had seen many ups and downs. Way back from the year 2015 because of the commercial success in Artificial Intelligence, once again AI field has taken up charge. This course not only gives the broad perspective of Artificial intelligence process but also the various techniques, methods and approaches carried out.

Prerequisites:

Strong knowledge of Mathematics, Good command over programming languages, Good Analytical Skills, Ability to understand complex algorithms Basic knowledge of Statistics, and modeling.

Course Objectives:

The objectives of this course are to:

1. Relate the Artificial Intelligence principles and techniques
2. Introduce the facts and concepts of cognitive science by computational model and their applications
3. Explore problem-solving paradigms, search methodologies and learning algorithms
4. Develop intelligent systems by assembling solutions to concrete computational problems.
5. Explore the role of knowledge representation, problem solving, and learning in intelligent-system engineering.

Course Outcomes:

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

1. Apply knowledge of computing and mathematics appropriate to the discipline
2. Analyze a problem, identify and define the computing requirements appropriate to its solution
3. Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
4. Design efficient algorithm to achieve optimized solution in complex situation
5. Apply heuristic methodologies in state-space problems
6. Characterize various ways to represent the environmental knowledge and to infer from it.

Course Contents:

UNIT 1: [10 Hours]

Artificial Intelligence: Definition, AI Problems-Task Domains of Artificial Intelligence; The Underlying Assumption - Physical Symbol System Hypothesis; AI technique - Knowledge properties, Knowledge Representation.

Problems, Problem Spaces and Search: Steps in building a System; Production Systems; Control Strategies-Requirements of a good control strategy; Problem Characteristics; Production System Characteristics; Issues in the Design of Search programs.

Heuristic search techniques: Generate-and-test, Hill Climbing-Simple Hill Climbing, Best First Search, Constraints satisfactions.

UNIT 2: [10 Hours]

Planning: Components of a Planning System, Goal Stacks Planning - A very Simple Blocks World Problem; Reactive Systems; Other Planning techniques.

Knowledge Representation: Introduction, Definition, Importance, Representation and Mappings-mappings between facts and representations, Representation of Facts; Approaches to Knowledge Representation-Properties, Types of Knowledge; Issues in Knowledge Representation-Important Attributes, Relationship among Attributes.

UNIT 3: [10 Hours]

Symbolic Reasoning under Uncertainty: Introduction to Non monotonic Reasoning; Logics for Non monotonic Reasoning-Default Reasoning and Minimalist Reasoning;

Learning: Introduction, Different methods of Learning – Rote Learning, Inductive Learning, Reinforcement Learning, Unsupervised Learning, Supervised Learning, Analogy – Derivational and Transformational

Expert Systems: Introduction, Rule based and Knowledge based, knowledge acquisition, Maintenance and Manipulations.

UNIT 4: [09 Hours]

Parallel and Distributed AI: Psychological modeling; Parallelism in Reasoning Systems; Distributed Reasoning Systems

Prolog: Introduction; Converting English to Prolog Facts and Rules; Goals; Prolog Terminology; Variables; Control Structures; Arithmetic Operators; Matching in Prolog; Backtracking; Recursion.

LISP: Introduction, Syntax and Numeric Functions, Basic List Manipulation Functions, Functions, Predicates and Conditionals Input, Output and Local variables, Iteration and Recursion, Property List and Arrays.

Text Books:

1. Elaine Rich, Kevin Knight, Shivashankar B Nair, ”Artificial Intelligence”, 3rd Edition, Tata McGraw Hill, 2013 – (Chapter 1 to 7 and Chapter 13 to 17).
2. Dan W. Patterson, “ Introduction to Artifiial Intelligence and Expert Systems”, Prentice Hall of India, 2006 – (Chapter 4,5,6 and 11).

Reference Books:

1. Jean-Louis Ermine, ”Expert Systems : Theory and Practice”, Prentice Hall of India, 1995
2. Stuart Russel, Peter Norvig, “Artificial Intelligence: A Modern Approach”, 3rdPearson 3rd edition 2013.

B21DAS421	Cyber Security	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

The course covers theory and practice of computer security, focusing on the security aspects of the web and Internet. It surveys cryptographic tools used to provide security, such as shared key encryption (DES, 3DES, RC-4/5/6, etc.); public key encryption, key exchange, and digital signature (Diffie-Hellmann, RSA, DSS, etc.). It then reviews how these tools are utilized in the internet protocols and applications such as SSL/TLS, IPSEC, Kerberos, PGP, S/MIME, SET, and others. System security issues, such as intrusion and firewalls, will also be covered.

Prerequisites:

Knowledge on Computer Networks

Course Objectives:

The objectives of this course are to:

1. Explain security concepts, Ethics in Network Security.
2. Identify security threats, and the security services and mechanisms to counter them
3. Comprehend and apply relevant cryptographic techniques
4. Comprehend security services and mechanisms in the network protocol stack
5. Illustrate the integrity and authentication process
6. Familiarize various cyber threats, attacks, vulnerabilities and defensive mechanisms

Course Outcomes:

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

1. Understand the fundamental concepts of cyber security and explain the encryption process using cryptographic algorithms.
2. Apply software tools and technology to analyze, design and develop applications that can solve real life problems.
3. Explain the concept of cybercrime , analyze cyber offenses using logical reasoning according to Indian ITA 2000
4. Analyze security tools and methods, interpret legal perspective and explore Indian IT Act to understand the values and ethics to be followed by cyber experts

Course Contents:

UNIT 1: **[10 Hours]**

Security and Cryptography: 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 2: **[10 Hours]**

Security Technology: Physical design; Firewalls; Protecting Remote Connections, Intrusion Detection Systems (IDS), Honey Pots, Honey Nets.

UNIT3: **[10 Hours]**

Cybercrime and cyber offenses: Introduction to Cybercrime and Laws Introduction, Cybercrime: Definition and Origins of the word, Cybercrime and information Security, Cybercriminals, Classifications of Cybercrimes, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cyber offenses: How Criminals Plan the Attacks,· Social Engineering, Cyber talking, Cyber cafe and Cybercrimes, Bot nets: The Fuel for Cybercrime, Attack Vector, Cloud Computing

UNIT 4: **[09 Hours]**

Tools and Methods: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, identity theft.

Cybercrimes and Cyber security: The Legal Perspectives, Cybercrime and the Legal Landscape around the World, Why Do We Need Cyberlaws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment.

Text Books:

1. Nina Godbole, SunitBelapur, "CYBER SECURITY UNDERSTANDING CYBER CRIMES, COMPUTER FORENSICS AND LEGAL PERSPECTIVES", Wiley India Publications, April, 2011.
2. Robert Jones, "INTERNET FORENSICS: USING DIGITAL EVIDENCE TO SOLVE COMPUTER CRIME", O'Reilly Media, October, 2005.
3. Michael E. Whitman and Herbert J. Mattord,"PRINCIPLES OF INFORMATION SECURITY", 2nd Edition, Thomson, 2005.
4. William Stallings,"NETWORK SECURITY ESSENTIALS: APPLICATIONS AND STANDARDS", Pearson Education, 2000.

Reference Books:

1. Marjie T. Britz, "COMPUTER FORENSICS AND CYBER CRIME: AN INTRODUCTION" – Pearson Education.
2. Chwan-Hwa (John) Wu,J. David Irwin, "INTRODUCTION TO COMPUTER NETWORKS AND CYBER SECURITY" - CRC Press
3. Bill Nelson, Amelia Phillips, Christopher Steuart, "GUIDE TO COMPUTER FORENSICS AND INVESTIGATIONS" Cengage Learning.

B21DAS422	Advanced Computer Networks	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

The focus is on principles, architectures, and protocols used in modern networked systems, such as the Internet itself, wireless and mobile networks and high performance networks. The Internet protocols have revolutionized communications. This advanced networking course will equip you with a deep knowledge of network concepts, protocol design, and performance analysis that make the Internet work, help you develop critical insight into their design, and obtain a firsthand feel for implementation through homework and project exercises.

Prerequisites:

Basic knowledge about computer communication network design, operations and implementation

Course Objectives:

The objectives of this course are to:

1. Identify and work on different routing protocols
2. Propose knowledge of Internetworking
3. Describe different types of routing mechanisms
4. Describe the Transport layer protocols and its functionality.
5. Understand motivation, parameters and Functions of Quality of service.

Course Outcomes:

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

1. Expose the fundamentals of data communications and networks by gaining knowledge of data transmission concepts.
2. Analyze the computer network with suitable network protocols and routing algorithms.
3. Analyze different routing protocols and traffic engineering methods deployed in networking.

Course Contents:

UNIT 1: **[10Hours]**

Transmission Networks: Introduction, PDH Networks, SONET/SDH Networks, DWDM Network, and and Wireless Transmission: Wireless media, Wireless Systems, Spread Spectrum Technology.

UNIT 2: **[10 Hours]**

Routing and Internet Protocol: Routing, Static routing, Dynamic routing, Distance Vector Routing Algorithm, Link State Routing, Open Shortest Path First Routing protocol.

Address types of the TCP/IP stack, IP Address format, IPv4 Packet Format, Hierarchical Addressing, Sub netting, ICMP, IPv6.

UNIT 3: **[10Hours]**

End-To-End Protocols: Simple De-multiplexer (UDP), Reliable Byte Stream (TCP), Remote Procedure Call, Congestion Control and Resource Allocation-Issues in Resource Allocation, Queuing Disciplines, TCP Congestion Control.

UNIT 4: **[09 Hours]**

Quality Of Service: Motivation for QoS, Parameters, Functions required for supporting QoS, Traffic Control, Leaky Bucket algorithm, Token Bucket Algorithm, Explicit Congestion Notification (ECN), Resource Reservation Protocol (RSVP).

Text Books:

1. Natalia Olifer, Victor Olifer, "COMPUTER NETWORKS", First Edition, John Wiley, 2015. UNIT-1: Chapter 10, 11
2. Larry & Peterson & Bruce S Davis, "COMPUTER NETWORKS-A SYSTEM APPROACH", 5th Edition, Elsevier Inc, 2014. Chapter 4, 5, 6.
3. Prakash C Guptha, "DATA COMMUNICATIONS AND COMPUTER NETWORK", Second Edition, PHI learning Pvt Ltd, Nov 2014. Chapter 23.

Reference Books:

1. BehrouzFerouzan "INTRODUCTION TO DATA COMMUNICATION &NETWORKING", 5th Edition, McGraw Hill Education Pvt Ltd 2013
2. Andrew S Tanenbaim, "COMPUTER NETWORKS", Pearson Education, 5th Edition, Elsevier Inc, 2014.

B21DAS423	Advanced Java Programming	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

The goal of the course is to help students gain knowledge in the basic concepts of object-oriented programming and build skills to develop modern software programmers using the language Advanced Java. The course helps to provide an overview of working principles of web related functionalities in Java, understand and apply the fundamentals core java, packages, database connectivity for computing.

Prerequisites:

Java Fundmentals, OOPs concept.

Course Objectives:

The objectives of this course are to:

- 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:

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

- Understand the basic principles of creating Java applications with graphical user interface (GUI).
- An ability to design, implement and evaluate a computer-based Applications, process, component, or program to meet desired needs.
- An ability to use current techniques, skills, and tools necessary for computing practices.
- Create rich user-interface applications using modern API's such as servlets and JSP.

