REVA UNIVERSITY
Bengaluru, India

SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS

HANDBOOK

For

Bachelor of Science in Computer Science with specialization in Cyber Security

2021-24

Rukmini Knowledge Park,

Kattigenahalli, Yelahanka, Bangalore - 560 064

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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 gives me immense happiness to welcome you to the School of Computer Science and Applications. Information technology, being considered as most significant and revolutionary innovation of mankind has transformed the planet earth completely. Predominately School of Computer Science and Applications have acquired the control of the modern life in a myriad way.

The BSc in Computer science with specialization in Cyber Security program is designed keeping in view the current demand for protection of internet-connected systems and protect information against unauthorized access to data centers and cyberthreats, both at national and global levels. This program is designed to give greater emphasis on Cyber Security. The programme gives emphasis on protecting and recovering computer systems, devices and programs against any type of cyber attack.

The aim of the programme is to create motivated, innovative, creative thinking graduates to fill in the roles of cyber security professionals who can play an important role in **protecting IT infrastructure, edge devices, networks, and data** and optimize outcomes. The programme is designed to develop human resources to meet the challenges of lack of security in advanced IT industry and digital revolution.

The main focus of the programme is to create motivated, innovative, creative thinking graduates to fill in the roles of cyber security professionals who can play an important role in helping secure businesses and optimized outcomes.

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 BSc in Computer science with specialization in Cyber Security are:

- Flexibility to choose Cyber Security career upon graduation.
- Opportunity to work on live problems.
- Opportunity to work on security related technologies.

Students after successful completion of BSc BSc in Computer science with specialization in Cyber Security

- Can start-up their career in either government sector or private sector since there are ample employment opportunities in these sectors.
- students will be skilled in Cyber Security with higher order critical, analytical, problem solving and transferable skills.
- will acquire ability to think rigorously and independently to meet higher level expectations of ICT industry, academics, research establishments or take up entrepreneurial route.
- Can seek placements in diversified fields like banking, e-commerce, insurance, entertainment, and such others.

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

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

RUKMINI