Course Contents:

Unit -1: Collections&Multithreading [10 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-2:JDBC [10 Hours]

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

Unit -3: Servlets and JSP [10 Hours]

Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling.H TTP 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-4: Remote Method Invocation [09 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 – PrenticeHall

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 McGraw Hill,2002.

2.Deitel&Deitel, Java How to Program, Prentice Hall,1999.

B21DA0404	Linux Lab	L	T	P	C
Duration :16Wks		0	0	2	2

Lab Experiments:

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 count the number of vowels and consonants in a given string.
6. To print all prime numbers between m and n (m<n).
7. To check whether a given string is a palindrome or not.
8. To generate the Fibonacci series.
9. To find the sum of series of n numbers.

10. To find the maximum and minimum from the list of given n numbers .

Part B

1. Write a Shell script to perform basic arithmetic operations.
2. Write a shell script that displays all the files in the current directory.
3. To write a shell script that creates a file and compresses it.
4. Write a script to convert the contents of a given file from uppercase to lowercase and also count the number of lines, words and characters of the resultant file.
5. Write a shell script to find the reverse of a given number.
6. Write a shell script to find the sum of digits of a given number.

B21DA0405	Python Programming Lab	L	T	P	C
Duration :16Wks		0	0	2	2

Lab Experiments:

PART-A

1. Demonstrate runtime reading of Strings.
   i) Illustrate the concept of String Slicing.
   ii) Also demonstrate a minimum of 5 functions defined on Strings.
2. Write a program to add two integers and print the result on the screen. Accept the values at runtime.
3. Demonstrate the usage of math and cmath module.(For Ex. Program to find the roots of a Quadratic Equation)
4. Illustrate the usage of files with the help of different functions defined on Files(such as write, read(demonstrate all four forms), open, and close(use both the forms of closing a file)

5. Write a program to find the largest of two numbers
6. Write a program to find the biggest of three numbers
7. Design a menu driven program to check whether the number is
   i)A perfect number or not
   ii)Armstrong number or not
   iii)Palindrome or not
8. Show the different operations defined on Lists, Tuples and Dictionaries
9. Write a program to find the factorial of a number using functions and without using functions. Accept the input at runtime.
10. Demonstrate the i) Designing of a class ii) Creation of Object of that class iii) accessing the methods and instance variables in the class. The student is at the liberty of choosing their own Description of the object for designing the class.

PART-B

1. Design Jumble Game. Enjoy Playing it.
2. Design Guess My Number Game. Check if you are able to guess the correct Number.

B21PTM401 / B21DAM401	**Soft Skills**
Duration :16Wks	

B21DAM402	**Skill Development Program**
Duration :16Wks	

FIFTH SEMESTER

B21DA0501	**.NET Programming using C#**	**L**	**T**	**P**	**C**
Duration :16Wks		**2**	**1**	**0**	**3**

Course Description:

This course will cover two major types of application development aspects using DotNet Framework. Although .DotNet Framework supports more than 72+ programming language we shall be using only C# programming language for developing console application and windows-based type application. Ado.Net will be connecting bridge between front-end and back end. Overall this course sets a platform to get big picture on designing, coding, connecting, building and deploying all the above type of application.

Prerequisites:

To start learning C#, firstly you should have computer knowledge. C# is closely tied to .NET framework. So if you program in C# then you will learn .NET framework as well.

Course Objectives:

The objectives of this course are to:

1. Knowledge about different Object Oriented Features.
2. Identify disconnected architecture of .Net.

Course Outcomes:

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

1. Will Understand .Net Framework and Describe some of the major enhancements to the new versions of C#
2. Design the Basic structure of C# for Various programming Technologies
3. Evaluate user requirements for software functionality required to decide whether the programming language C# can meet user requirements Analysis
4. propose the use of certain technologies by implementing them in the C# programming language to solve the given problem

Course Contents:

UNIT 1: **[10 Hours]**

Introduction: 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 2: **[10 Hours]**

C# Languages Fundamentals: 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 un boxing types , Iterators Constructs ,Control flow constructs Arrays , C# Enumerations.

UNIT 3: **[10 Hours]**

Object- oriented Programming with C#: 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 ,Interface, Exception Handling

UNIT 4: **[09 Hours]**

Graphical User interface with Windows Forms: Event Handling Control properties and layout labels, Textboxes ,buttons, Group boxes and panels , checkboxes and radio button, Tooltips, List Box and Combo Box ,Group boxes Mouse-Even handling, Keyboard –Event Handling ,Understanding ADO.NET and Creating Connection string.

TEXT BOOKS:

1. BlackBook,"NET4.0 Programming(6-in-1)", Kogent Learning Solution Inc, Wiely-Dream Tech Press [chapter 1,10,11,12,19]
2. PaulDeitel and Harvey Deitel, "C#2010 for Programmers",4th Edition, Pearson Education.

B21DA0502	Web Technology	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

This course is an overview of the modern Web technologies used for the Web development. The purpose of this course is to give students the basic understanding of how things work in the Web world from the technology point of view as well as to give the basic overview of the different technologies. The topics include (although in some cases briefly): History of the Web, Hypertext Markup Language (HTML), Extensible HTML (XHTML), Cascading Style Sheets (CSS), and JavaScript. We will follow the guidance of the World Wide Web Consortium (W3C) to create interoperable and functional websites.

Prerequisites:

Basic knowledge of Computer fundamentals.

Course Objectives:

The objectives of this course are to:

1. Describe rich internet applications that use most recent client-side programming technologies.
2. Apply client-side validations using Java Script.
3. Capture core technical skills necessary for a complete understanding of front-end web development, including HTML5 and CSS, JavaScript, DOM.

Course Outcomes:

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

1. Understand the fundamental concepts of HTML and XHTML scripting tools.

2. To Learn and implement the programming concepts of CSS and Java Script

3. Understand the principles of creating an effective web page

4. Design and develop web applications using the web technology tools

Course Contents:

UNIT 1: **[10 Hours]**

Fundamentals of Web: Fundamentals of Web: A Brief Introduction to the Internet, The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet Mail Extensions, The Hypertext Transfer Protocol.

Introduction to XHTML: Basic Syntax, Standard XHTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, Syntactic Differences between HTML and XHTML.

UNIT 2: **[10 Hours]**

CSS & Basics of JavaScript:CSS: 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.

The Basics of JavaScript: Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics, Primitives Operations and Expressions

UNIT 3: **[10 Hours]**

JavaScript and XHTML DocumentsJavaScript: Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Pattern Matching Using Regular Expressions, Errors in Scripts.

XHTML Documents: The JavaScript Execution Environment, The Document Object Model, Element Access in JavaScript, Events and Event Handling.

UNIT 4: **[09 Hours]**

Event Handling & Dynamic Documents with Java Script Event Handling: Handling Events from Body Elements, Handling Events from Button Elements, Handling Events from Text Box and Password Elements, The DOM 2 Event Model.

Dynamic Documents with JavaScript: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements.

Text Books:

1. Robert W Sebesta, "PROGRAMMING THE WORLD WIDE WEB", 5th Edition, Pearson Education, 2008. (Chapters: 1, 2, 3, 4, 5 and 6)

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. 2.Chris Bates, "WEB PROGRAMMING BUILDING INTERNET APPLICATIONS",3rd Edition, Wiley India, 2006. 3. XueBai 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.

B21DA0503	Cloud Computing	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

The course is composed to enable to the student to gain the knowledge of multi-tenant server enabled computing services that can be provided as pay-per-use basic. The course gives the theoretical description of the cloud computing technologies in terms of hardware, software, architectures, limitations, advantages and disadvantages, issues, constraints, and security problems on data content that has been exchanged.

Prerequisites:

Knowledge in Virtualization concepts, operating system, Networking, and coding skills

Course Objectives:

The objectives of this course are to:

1. Introduce the broad perceptive of cloud architecture and model
2. Explain the concept of Virtualization and design of cloud Services
3. Identify and familiar with the lead players in cloud.
4. Explain the features of cloud simulator
5. Apply different cloud programming model as per need.
6. Design the trusted cloud Computing system

Course Outcomes:

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

1. Compare the strengths and limitations of cloud computing
2. Identify the architecture, infrastructure and delivery models of cloud computing.
3. Apply suitable virtualization concept.
4. Choose the appropriate cloud player, Programming Models and approach.
5. Illustrate the core issues of cloud computing such as security, privacy and interoperability.

Course Contents:

UNIT 1: **[10 Hours]**

Fundamentals of Cloud Computing: Cloud computing at a glance, the vision of cloud computing, defining a cloud, a closer look, Historical developments, Building cloud computing environments Application development. Characteristics of Cloud computing. Scalability, types of scalability. Horizontal Scalability and Cloud Computing, Computing platforms and technologies.

UNIT2: **[10 Hours]**

Fundamental concept and Models: Basics of Virtualization, Characteristics of virtualized environments, Taxonomy of virtualization techniques, - Types of Virtualization, Virtualization and cloud computing.

UNIT3: **[10 Hours]**

Cloud Infrastructure Mechanisms and Architecture: Fundamentals of Cloud Architecture, 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, Introduction to Cloud Software Environments , Architecture of Open Stack, Aneka.

UNIT4: **[09 Hours]**

Cloud Applications and parallel programming paradigms: Scientific applications, Healthcare: ECG analysis in the cloud, Biology: protein structure prediction, Geo science: satellite image processing, Business and consumer applications, CRM and ERP, Social networking, media applications. Open cloud platforms AWS, Distributed file systems (HDFS) and the cloud, Cloud storage systems, Introduction to NoSQL databases. Programming Models: Map Reduce.

Text Book:

1. RajkumarBuyya, Christian Vechiolla, ThamaraiSelvi, "MASTERING CLOUD COMPUTING", Elsevier publications, 2013, USA. Unit 1: Chapter 1,Unit 2: Chapter 3,5.1, Unit 3:Chapter 4, Unit 4:Chapter 8.1,9.1,and 10.

Reference Books:

2. RajkumarBuyya, James Broberg, AndrzejGoscinski, "CLOUD COMPUTING: PRINCIPLES AND PARADIGMS", Wiley, India.
3. Kai Hwang, Geoffrey C Fox, Jack G Dungaree, "DISTRIBUTED AND CLOUD COMPUTING FROM PARALLELPROCESSING TO THE INTERNET OF THINGS", Morgan Kaufmann Publishers, 2012.
4. Thomas Erl, Zaigham,Mahmood, Ricardo Puttini, "CLOUD COMPUTING:CONCEPTS, TECHNOLOGY & ARCHITECTURE", Prentice Hall/Pearson.

B21DAS511	Mobile App Development	L	T	P	C
Duration :16Wks		2	0	1	3

Course Description:

Android application development is the process by which new applications are created for devices running the Android operating system. Learn to setup Android application development environment. Illustrate user interfaces for interacting with apps and triggering actions .Interpret tasks used in handling multiple activities. Identify options to save persistent application data. Create, test and debug Android application by setting up Android development environment. Analyse performance of android applications and understand the role of permissions and security.

Prerequisites:

Knowledge on Object Oriented Programming and Java Programming

Course Objectives:

The objectives of this course are to:

1. Learn to setup Android application development environment
2. Illustrate user interfaces for interacting with apps and triggering actions
3. Interpret tasks used in handling multiple activities
4. Identify options to save persistent application data

Course Outcomes:

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

1. To define and understand the concepts, tools used in the developing android applications.
2. To Design and develop different types of widgets used in Android Studio.
3. To understand, analyze, apply the various tools used for adding extra features to Android Application and make it interactive.
4. To apply and identify the solutions through domain knowledge of database and to store data using shared preferences and SQLite.

Course Contents:

UNIT 1: [10 Hours]

Basic Android Concepts: Introduction to Android - History of android ,The Open Handset Alliance, Android SDK installation ,Android SDK & their codenames , Advantages of android ,The Android O/S Architecture, Over view of IDE for Android application, What is AVD , How to launch and start the AVD (android virtual device) Managing Application Resources - What are resources, resource value types, storing different resource values types (string, string arrays, Boolean, colors, integer, animation, & menus) Android Application Components - Activities & its life cycle , Services & its lifecycle, Broadcast receiver, Content provider, Intents, shutting down component , Android Manifest File in detail ,Use of Intent Filter.

UNIT 2: [10Hours]

Widgets – User Interface Elements: Form Widgets – Text View, basic Button, Toggle Button, Check Box, Checked Text View, Radio Buttons, Radio Group, Spinner Control, Date Picker, Time Picker , Chronometer, Progress bar, Rating bar, Option menu, Image View Text Fields - Various type of Text Fields (Plain text, Password Text, Numeric Text, Email Text, Phone Text, Multiline Text etc) Working with various type of dialog - Simple dialog, alert dialog, character picker dialog, date picker dialog, progress dialog , List Dialog, Custom Dialog Toast – (Custom Toast)

UNIT 3: [10 Hours]

Features of Android: Styles and Themes - Basic Styles & Themes in XML layout Various Layouts - What is layout, Layouts common attribute, Types of Layout (Linear layout, Relative layout, Table layout , Frame layout ,Tab layout) Using Data-Driven Containers - List View, Grid View, and Gallery View (Using the Array Adapter) App widgets - What is app widget, Use of App Widgets, Creating app widget configuration activity

UNIT 4 [09 Hours]

Data Storage : Introduction to data storage - Introduction to various storage options available in android system Working with Application Preferences - Creating Private and Shared Preferences, Manipulating with Shared Preferences, Read/Write Data on the Android File System [Internal Storage] Storing Structured Data Using SQLite Databases - Creating a SQLite Database, Creating Tables and Other SQLite Schema Objects, Creating, Updating, and Deleting Database Records, Querying SQLite Databases, Working with Cursors, Closing and Deleting a SQLite Database

Text Book:

1. Rick rogers, John Lombardo, "ANDROID APPLICATION DEVELOPMENT", -O"Reilly (unit 1 & 2)
2. Reto Meier Wrox, "PROFESSIONAL ANDROID 2 APPLICATION DEVELOPMENT" (unit 4)

Reference Books:

1. Lauren Darcey and Shane Conder, "ANDROID WIRELESS APPLICATION DEVELOPMENT", Pearson Education, 2nd edition.
2. ByWei-MengLee, "BEGINNING ANDROID APPLICATION DEVELOPMENT", Wrox Publication.
3. Frank Ableson, Charlie Collins and RobiSen, "UNLOCKING ANDROID DEVELOPER"SGUIDE", Manning Publication Co.

MOBILE APP DEVELOPMENT LAB

1. Display Hello World
2. Add two Edit Text. When a number is entered in Edit Text 1, the square of that number should be displayed in Edit Text 2.
3. Add an Edit Text and a button. When the button is clicked, the text inputted in Edit Text should be retrieved and displayed back to the user.
4. Add two Edit Text and a button. When the button is clicked, the text inputted in Edit Text 1 should be retrieved and displayed in EditText2.
5. Program a calculator
6. Create applications to include Action Bar, Menus, Dialogs and Notifications
7. Create a user login form and registration form. First time users have to register through the registration form and the details should be stored in the database. Then they can login using the login page.

B21DAS512	Computer Animation	L	T	P	C
Duration :16Wks		2	0	1	3

Course Description:

The Computer Animation subjects focus on creation of animations using image sequence. It also gives the practical exposure to the students on two animation software's adobe photoshop and flash software's. Using these software's users easily design images and edit the images and also to design the animation using various tweening techniques.

Prerequisites:

Introduction to Computer Graphics is a prerequisite, which introduces the fundamental concepts of computer graphics which are essential in such an advanced computer animation course.

Course Objectives:

The objectives of this course are to:

1. Gain knowledge in Animation
2. Recognize, locate and navigate through all aspects of the Photoshop user interface.
3. Create, manipulate, and edit text and graphics to obtain desired graphical outcomes.
4. Design, create, edit, and manipulate animation using several animation tools and techniques

Course Outcomes:

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

1. Visualize the sequence of animation process
2. Apply different filters and tools of adobe photoshop to enhance the quality of an image
3. Design and develop an animation using selection and transformation tools of flash software
4. Apply the action buttons and action frames of flash for creating small movie clips

Course Contents:

UNIT 1: [10 Hours]

Animation and Photoshop: Basic Concepts, Specification of Animations, Methods of Controlling Animation, Display of Animation, Transmission of Animation, Virtual Reality Modeling Language, PHOTOSHOP: Fundamentals ,Opening and Importing Images ,Resolution ,Models and Color Spaces ,Layers. PAINTING PIXELS: The Painting Tools, Erasing, Fills, Type. SELECTION AND ALLIED OPERATIONS: Marquee selection and cropping, Lasso Selection, Paths ,Combining and Transforming Selections.

UNIT 2: [10 Hours]

Adjustments &Retouching And Effects And Filters: Tonal Adjustment, Color Adjustments, Retouching By Hand, Blurring and Sharpening, Special Effects and Distortion, Layer Effects and Layer Styles.

UNIT 3: [10 Hours]

Flash: Animation with Interacting, Basic Concepts, Drawing, Lines and Shapes, Strokes and Fill, Shapes and Brushes, Selection, Transformation and Reshaping ,Importing Artwork and Manipulating Images. ANIMATION: Animating One Frame at a Time, Motion Tweening, Symbols and Instances, Shape Tweening, Sound.

UNIT 4: [09 Hours]

Actions: Buttons, Button action, Frame Action, Action and Movie Clip Symbols, Actions, Browsers and Networks, Beyond the Basic Actions. FLASH MX275: Interface Elements, Panels, Tools, Layer Folders, Accessibility, Video User Interface Components, Changing the Appearance of Components.

Text Books:

1. Nigel Chapman and Jenny Chapman, “PRACTICAL MULTIMEDIA”. Wiley ,Dream Tech Pvt. Ltd, 2nd Ed., 2003
2. Ralf Steinmetz, KlaraNarstedt, “MULTIMEDIA FUNDAMENTALS”, Media Coding and Content Processing, 2ndEdition, Pearson Education, 2007.(chapter:6)

Reference Books:

1. Thiagharajan and Anbumani, “FLASH MX 2004”, Tata McGraw Hill, New Delhi.
2. Laurie Ulrich Fuller and Robert C. Fuller, “PHOTOSHOP CS3 BIBLE”, Willey India Pvt. Ltd.

ANIMATION LAB

1. Design a poster with images and text using Photoshop
2. Overlap multiple images with different opacities using concept of layers using Photoshop
3. Demonstrate different selection tools by applying on a image using Photoshop
4. Demonstrate different filters using Photoshop
5. Create a gif file using Photoshop
6. Create an animation using flash for growing moon
7. Create an animation using flash for with two balls
8. Procedure to create an animation with the following features. WELCOME * Letters should appear one by one * The fill color of The text should change to a different color after the display of the full word
9. Procedure To Create An Animated Cursor Using Start drag ("Ss", True); Mouse.Hide()
10. Design A Visiting Card Containing At least One Graphic And T

B21DAS513	Machine Learning	L	T	P	C
Duration :16Wks		2	0	1	3

Course Description:

Machine Learning is concerned with computer programs that automatically improve their performance through experience. This course covers the theory and practical algorithms for machine learning from a variety of perspectives. Topics such as Bayesian networks, decision tree learning, Support Vector Machines, statistical learning methods and unsupervised learning are covered. Short programming assignments include hands-on experiments with various learning algorithms gives students a chance to dig into an area of their choice. This course is designed to give a thorough grounding in the methodologies, technologies, mathematics and algorithms currently needed by people who do research in machine learning.

Prerequisites:

Familiarity with Statistics, Linear Algebra, Calculus, Probability and Programming Languages

Course Objectives:

The objectives of this course are to:

1. Describes the basic components of Machine Learning with concepts of Python
2. Differentiates broad categories of Machine learning
3. Compare different types of algorithms used in Machine Learning domain with limitations
4. Examine the limitations of various machine learning algorithms and the way to evaluate performance of machine learning algorithms

Course Outcomes:

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

1. Understand the fundamental concepts and theories of Machine Learning
2. Analyze and Apply techniques of Supervised machine learning and solve the real world problems
3. Interpret and Apply Unsupervised Machine Learning algorithms for specific problems.
4. Understand the Reinforcement Learning Technique and Understand Q Learning.

Course Contents:

UNIT 1: [10 hours]

Introduction: Overview of ML, broad categories of Machine learning- Supervised, Unsupervised, Semi-supervised, and Reinforcement Learning, Applications areas of Machine Learning. Examples and case studies.

UNIT 2 [10 hours]

Supervised Learning: Introduction, Classification and Linear Regression, k-Nearest Neighbor, Linear models, Decision Trees, Naive Bayes Classifiers, Support Vector Machines (SVM) Algorithms. Neural Networks (deep learning), discussions on case studies

UNIT 3: [10 hours]

Unsupervised Learning: Introduction, types and challenges, preprocessing and scaling of datasets, Dimensionality reduction, feature extraction. Principal Component Analysis (PCA), k-means and agglomerative clustering, comparison of cluster algorithms, discussions on Case studies.

UNIT 4: [09 hours]

Semi-supervised: Introduction, discussion on Generative models and Graph-based methods. Reinforcement: Introduction, the learning task, Q learning Algorithm, relations ship to dynamic programming, discussions on Case studies

Text Books:

1. Andreas C Muller & Sarah Guidp, "Introduction of Machine Learning with Python", O'Reilly & Shroff publishers. Chapters 1, 2 and 3.
2. Tom M Mitchell, "Machine Learning", McGraw Hill Education publication – 2013. Chapter 13.
3. Peter Flach, "Machine Learning: The Art and Science of algorithms", Cambridge University Press, Chapter 12.

References Books:

1. EthemAlpaydin, “Machine Learning”, PHI learning private limited. Chapter 1, 7, 16, 18, 19
2. David barber and Bayesian, “Reasoning and Machine Learning”, Cambridge University Press. Chapter 13, 15
3. Olivier Chapelle, Bernhard Sch¨olkopf and Alexander Zien, “Semi-Supervised Learning”, MIT Press Cambridge
4. Trevor Hastie, Robert Tibshirani and Jerome Friedman, “The Elements of Statistical Learning”, Springer 2017 publication.

LAB MODULES:

1. Implementation of regression algorithm
2. Implementation of Naïve Bayes algorithm
3. Implementation of Decision Tree algorithm
4. Implementation of K-means algorithm
5. Implementation of PCA algorithm
6. Implementation of SVM algorithm
7. Implementation of Q- algorithm

The above algorithms has to be executed on different sets/types of datasets

B21DAS521	Software Testing & Quality Assurance	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

This course describes the key aspects of a Software Testing and Quality Assurance. It begins with the overview of project planning and elaborates software evaluation and testing. This course also includes those topics relevant to successful software testing and quality assurance management, Risk and quality management.

Prerequisites:

Knowledge on Software engineering

Course Objectives:

The objectives of this course are to:

1. Explain the concepts and process of testing activates that occur within the process.
2. Describe the various Testing Technique and Design different type of Test cases.

3. Characterize the look and feel and usage aspects of Usability and Accessibility Testing.
4. Analyze the different perspective of test metrics and measurements.

Course Outcomes:

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

1. Knowledge about testing principles and analyze, evaluate software Development life cycle models.
2. Explain and Design the test case for black box, white box and integration testing
3. Analyze system, acceptance, performance testing and interpret these test cases to a particular problem.
4. Evaluate software quality maturity models and apply capability maturity model for a particular project.

Course Contents:

UNIT 1: **[10 Hours]**

Principles of Testing: Context of testing in producing software, the complete car, Dijkstra's Doctrine, A test in time! The act and the Saint, Test the Tests first, the pesticide paradox, The convoy and the Rags, The policemen on the Bridge, The ends of the Pendulum, Men in Black, Automation Syndrome.

Software Development Life Cycle Models:

Phases of Software Project, Quality , Quality Assurance and Quality Control, Testing, Verification and validation, Process models to represent different phases, Life cycle models.

UNIT 2: **[10 Hours]**

White Box Testing- Static Testing, Structural Testing, Challenges in white box testing.

Black Box Testing: Introduction, How to do black box testing?

Integration Testing: Introduction, Integration testing as a type of Testing, Integration testing as a phase of Testing, Scenario Testing.

UNIT 3: **[10 Hours]**

System and Acceptance Testing: Overview, Functional Vs Non-Functional Testing, Functional System Testing, Non-Functional Testing, Acceptance Testing.

Performance Testing: Introduction, Factors Governing Performance Testing, Methodology for Performance Testing, Tools for performance testing, Process for performance testing.

UNIT 4: **[09 Hours]**

Software Quality, Maturity Models: Five views of software quality, McCall's quality and criteria, ISO 9126 Quality characteristics, ISO 9000:2000 Software Quality Standards.

Maturity Models: The basic idea in Software Process, Capability Maturity Model, Test Process Improvement, Testing Maturity Model.

Text Books:

1. Srinivasan Desikan and Gopalaswamy Ramesh, "SOFTWARE TESTING - PRINCIPLES AND PRACTICES", Pearson India Education, 2016.Chapters 01 to 07
2. KshirasagaraNaik, PriyadarshiTripathy, "SOFTWARE TESTING AND QUALITY ASSURANCE", Wiley India 2012.(Chapters 17 &18)

Reference Books:

1. Mauro Pezze, Michael Young, "SOFTWARE TESTING AND ANALYSIS- PROCESS, PRINCIPLES AND TECHNIQUES", Wiley India, 2012.
2. M.G.Limaye, "SOFTWARE TESTING-PRINCIPELS, TECHNIQUES AND TOOLS" – McGraw Hill, 2009.

B21DAS522	Network Administration	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

This current topics course will focus on the design, installation, configuration, and operation of local area networks. This course provides students with the knowledge and skills necessary to install and configure a stand-alone and client computer that are part of a workgroup or domain. We will also discuss alternate local area network methodologies including Microsoft Windows 2000, Novell NetWare, UNIX, Windows NT, and Windows 98. Every class will include a lecture or discussion on network topic along with demonstration of the concepts.

Prerequisites:

Basic knowledge on Operating Systems, their functionalities and Unix/Linux basic commands and Shell script.

Course Objectives:

The objectives of this course are to:

1. Develop and Applying technology in an environment
2. Describe the working of local area network (LAN) technologies for wired and wireless networks as well as analyze the working of virtual LANs and different networking devices, Network administration models, Network management technologies,
3. Construct and use routing tables for datagram forwarding and study the different categories of Internet routing protocols
4. Describe the responsibilities of the different layers of TCP/IP protocol stack as well as the use of different fields in the packet headers corresponding to these layers
5. Explain the different classes of IP addresses, Setting up the DNS name service, Setting up a WWW server, E-mail configuration

Course Outcomes:

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

1. Understand the role of operating systems and computer networks in information technology applications within organizations.
2. Understand the appropriate use of networking hardware and software
3. Install, configure, and maintain an operating system and applications software on a personal computer
4. Select hardware and software components, build, configure, and maintain a computer network.

5. Explain the different classes of IP addresses, Setting up the DNS name service, Setting up a WWW server, E-mail configuration

Course Contents:

UNIT 1: **[10 Hours]**

Introduction: Network and system administration, Applying technology in an environment, The human role in systems , Discipline, challenges, Common practice and good practice System Administration, Network Infrastructure, Operating Systems, File systems, IPv4 Networks, Address space in IPv4, Host identities and name services. Common network sharing models, Local network orientation and analysis

UNIT 2: **[10 Hours]**

User management: Issues, User registration, Account policy, Login environment, User support services, Controlling user resources, online user services, Ethical conduct of administrators and users, Computer usage policy

UNIT 3: **[10 Hours]**

Network-level services: Network administration models, Network management technologies, The Internet, Getting traffic to its destination, Alternative network transport and connection technologies, IP routing and forwarding.

UNIT 4: **[09 Hours]**

Application-level services: Proxies and agents, installing a new service, setting up the DNS name service, Setting up a WWW server, E-mail configuration.

Text Book:

1. Mark Burgess, "PRINCIPLES OF NETWORK AND SYSTEM ADMINISTRATION" 2nd Edition, John Wiley Chapter 1, 2, 3, 5, 10, 9.

B21DAS523	Ethical Hacking	L	T	P	C
Duration :16Wks		2	1	0	3

B21DA0504	.NET Programming Lab	L	T	P	C
Duration :16Wks		0	0	2	2

Lab Experiments:

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

PART B

1. Develop graphical user interfaces for C# programs using GUI components such as labels, buttons, text boxes, radio button and check boxes
2. Use the C# event-handling model to respond to events arising from the GUI components

B21DA0505	Web Technology Lab	L	T	P	C
Duration :16Wks		0	0	2	2

Lab Experiments:

PART-A

1. Create a web page to display the course syllabus.
2. Design student details in first page and result in next page, link both pages using hyper links.
3. Create a web page for class time table
4. Develop a web page with 2 or more images, move images in different directions and write hyper link to any one image.
5. Create a web page to display the following content using list tag.

General Aviation

1. Single Engine Aircraft
    a. Tail Wheel
    b. Tricycle
2. Dual Engine Aircraft

i. Wing Mounted
ii. Push Pull Mounted
Commercial Aviation
I. Dual Engine
Wing Mounted
Push Pull Mounted
II. Tri Engine
Third Engine
Second Engine

6. Design login page and validate it using JavaScript
7. Develop a HTML Form which accepts two numbers. Write JavaScript code to execute arithmetic operations and displays the result.
8. Create a student form and write JavaScript code to count the number of elements used in the form.

PART-B

1. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
2. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
3. Develop web page with one text box and Write a JavaScript code to convert the text entered in textbox to upper case.
4. Create a web page using two image files, which switch between one another as the mouse pointer moves over the images. Use the on Mouse Over and on Mouse Out
5. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.
6. Create a HTML form with 3 Textboxes. Write JavaScript code to validate input for numbers, alphabets, alphanumeric and verify that all 3 textboxes has been filled.
7. Write a user-defined function in JavaScript to find sum of N Numbers
8. Write a JavaScript code to find factorial of a number using recursive function

B21PTM501 / B21DAM501	**Soft Skills**
Duration :16Wks	

B21DAM502	**Skill Development Program**
Duration :16Wks	

B21DAO501	**Open Elective - Fundamentals of Computer Programming & Office Automation**	**L**	**T**	**P**	**C**
Duration :16Wks		**3**	**0**	**0**	**3**

Course Description:(3-4 lines-course aim and summary be added)

The main emphasis of this course is introduction to structure and function of computers. Its purpose is to present, as clearly and completely as possible, the nature and characteristics of modern day computer systems. This covers all aspects of computer technology from the underlying basics of computers and operating systems and its types. The focus of this course is on business productivity software applications and professional behavior in computing, including word processing (as needed), spreadsheets, databases, presentation graphics, and to explore various methods where Information Technology can be used to support existing businesses and strategies.

Prerequisites:

Basic knowledge on computers

Course Objectives:

The objectives of this course are to:

1. To understand how to use software packages in day to day activities
2. Learn the essential and use of internet

Course Outcomes:

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

1. To provide an in-depth training in use of office automation packages, internet etc. essential for common man for day to day office management, and e-governance.
2. Describe the Basics of Operating systems & computers.

Course Contents:

Unit 1: **[13 Hours]**

Fundamentals of computer: Overview Of a Computer, Functional Components of a computer (Working of each unit), Evolution Of Computers, Generations Of Computers, Classification Of Computers, Applications Of Computers.**Hardware:**Block diagram of computer, Input and Output devices, Memory and storages devices, Different ports and its uses, Different type of printers

Unit 2: **[13 Hours]**

Operating system (Windows XP): Windows concepts, Features, Windows Structure, Desktop, Task bar, Start Menu, My Computer, Recycle Bin, Windows Accessories, calculator, Notepad, Paint, Word pad, Character Map, Windows Explorer, Entertainment, Installation of Hardware and Software, Using scanner, system tools, communication, sharing information between computers.

Unit 3: **[13 Hours]**

Word Processing: Typing, Editing, Proofing & Reviewing, Formatting Text & Paragraphs, Automatic Formatting and Styles, Working with Tables, Graphics and Frames, Mail Merge,

Automating Your Work & printing Documents.**ExcelSpreadsheet:**Working& Editing In Workbooks, Creating Formats & Links, Formatting a Worksheet& creating graphic objects, Creating Charts (Graphs), formatting and analyzing data, Organizing Data in a List (Data Management), Sharing & Importing Data, Printing.

Unit 4: **[13 Hours]**

PowerPoint Presentations: Getting started in PowerPoint, Creating a presentation, Creating & editing slides, Previewing a slide show, Adding picture & graph, Adding sound & video, Adding auto shape, Animating objects.**Introduction to Internet:**Intranet tools: E-mail: Anatomy of e-mail, e-mail address, finding e-mail address, adding signature, attaching files, opening attachments, managing e-mail account, Webmail.

Text Book:

1. Archana Kumar," Computer Basics with Office Automation", I.K. International Publishing House Pvt. Limited, 2010

SIXTH SEMESTER

B21DA0601	Data Analytics using R	L	T	P	C
Duration :16Wks		3	0	1	4

Course Description:

Data Analytics is the science of analyzing data to convert information to useful knowledge. This knowledge could help us understand our world better, and in many contexts enable us to make better decisions. This course seeks to present you with a wide range of data analytic techniques and is structured around the broad contours of the different types of data analytics, Fundamentals of Big Data, Big Data Analytics, Big Data Management,andApplications ofBigData Analytics.

Prerequisites:

Basic knowledge in Programming languages, Algorithm and Data Structure, Database concepts, and Strong knowledge in statistics and mathematics.

Course Objectives:

The objectives of this course are to:

1. Introduce students to the basics of Big Data and Big Data Analytics.
2. Equip the students with the concepts of storing Big Data using Hadoop Distributed File System.
3. To provide the students with the foundation ofBig Data analysis using Map Reduce.
4. To expose students to data analytics features using R.

Course Outcomes:

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

1. Understand the fundamentals of various Bigdata analysis techniques.
2. Deploy a structured lifecycle approach to data science and big data analytics projects and understand and work with big data analytics platform/tools like R and RStudio to create statistical models and to visualize.
3. Understand the association of analytics with other domains.
4. Deployment of big data analytic techniques for useful business applications.

Course Contents:

UNIT 1: **[13 Hours]**

Introduction To Big Data: Types of Digital Data, Introduction to Big Data, Elements of Big Data (Facts, capabilities, benefits, where it is used), Big Data Analytics, How to analyze Big Data, History of Big Data, Big Data in the real world (Myths, Challenges, Future), Big Data Management.

UNIT 2: **[13 Hours]**

Hadoop and HDFS (Hadoop Distributed File System): Introduction and History of Hadoop, Hadoop Echo System, The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT 3: **[13 Hours]**

Map Reduce: Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

UNIT 4: **[13 Hours]**

Data Analytics with R: Take your first steps with R, data types, missing values, basics of R syntax, The R workspace, Vectors, System- and user-defined objects, Matrices, Lists, Functions, Statistics methodology, Factors and Data frames, Basic Graphics.

Text Books:

1. Tom White “Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
2. Seema Acharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015.

Reference Books:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.

2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
4. AnandRajaraman and Jefrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press, 2012.

B21DAS611	OOAD Using UML	L	T	P	C
Duration :16Wks		2	0	1	3

Course Description:

Object Oriented Approach is innovative and modern approach of designing the system by focusing primarily on Data elements of the application domain. it differs from the functional/traditional approach by providing features like data hiding, encapsulation and better reuse. Modeling is not a separate phase but it is involved in every phase of software engineering. Modeling is all about making models/prototypes of the system/situations needed to do better analysis, design, coding and testing Object Oriented Modeling and Design is thinking about the problem using models organized around the real world concepts.

Prerequisites:

Ideally students should have some working knowledge of a procedural programming language and syntax, such as C. Attendees should have a working knowledge of developing software applications. Designing and analysis experience is also extremely beneficial

Course Objectives:

The objectives of this course are to:

1. Introduce the concept of Object-oriented design
2. Acquire knowledge of Basic UML Concepts, Life Cycle of Object oriented Development, Modeling Concepts
3. Produce conceptual models for solving operational problems in software and IT
4. Environment using UML
5. Analyze the development of Object Oriented Software models

Course Outcomes:

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

1. Develop a working understanding of formal object-oriented analysis and design processes
2. Ability to abstract object-based views for generic software systems.
3. Ability to analyze and model software specifications.
4. Demonstrate object-based views for generic software systems

Course Contents:

UNIT 1: **[10 Hours]**

Modeling Concepts & Class Modeling: Introduction to OO development, OO themes; Evidence for usefulness of OO development; OO modeling history, Modeling as Design Technique: Modeling; abstraction; The three models. Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips. Advanced object and class concepts; Association ends; N-array associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages;

UNIT 2: **[10 Hours]**

State Modeling and Interaction Modeling: State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips. Advanced State Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models

UNIT 3 **[10 Hours]**

System Conception and Analysis: System Conception: Devising a system concept; elaborating a concept; preparing a problem statement. Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis. Application Analysis: Application interaction model; Application class model; Application state model; adding operations.

UNIT 4 **[09 Hours]**

System Design and Class Design: Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recording downwards, Refactoring; Design optimization; Reification of behavior.

Text Books:

1. Michael Blaha, James Rumbaugh, "OBJECT-ORIENTED MODELING AND DESIGN WITH UML",2nd Edition, Pearson Education / PHI, 2005. (Chapters 1 to 9, 11 to 14.10,15.1 to 15.8)
2. Frank Buschmann, RegineMeunier, Hans Rohnert, Peter Sommerlad, Michael Stal, "PATTERN-ORIENTEDSOFTWARE ARCHITECTURE, A SYSTEM OF PATTERNS", Volume 1, John Wiley and Sons, 2006. (Chapters 1, 2.4, 3)

Reference Books:

1. Grady Booch, "OBJECT-ORIENTED ANALYSIS AND DESIGN WITH APPLICATIONS", 3rd Edition, Pearson,2007.
2. Mark Priestley, "PRACTICAL OBJECT-ORIENTED DESIGN WITH UML", 2nd Edition, Tata McGraw-Hill, 2003.
3. K. Barclay, J. Savage, "OBJECT-ORIENTED DESIGN WITH UML AND JAVA", Elsevier, 2008.
4. Booch, G, Rumbaugh, J and Jacobson, I, "THE UNIFIED MODELING LANGUAGE USER GUIDE", 2 nd Edition, Pearson, 2005.

5. E. Gamma, R. Helm, R. Johnson, J. Vlissides, "DESIGN PATTERNS-ELEMENTS OF REUSABLE OBJECT- ORIENTED SOFTWARE", Addison-Wesley, 1995.
6. Michael R Blaha, James R Rumbaugh, "OBJECT ORIENTED MODELING AND DESIGN WITH UML", 2nd Edition, Prentice Hall, 2004.

B21DAS612	Advanced Web Technologies	L	T	P	C
Duration :16Wks		2	0	1	3

Course Description:

Students following this theme will gain an understanding and insight into the technologies that deliver the Web as we see it today. The topics covered include underlying languages and standards used to represent information on the web; techniques for understanding and managing data and information in a web context; and techniques and technology used to design and deliver web infrastructure.

Prerequisites:

To get started with web technology you should have the basic knowledge of Computer fundamentals

Course Objectives:

The objectives of this course are to:
1. Review the need of Angular JS
2. Discuss the perl scripting and concepts of server programming by using PHP
3. Differentiate use of AJAX objects over normal HTML objects

Course Outcomes:

On completion of this course the student shall be able to:
1. Construct Angular views and templates by implementing expressions and built-in directives
2. Design server webpage by using perl scripting
3. Describe a server side webpage by using PHP
4. Apply AJAX objects over normal HTML objects
5. Develop a server side scripting by using SOAP architecture

Course Contents:

UNIT 1: **[10 Hours]**

Introduction to XML: Introduction to XML: Introduction, The Syntax of XML, XML Document Structure, Document Type Definitions, Namespaces, XML Schemas, Displaying Raw XML Documents, Displaying, XML Documents with CSS. XSLT Style Sheets, XML Processors, Web Services

UNIT 2: **[10 Hours]**

Introduction to PHP: Introduction to PHP: Origins and Uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives Operations and Expressions, Output, Control Statements, Arrays, Functions, Pattern Matching, Form Handling.

Database Access through the Web: Relational Databases, An Introduction to the Structured Query Language, Database Access with PHP and MySQL.

UNIT 3: **[10 Hours]**

Introduction to Ruby& Rails: Introduction to Ruby: Origins and Uses of Ruby, Scalar Types and Their Operations, Simple Input and Output, Control Statements, Fundamentals of Arrays, Hashes, Methods, Classes, Blocks and Iterators, Pattern Matching.

Introduction to Rails: Overview of Rails, Document Requests.

UNIT 4: **[09 Hours]**

Angular JS: Angular JS: Introduction, Client – Side Templates, Model View Controller(MVC), Data Binding, Dependency Injection, Directives, Examples. Anatomy of an Angular JS Application, Invoking Angular, Model View Controller, Templates and Data Binding, Organizing Dependencies with Modules, Formatting Data with Filters, Changing Views with Routes and $location, Talking to Servers, Changing the DOM with Directives Validating User Input.

Text Books:

1. Robert W Sebesta, "PROGRAMMING THE WORLD WIDE WEB", 6th Edition, Pearson Education, 2008. (Chapters: 7, 9, 10, 13, 14 and 15)
2. Brad Green &ShyamSeshadri, "ANGULAR JS", O'ReillyPublications, 2015. (Chapter 1 &2)

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. XueBai, "THE WEB WARRIOR GUIDE TO WEB PROGRAMMING", Thomson, 2003.
4. Sklar, "THE WEB WARRIOR GUIDE TO WEB DESIGN TECHNOLOGIES", 1st Edition, Cengage Learning India.

LAB

PART - A

1. Write a Perl Script which counts the words in a given file
2. Using PHP and My SQL develop a program to accept book information viz. isbn, title, authors, edition and publisher from a web page and store the information in a database, search for a book with the title and display the search results with proper headings.
3. Create a registration form using PHP which contains name, email, contact no, address and gender, display the details in other server page when user clicks the submit button.

2. Create a program to order product by customer using PHP and store the details in My SQL Database.
3. Develop a web application for Student Admission System using PHP & MySQL database.

PART – B

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

- Should be minimum of three pages
- Create database and store details in database
- Java script can be used for client scripting and php can be used for server side scripting.

B21DAS621	Internet Of Things	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

The students will be able to understand the potential of the Internet of Things for our society, in terms of impact on the lives of billions of people and on the world economy. The students will also understand the underlying technology that powers the Internet of Things, as well as the challenges that comes with such technologies. Will explore many real-life examples of IoT devices that are commercially available, and you will have a glimpse of the future of the Internet of Things.

Prerequisites:

General knowledge of networking, sensing, databases, programming, and related technology.

Course Objectives:

The objectives of this course are to:

1. Discuss the basics of Microcontroller & Microprocessor
2. Identify different IoT applications and their application areas.
3. Explain the emerging field of wireless sensor networks and IoT, which consist of many tiny, low-power devices equipped with sensing, computation, and wireless communication capabilities.
4. Describe operating systems, radio communication, networking protocols, Methodologies of IoT.

Course Outcomes:

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

1. Create the IoT applications with the help of IoT enabled Technologies
2. Sketch protocols for IoT Applications
3. Analyze low-power devices equipped with sensing, computation, and wireless communication capabilities.
4. Develop the operating systems, radio communication, networking protocols, using Methodologies of IoT

Course Contents:

UNIT 1: [10 Hours]

Microprocessors and microcontroller Introduction : Microprocessors and microcontroller, Introduction, Microprocessors and Microcontrollers, RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture, Computer software. The 8051 Architecture: Introduction, Architecture of 8051, Pin diagram of 8051, Memory organization, External Memory interfacing, stacks.

UNIT 2: [10 Hours]

Introduction to Internet of Things : Definition & Characteristics of IoT, Physical Design of IoT, Things in IoT, IoT Protocols, Logical Design of IoT, IoT Functional Blocks , Communication Models , IoT Communication APIs,

UNIT 3: [10Hours]

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

UNIT 4: [10Hours]

Developing Internet of Things: IoT Design Methodology, Step 1: Purpose & Requirements Specification, Step 2: Process Specification, Step 3: Domain Model Specification, Step 4: Information Model Specification, Step 5: Service Specifications , Step 6: IoT Level Specification, Step 7: Functional View Specification, Step 8: Operational View Specification ,Step 9: Device & Component Integration, Step 10: Application Development.

Text Books:

1. Godse, Atul P. “MICROPROCESSORS & MICROCONTROLLERS”, Technical publications, 2008.

2. Vijay Madisetti, ArshdeepBahga "INTERNET OF THINGS-AN HANDS ON APPROACH", 2014 (chapter 1, 2, 5, 6, 7).

Reference Books:

1. CunoPfister,"GETTING STARTED WITH THE INTERNET OF THINGS", OReilly, 2011.
2. FrancisDaCosta, Rethinking,"INTERNET OF THINGS", Apress Open Edition, 2013
3. Adrian McEwen, Hakim Cassimally, "DESIGN OF INTERNET OF THINGS", 2014 John Wiley and Sons, Ltd.

B21DAS622	Digital Marketing	L	T	P	C
Duration :16Wks		2	1	0	3

Course Description:

The subject of Digital Marketing basic concepts and technologies used in the field of Marketing, comparing traditional marketing vs internet based marketing strategies. Goals achieved through internet like search engine, making advertising using banner, ads, email, social media postings. Targeting the audience through various strategies and helping them in buy cross selling and upselling.

Prerequisites:

Knowledge on Social Networking sites

Course Objectives:

The objectives of this course are to:

1. Develop industry background knowledge to knowledgeably navigate Internet Marketing topics including online advertising, search, social media, and online privacy.
2. Evaluate an experiment quantitatively and qualitatively to measure the effectiveness of business decisions and online advertising effectiveness in particular.
3. Design and implement an experiment.
4. Apply best practices for social media marketing.

Course Outcomes:

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

1. To identify the techniques involved in formulating the search engine optimization.
2. To analyze and evaluate the process involved digital advertisement.
3. To Design and develop the process involved in digital marketing using Email.
4. To Analyze and interpret the techniques involved in social media marketing

Course Contents:

UNIT 1: **[10 Hours]**

Introduction To Digital Marketing: Start with the Customer and Work Backward, What Are the 3i Principles?

Search Engine Optimization (Seo):

An Introduction, Search Engine Result Pages: Positioning, Search Behavior, Goals, On-Page Optimization, Off-Page Optimization, Analyze.

UNIT 2: **[10 Hours]**

Pay Per Click: An Introduction, Goals, Setup, Manage, Analyze

Digital Display Advertising: An Introduction, Display Advertising: An Industry Overview, Define, Format, Configure, Analyze

UNIT 3: **[10Hours]**

Email Marketing: An Introduction, Data—Email Marketing Process, Design and Content, Delivery, Discovery.

Mobile Marketing: An Introduction, Opportunity, Optimize, Advertise, Analyze.

UNIT 4: **[09 Hours]**

Social Media Marketing (Smm): An Introduction, Goals, Channels, Implementation, Analyze, Laws and Guidelines

Text Books:

1. Ian Dodson, "THE ART OF DIGITAL MARKETING: The Definitive Guide to Creating Strategic, Targeted and Measurable Online Campaigns",1st Edition, Wiley Publications, 2016. (Chapters : 1, 2, 3, 4, 5, 6, 7, 8, 9).

Reference Books:

1. Damian Ryan, "UNDERSTANDING DIGITAL MARKETING: Marketing Strategies for engaging the digital generation" 4th Edition, Kogan Page, 2017.
2. Ryan Deiss and Russ Henneberry, "DIGITAL MARKETING : For Dummies", John Wiley & Sons, Inc, 2017.
3. Alan Charlesworth, " DIGITAL MARKETING : A Practical Approach", 2nd Edition, Routledge, 2009.

B21DA0602	Project Work	L	T	P	C
Duration :16Wks		0	0	10	10

Course Description:

Knowledge on Software engineering and any of Programming languages

Course Objectives:

The objectives of this course are to:

Course Outcomes:

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

Course Contents:

MESSAGE TO THE STUDENTS

The Bachelor of Computer Applications (BCA) programme prepares the students to take up positions as Programmers, Systems Analysts, Systems Designers in the field related to computer science and information technology. We had therefore imparted the comprehensive knowledge covering the skills and core areas of computer science courses with equal emphasis on the theory and practice in BCA programme.

The BCA students are encouraged to involve themselves completely on the project work in their final semester. It is advised to students to develop their project for solving problems of software industry or any research organization. Doing this will give more exposure to handle real life problems of project development.

This project work is kept in BCA program to give you opportunity to develop quality software solution. During the development of the project you should involve in all the stages of the software development life cycle (SDLC) like requirements analysis, systems design, software development/coding, testing and documentation, with an overall emphasis on the development of reliable software systems. The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices, and develops good understanding of SDLC.

Students should take this project work very seriously. Project should be taken as an opportunity to develop software, which gives exposure to SDLC.Topics selected, should be complex and large enough to justify as a BCA project. The project should be genuine and original in nature and should not be copied from anywhere else.

GUIDELINES FOR PROJECT FORMULATION

TYPE OF PROJECT

As majority of the students are expected to work out a real life project in some industry/research and development laboratories/educational institutions/software companies, it is suggested that the project is to be chosen which should have some direct relevance in day-to-day activities of the candidates in his/her institution. Students are encouraged to work in the areas listed at the end. However, it is not mandatory for a student to work on a real life project. The student can formulate a project problem with the help of Guide.

PROJECT PROPOSAL (SYNOPSIS)

The project proposal should be prepared in consultation with your guide. The project proposal should clearly state the project objectives and the environment of the proposed project to be undertaken. The project work should compulsorily include the software development. The project proposal should contain complete details in the following form:

1. Title of the Project
2. Introduction and Objectives of the Project
3. Project Category (RDBMS/OOPS/Networking/Multimedia/Artificial Intelligence/Expert Systems etc.)
4. Analysis (DFDs at least up to second level , ER Diagrams/ Class Diagrams/ Database Design etc. as per the project requirements).
5. A complete structure which includes: Number of modules and their description to provide an estimation of the student's effort on the project. Data Structures as per the project requirements for all the modules. Process Logic of each module. Testing process to be used. Reports generation (Mention tentative content of report)
6. Tools / Platform, Hardware and Software Requirement specifications
7. Are you doing this project for any Industry/Client? Mention Yes/No. If Yes, Mention the Name and Address of the Industry or Client
8. Future scope and further enhancement of the project.

ITEMS TO BE INCLUDED IN THE PROJECT REPORT

The following items should be included in the Project Report:

The project report must contain the following:

1. Introduction Objectives
2. Tools/Environment Used
3. Analysis Document (This should include SRS in proper structure based on Software Engineering concepts, E-R diagrams/Class diagrams/any related diagrams (if the former are not applicable), Data flow diagrams/other similar diagrams (if the former is not applicable), Data dictionary).
4. Design Document (Modularization details, Data integrity & constraints including database design, Procedural design, User interface design) Program code (Complete code (well indented)/Detailed specification instead of code*, Comments & Description. The program code should always be developed in such a way that it includes complete error handling, passing of parameters as required, placement of procedure/function statements as needed.)
5. Testing (Test case designs are to be included separately for Unit testing, Integration testing, System testing; Reports of the outcome of Unit testing, Integration testing, System testing are to be included separately. Also, details of debugging and code improvement are to be included.)
6. Input and Output Screens
7. Limitations of the Project
8. Future Application of the Project
9. Bibliography

LIST OF BROAD AREAS OF APPLICATION AND RELATED TOOLS

FRONT END / GUI Tools:	Visual Basic, Power Builder, X-Windows (X/lib, X/motif, X/Intrinsic), Oracle Developer 2000, VC++, Jbuilder
RDBMS/BACK END:	Oracle, Ingres, Sybase, Progress, SQL Plus, Versant, MY SQL, SQL Server, DB2
LANGUAGES:	C, C++, Java, VC++, C#, Python

SCRIPTING LANGUAGES:	PERL, SHELL Scripts (UNIX), TcL/TK
RDBMS/BACK END:	Oracle, Ingres, Sybase, Progress, SQL Plus, Versant, MY SQL, SQL Server, DB2
INTERNET TECHNOLOGIES:	Java script, VB Script, Perl & CGI script, HTML, Java, Active X, RMI, CORBA, SWING, JSP, ASP, XML, EJB, Java Beans, Java Servlets, UML, CSS, VB.Net, J2EE.
OPERATING SYSTEMS:	WINDOWS 95/98/2000/ME, WINDOWS NT, UNIX, LINUX, WINDOWS XP, DOS
APPLICATIONS:	Financial/ Manufacturing/ Multimedia/ Computer Graphics/ Instructional Design/ Database Management System/ Internet/ Intranet/ Computer NetworkingCommunication Software/E-Commerce/ ERP / MRP/ TCP/IP Internals/ Routing protocols/ Socket Programming/ Implementation of Switches & Routers

B21PTM601/ B21DAM601	**Soft Skills**
Duration :16Wks	

B21DAM602	**Skill Development Program**
Duration :16Wks	

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 Science 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.

Programme Regulations

(Framed as per the provisions under Section 35 (ii), Section 7 (x) and Section 8 (xvi) & (xxi) of the REVA University Act, 2012)

1. Title and Commencement:

1.1 These Regulations shall be called **"REVA University Academic Regulations – Bachelor Degree Programs 2020-21 Batch subject to amendments from time to time by the Academic Council on recommendation of respective Board of Studies and approval of Board of Management**

1.2 These Regulations shall come into force from the date of assent of the Chancellor.

2. The Programs:

These regulations cover the following Bachelor Degree Programs of REVA University offered during 2020-21:

B Com (Industry Integrated)

B Com (Honors)
BBA (Industry Integrated)
BBA (Honors)
BBA (Entrepreneurship)
BA - Journalism, English, Psychology
BA - Tourism, History & Journalism
BA - Political Science, Economics & Journalism
BA - Performing Arts, English Psychology
BCA
BSc (Honours) Cloud Computing & Big Data
BSc in Physics, Chemistry, Maths
BSc in Maths, Statistics, Comp Sci.
BSc in Bioinformatics Biology, Maths, Computer Science
BSc in Biotechnology, Biochemistry, Genetics
BSc in Medical Lab Technology
BSc in Physics, Maths, Computer Science

3. Duration and Medium of Instructions:

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

3.2 The medium of instruction shall be English.

4. Definitions:

4.1 Course: "Course" means a subject, either theory or practical or both, listed under a program; Example: "Business Research Methodology" in BBA (Honors) program, "Auditing and Corporate Governance" in B Com (Industry Integrated) program are examples of courses to be studied under respective programs.

Every course offered will have three components associated with the teaching-learning process of the course, namely:

L	**Lecture**
T	**Tutorial**
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 / Project Based Learning or Course end Project/Self Study/ Online courses from listed portals that equip students to acquire the much required skill component.

4.2 Classification of Courses

Courses offered are classified as: Foundation Courses, Core Courses, Hard Core Courses, Soft Core Courses, Open Elective Courses, Project work/Dissertation

4.2.1 **Foundation Course:** The foundation Course is a mandatory course which should be completed successfully as a part of graduate degree program irrespective of the program of study

4.2.2 **Core Course:** A course which should compulsorily be studied by a candidate choosing a particular program of study

4.2.3 **Hard Core Course (HC) simply core course:** 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

4.2.4 **Soft Core Course (SC) (also known as Professional Elective Course)**

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

4.2.5 Open Elective Course (OE):

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

4.2.6 Project Work / Dissertation:

School can offer project work/dissertation as a course. Depending on the duration required for completing the project/dissertation work, credits can be assigned. Normally 26 hours of practical work/project work/dissertation work is considered to be equivalent to a credit. School can classify project as a minor or a major project depending on the credits allotted. Normally, a minor project carries 4-6 credits and a major project carries double the number of credits of a minor project.

4.2.7 "Program" means the academic program leading to a Degree, Post Graduate Degree, Post Graduate Diploma or such other degrees instituted and introduced in REVA University.

5. Eligibility for Admission:

5.1. The eligibility criteria for admission to **Three Years Bachelor Degree** Programs (6 Semesters) is given below:

Sl. No.	Program	Duration	Eligibility
1	Bachelor of Commerce (Industry Integrated)	6 Semesters (3 years)	Pass in PUC/10+2 with minimum 50% marks of any recognized Board / Council or any other qualification recognized as equivalent there to.
2	Bachelor of Commerce (Honours)		Pass in PUC/10+2 with minimum 75% marks of any recognized Board / Council or any other qualification recognized as equivalent there to.

3	Bachelor of Business Administration (Industry Integrated)	6 Semesters (3 years)	Pass in PUC/10+2 with minimum 50% marks of any recognized Board / Council or any other qualification recognized as equivalent there to.
4	Bachelor of Business Administration (Honours)	6 Semesters (3 years)	Pass in PUC/10+2 with minimum 75% marks of any recognized Board / Council or any other qualification recognized as equivalent there to.
5	Bachelor of Business Administration (Entrepreneurship)	6 Semesters (3 years)	
6	**Bachelor of Arts in** a) Journalism, English & Psychology (JEP) b) Political Science, Economics, Journalism (PEJ) c) Tourism, Journalism & History (TJH)	6 Semesters (3 years)	Pass in PUC /10+2 of any recognized Board / Council or any other qualification recognized as equivalent there to.
7	Bachelor of Arts in Performing Arts, English & Psychology	6 Semesters (3 years)	
8	Bachelor of Computer Applications	6 Semesters (3 years)	Pass in PUC/10+2 with at least 45% marks (40% in case of candidate belonging to SC/ST category) of any recognized Board/Council of any other qualification recognized as equivalent there to.
9	Bachelor of Science (Hons.) in Computer Science (with specialization in Cloud Computing & Big Data)	6 Semesters (3 years)	Pass in PUC/10+2 examination with Mathematics / Computer Science / Statistics as compulsory subject along with other subjects and obtained minimum 45% marks (40% in case of candidates belonging to SC/ST category) in the above subjects taken together from any Board recognized by the respective State Government /Central Government/Union Territories or any other qualification recognized as equivalent thereto.
10	**B Sc in** a) Physics, Chemistry and Mathematics (PCM) b) Mathematics, Statistics and Computer Science (MStCs) c) Physics, Mathematics and Computer Science (PMCs)	6 Semesters (3 years)	Pass in PUC/10+2 with Mathematics as compulsory subjects and at least 45% marks (40% in case of candidate belonging to SC/ST category) of any recognized Board/Council or any other qualification recognized as equivalent there to.
11	**B Sc in** a) Bioinformatics – Biology, Computer Science & Mathematics (BCsM) b) Biotechnology, Biochemistry, Genetics	6 Semesters (3 years)	Pass in PUC/10+2 with Biology as compulsory subject and at least 45% marks (40% in case of candidate belonging to SC/ST category) of any recognized Board/Council or any other qualification recognized as equivalent there to.

	c) Medical Laboratory Technology (BMLT)		

5.2 Provided further that the eligibility criteria are subject to revision by the Government Statutory Bodies, University from time to time.

6. Courses of Study and Credits

6.1 Each course of study is assigned with certain credit value

6.2 Each semester is for a total duration of 20 weeks out of which 16 weeks dedicated for teaching and learning and the remaining 4 weeks for IAs and final examination, evaluation and announcement of results.

6.3 The credit hours defined as below

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.

1 credit = 13 credit hours spread over 16 weeks or spread over the semester

The total duration of a semester is 20 weeks inclusive of semester-end examination.

For Example: The following table describes credit pattern

Table -2: Credit Pattern

Lectures (L)	Tutorials (T)	Practice (P)	Credits (L:T:P)	Total Credits	Total Contact H
4	2	0	4:1:0	5	6
3	2	0	3:1:0	4	5
3	0	2	3:0:1	4	5
2	2	2	2:1:1	4	6
0	0	6	0:0:3	3	6
4	0	0	4:0:0	4	4
2	0	0	2:0:0	2	2

a. The concerned BoS will choose the convenient Credit Pattern for every course based on size and nature of the course

7. Different C**ourses of Study**:

Different C**ourses of Study** are labeled as follows:

a. Foundation Course (FC)
b. Core Course (CC)
c. Hard Core Course (HC)
d. Soft Core Course (SC)
e. Open Elective Course (OE)
f. Project Work / Dissertation: School can offer project work/dissertation as a course. Depending on the duration required for completing the project/dissertation work, credits can be assigned. Normally 26 hours of practical work/project work/dissertation work is considered to be equivalent to a credit. School can classify project as a minor or a major project depending on the credits allotted. Normally, a minor project carries 4-6 credits and a major project carries double the number of credits of a minor project.

These are defined under Section 4 of these regulations.

8. Credits and Credit Distribution

Registered candidates are required to earn the credits stated in the below table for the award of degree in the respective program:

Credits	Programs
120	**B.Com (Industry Integrated) degree, BBA (Industry Integrated) degree, and BCA**
140	**B.Com (Honors), BBA (Honors), BBA (Entrepreneurship) and B Sc (Honors)**
144	**BA - Journalism, English, Psychology, BA - Tourism, History & Journalism, BA - Political Science, Economics & Journalism, BA - Performing Arts, English Psychology, BSc in Physics, Chemistry, Maths, BSc in Maths, Statistics, Comp Sci., BSc in Bioinformatics Biology, Maths, Computer Science, BSc in Biotechnology, Biochemistry, Genetics, BSc in Medical Lab Technology, and BSc in Physics, Maths, Computer Science**

The following courses are foundation courses and they are mandatory courses. Students registering for any of the programs mentioned in the table above are required to successfully complete the courses for the award of the degree.

1. Communicative English
2. Languages K / H / Additional English
3. Indian Constitution

4. Human Rights

8.2. The concerned BoS 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 and classify the courses as **Foundation Course (FC), Hard Core (HC), Soft Core (SC) and Open Elective (OE).**

8.3**.** The concerned BoS shall specify the desired Program Educational Objectives, Program Outcomes, Program Specific Outcomes and Course Outcomes while preparing the curriculum of a particular program.

8.4. A candidate can enrol during each semester for credits as prescribed in the scheme of the program.

8.5 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 prescribed number of credits for the award of the degree for three year program 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.

8.6 Add on Proficiency Diploma / Minor degree/ Honor Degree:

To acquire Add on Proficiency Diploma/ Minor degree/ Honor Degree:, a candidate can opt to complete a minimum of 18-20 extra credits either in the same discipline /subject or in different discipline / subject in excess to prescribed number of credits for the award of 3 year degree in the registered program.

The Add on Proficiency Certification / Diploma/ Minor degree/ Honor Degree: so issued to the candidate contains the courses studied and grades earned.

9 Assessment and Evaluation

9.1 The Scheme of Assessment will have two parts, namely;

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

9.2 Assessment and Evaluation of each Course shall be for 100 marks. The Internal Assessment (IA) and Semester End Examination (SEE) of for 3 year programs shall carry 50:50 marks respectively (i.e., 50 marks internal assessment; 50 marks semester end examination).

9.3 The 50 marks of internal assessment shall comprise:

Internal Test	30 marks
Assignments / Seminars / Quizzes / Presentations / Case Studies etc.	20 marks

9.4 There shall be **two Internal Tests** conducted as per the schedule announced below. **The Students' shall attend both the Tests compulsorily.**

- 1st test is conducted for 15 marks during **8th week** of the Semester;
- 2nd test is conducted for 15 marks during **16th week** of the of the Semester;
- Suitable number of Assignments/quizzes/presentations are set to assess the remaining 20 marks of IA at appropriate times during the semester

9.5 The coverage of syllabus for the said tests shall be as under:

- Question paper of the **1st test should be based on first 50% of the total syllabus**;
- Question paper of the **2nd test should be based on second 50% of the total syllabus**;

9.6 The Semester End Examination for 50 marks shall be held in the 18th and 19th week of the beginning of the semester and the syllabus for the semester end examination shall be entire syllabus.

9.7 A test paper is set for a maximum of 30 marks to be answered as per the pre-set time duration (1 hr / 1 hr 15 minutes / 1 hr 30 minutes). Test paper must be designed with School faculty members agreed pattern and students are assessed as per the instructions provided in the question paper. Questions must be set using Bloom's verbs. The questions must be set to assess the students outcomes described in the course document.

9.8 The question papers for internal test shall be set by the internal teachers who have taught the course. If the course is taught by more than one teacher all the teachers together shall devise a common question paper(s). However, these question papers shall be scrutinized by School specific Question Paper Scrutiny Committee formed by the respective School Head /Director to bring in the uniformity in the question paper pattern and as well to maintain the necessary standards.

9.9 The evaluation of the answer scripts shall be done by the internal teachers who have taught the course and set the test paper.

9.10 Assignment/seminar/Project based learning/simulation based problem solving/field work should be set in such a way, students be able to apply the concepts learnt to a real life situation and students should be able to do some amount self-study and creative thinking. While setting assignment care should be taken such that the students will not be able to plagiarise the answer from web or any other resources. An assignment / Quiz or combination thereof can be set for a maximum of 20 marks. Course instructor at his/her discretion can design the questions as a small group exercise or individual exercise. This should encourage collaborative learning and team learning and also self-study.

9.11 Internal assessment marks must be decided well before the commencement of Semester End examinations

9.12 Semester End Examination: The Semester End Examination is for 50 marks shall be held in the 18th and 19th week of the semester and the entire course syllabus must be covered while setting the question paper.

9.13 Semester End Examination paper is set for a maximum of 100 marks to be answered in 3 hours duration. Each main question be set for a maximum of 25 marks, main questions can have 3-4 sub questions. A total of 8 questions are set so that students will have a choice. Each question is set using Bloom's verbs. The questions must be set to assess the students outcomes described in the course document. (Please note question papers have to be set to test the course outcomes)

9.14 There shall be three sets of question papers for the semester end examination of which one set along with scheme of examination shall be set by the external examiners and two sets along with scheme of examination shall be set by the internal examiners. All the three sets shall be scrutinized by the Board of Examiners. It shall be responsibility of the Board of Examiners particularly Chairman of the BOE to maintain the quality and standard of the question papers and as well the coverage of the entire syllabus of the course.

9.15 There shall be single evaluation by the internal teachers who have taught the subject. However, there shall be moderation by the external examiner. In such cases where sufficient number of external examiners are not available to serve as moderators internal senior faculty member shall be appointed as moderators.

9.16 Board of Examiners, question paper setters and any member of the staff connected with the examination are required to maintain integrity of the examination system and the quality of the question papers.

9.17 There shall also be an **Program Assessment Committee (PAC)** comprising at-least 3 faculty members having subject expertise who shall after completion of examination process and declaration of results review the results sheets, assess the performance level of the students, measure the attainment of course outcomes, program outcomes and assess whether the program educational objectives are achieved and report to the Director of the School. **Program Assessment Committee (PAC)** shall also review the question papers of both Internal Tests as well Semester End Examinations

and submit reports to the Director of the respective School about the scope of the curriculum covered and quality of the questions.

9.18 The report provided by the **Program Assessment Committee (PAC)** shall be the input to the Board of Studies to review and revise the scheme of instruction and curriculum of respective program

9.19 During unforeseen situation like the Covid-19, the tests and examination schedules, pattern of question papers and weightage distribution may be designed as per the convenience and suggestions of the board of examiners in consultation with COE and VC

9.20 University may decide to use available modern technologies for writing the tests and SEE by the students instead of traditional pen and paper

9.21 Any deviations required to the above guidelines can be made with the written consent of the Vice Chancellor

9.22 Online courses may be offered as per BACHELOR norms.
For online course assessment guidelines would be as follows:

1. If the assessment is done by the course provider, then the School can accept the marks awarded by the course provider and assign the grade as per REVA University norms.
2. If the assessment is not done by the course provider then the assessment is organized by the concerned school and the procedure explained in the regulation will apply
3. In case a student fails in an online course, s/he may be allowed to repeat the course and earn the required credits

IAs for online courses could be avoided and will remain at the discretion of the School.

9.23 The online platforms identified could be SWAYAM, NPTEL, Coursera, Edx.org, Udemy, Udacity and any other internationally recognized platforms like MIT online, Harvard online etc.

9.24 Utilization of one or two credit online courses would be:

4 week online course – 1 credit – 15 hours
8 week online course / MOOC – 2 credits – 30 hours
12 week online course / MOOC – 3 credits – 45 hours

9.25 **Summary of Internal Assessment, Semester End Examination and Evaluation** Schedule is provided in the table given below.

Summary of Internal Assessment and Evaluation Schedule

S. No	Type of Assessment	when	Syllabus Covered	Max Marks	Reduced to	Date by which the process must be completed
1	Test-1	During 8th week	First 50%	30	15	8th week
2	Assignment / quiz / presentation / any other assessment method as decided by the School	On or before 8th week (10 marks)				
3	Test -2	During 16th Week	Second 50%	30	15	16th Week
4	Assignment / quiz / presentation / any other assessment method as decided by the School	On or before 16th Week (10 marks)				
5	SEE	19/20th Week	100%	100	50	20th Week

Note: 1. Examination and Evaluation shall take place concurrently and Final Grades shall be announced as per the notification from COE.

2. Practical examination wherever applicable shall be conducted after 2nd test and before semester end examination. The calendar of practical examination shall be decided by the respective School Boards and communicated well in advance to the Controller of Examination who will notify the same immediately

10 Assessment of Students Performance in Practical Courses

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

a) Knowledge of relevant processes;

b) Skills and operations involved;

c) Results / products including calculation and reporting.

10.1 The 50 marks meant for Internal Assessment (IA) of the performance in carrying out Practical shall further be allocated as under:

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

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

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

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

10.3 For MOOC and Online Courses assessment shall be decided by the BOS of the School.

11. 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	Periodic Progress and Progress Reports (25%)
Component – II	Demonstration and Presentation of work (25%)
Component – III	Evaluation of Report (50%)

All assessments must be done by the respective Schools as per the guidelines issued by the Controller of Examinations. However, the responsibility of announcing final examination results and issuing official transcripts to the students lies with the office of the Controller of Examinations.

12. Requirements to Pass a Course:

A candidate's performance from IA and SEE will be in terms of scores, and the sum of IA and SEE scores will be for a maximum of 100 marks (IA = 50 , SEE = 50) and have to secure a minimum of 40% to declare pass in the course. However, a candidate has to secure a minimum of 25% (13 marks)

in Semester End Examination (SEE) which is compulsory.

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
80-89	9	v*9	A+
70-79	8	v*8	A
60-69	7	v*7	B+
55-59	6	v*6	B
50-54	5.5	v*5.5	C+
40-49	5	v*5	C
0-39	0	v*0	F
ABSENT			AB

O - Outstanding; A+-Excellent; A-Very Good; B+-Good; B-Above Average; C+-Average; C-Satisfactory; F – Unsatisfactory.

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

a. Computation of SGPA and CGPA

The Following examples describe computation of 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.

Examples on how SGPA and CGPA are computed

Example No. 1

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course 1	3	A+	9	3X9=27
Course 2	3	A	8	3X8=24
Course 3	3	B+	7	3X7=21
Course 4	4	O	10	4X10=40
Course 5	1	C	5	1X5=5
Course 6	2	B	6	2X6=12
	16			129

Thus, **SGPA = 129 ÷ 16 = 8.06**

Example No. 2

Course	Credit	Grade letter	Grade Point	Credit Point (Credit x Grade point)
Course 1	4	A	8	4X8=32
Course 2	4	B+	7	4X7=28
Course 3	3	A+	9	3X9=27
Course 4	3	B+	7	3X7=21
Course 5	3	B	6	3X6=18
Course 6	3	C	5	3X5=15
	20			141

Thus, **SGPA = 141 ÷ 20 = 7.05**

b. Cumulative Grade Point Average (CGPA):

Overall Cumulative Grade Point Average (CGPA) of a candidate after successful completion of the required number of credits for the respective programs are calculated taking into account all the courses undergone by a student over all the semesters of a program, i. e : **$CGPA = \sum(Ci \times Si) / \sum Ci$**

Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

Example:
CGPA after Final Semester

Semester (ith)	No. of Credits (Ci)	SGPA (Si)	Credits x SGPA (Ci X Si)
1	20	6.83	20 x 6.83 = 136.6
2	19	7.29	19 x 7.29 = 138.51
3	21	8.11	21 x 8.11 = 170.31
4	20	7.40	20 x 7.40 = 148.00
5	22	8.29	22 x 8.29 = 182.38
6	18	8.58	18 x 8.58 = 154.44
Cumulative	**120**		**930.24**

Thus, **CGPA** = 930.24/120 = 7.75

c. Conversion of grades into percentage:

Conversion formula for the conversion of CGPA into Percentage is:

Percentage of marks scored = CGPA Earned x 10

Example: CGPA Earned 7.75 x 10=77.5

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

13. Classification of Results

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

CGPA	Grade (Numerical Index)	Letter Grade	Performance	FGP
	G			Qualitative Index
9 >= CGPA 10	10	O	Outstanding	Distinction
8 >= CGPA < 9	9	A+	Excellent	
7 >= CGPA < 8	8	A	Very Good	First Class
6 >= CGPA < 7	7	B+	Good	
5.5> = CGPA < 6	6	B	Above average	Second Class
> 5 CGPA < 5.5	5.5	C+	Average	
> 4 CGPA <5	5	C	Satisfactory	Pass
< 4 CGPA	0	F	Unsatisfactory	Unsuccessful

Overall percentage=10*CGPA

a. **Provisional Grade Card**: The tentative / provisional grade card will be issued by the Controller of Examinations at the end of every semester indicating the courses completed successfully. The provisional grade card provides **Semester Grade Point Average (SGPA).**
b. **Final Grade Card:** Upon successful completion of three year Degree a Final Grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Controller of Examinations.

14. Attendance Requirement:

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

14.2 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.

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

15. Re-Registration and Re-Admission:

15.1 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 semester end examination and S/he shall have to seek re-admission to that semester during subsequent semester / year within a stipulated period.

15.2 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 s/he shall seek re-admission to such dropped semester.

16. Absence during Internal Test:

In case a student has been absent from an internal tests due to the illness or other contingencies s/he may give a request along with necessary supporting documents and certification from the concerned class teacher / authorized personnel to the concerned Director of the School, for conducting a separate internal test. The Director of the School may consider such request depending on the merit of the case and after consultation with course instructor and class teacher, and arrange to conduct a special

internal test for such candidate(s) well in advance before the Semester End Examination of that respective semester. Under no circumstances internal tests shall be held / assignments are accepted after Semester End Examination.

17. Provision for Appeal

If a candidate is not satisfied with the evaluation of Internal Assessment components (Internal Tests and Assignments), s/he can approach the Grievance Cell with the written submission together with all facts, the assignments, and test papers, which were evaluated. S/he can do so before the commencement of respective 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 for taking disciplinary/corrective action on an evaluator if s/he is found guilty. The decision taken by the Grievance committee is final.

18. Grievance Committee:

In case of students having any grievances regarding the conduct of examination, evaluation and announcement of results, such students can approach Grievance Committee for redressal of grievances. Grievance committees will be formed by CoE in consultation with VC.

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

- The Controller of Examinations - 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.

19. Eligibility to Appear for Semester End Examination (SEE)

Only those students who fulfil a minimum of 75% attendance in aggregate of all the courses including practical courses / field visits etc., as part of the program shall be eligible to appear for Semester End Examination

20. Provision for Supplementary Examination

In case a candidate fails to secure a minimum of 25% (13 marks) in Semester End Examination (SEE)

and a minimum of 40% marks together with IA and SEE to declare pass in the course, such candidate shall seek supplementary examination of only such course(s) wherein his / her performance is declared unsuccessful. The supplementary examinations are conducted after the announcement of even semester examination results. The candidate who is unsuccessful in a given course(s) shall appear for supplementary examination of odd and even semester course(s) to seek for improvement of the performance.

21. 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, s/he shall have to clear all courses of all semesters within the double duration, i.e., with six years of admission of the first semester failing which the student has to re-register to the entire program.

22. Challenge Valuation:

a. A student who desires to apply for challenge valuation shall obtain a photo copy of the answer script(s) of semester end examination by paying the prescribed fee within 10 days after the announcement of the results. S/he 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 Controller of Examinations within 10 days after the announcement of the results. This challenge valuation is only for semester end examination.

b. The answer scripts (in whatever form) 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.

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

School of Computer Science and Applications

Faculty list 2021 - 2022

Sl. No	Name	Designation
1	Dr. S Senthil	Professor & Director
2	Dr. M Vinayaka Murthy	Professor
3	Dr. Anand Kumar	Professor
4	K. Vijaya Lakshmi	Assoc. Professor
5	Dr. Rajeev Ranjan	Assoc. Professor
6	Dr. Anand R	Assoc. Professor
7	Dr. Hemanth K S	Assoc. Professor
8	Dr. Sasikala G	Assoc. Professor
9	Dr. Ambili P S	Assoc. Professor
10	Dr. Vijayalakshmi A Lepakshi	Assoc. Professor
11	Dr. Devi A	Asst. Professor
12	Dr. G Kadiravan	Asst. Professor
13	Dr. N Thrimoorthy	Asst. Professor
14	Dr. Thontadari	Asst. Professor
15	Prof. Lokesh C K	Asst. Professor
16	Prof. Ravi Dandu	Asst. Professor
17	Prof. R Pinaka Pani	Asst. Professor
18	Prof. Vijaya Kumar H	Asst. Professor
19	Prof. Vijayalaxmi. P. Chiniwar	Asst. Professor
20	Prof. Deepa B G	Asst. Professor
21	Prof. Vidya S	Asst. Professor
22	Prof. Krishnamurthy R	Asst. Professor

23	Prof. Md Abdul Khader Jailani	Asst. Professor
24	Prof. Shobhana Saxena	Asst. Professor
25	Prof. P Sree Lakshmi	Asst. Professor
26	Prof. Shreetha Bhat	Asst. Professor
27	Prof. Sneha N	Asst. Professor
28	Prof. Vinay G	Asst. Professor
29	Prof. A P Bhuveneswari	Asst. Professor
30	Prof. Abhay Kumar Srivastav	Asst. Professor
31	Prof. Aryamol	Asst. Professor
32	Prof. Kusha K R	Asst. Professor
33	Prof. Aditya V	Asst. Professor
34	Manju B	Asst. Professor
35	Prof. Pallavi M O	Asst. Professor
36	Prof. Jesla	Asst. Professor
37	Prof. Komala	Asst. Professor
38	Prof. Anushree Raj	Asst. Professor
39	Prof. Pradeepa D	Asst. Professor
40	Prof. P Sathish	Asst. Professor
41	Prof. Pradeep Udupa	Asst. Professor
42	Prof. Apoorva M C	Asst. Professor
43	Prof. Nagaraj S	Asst. Professor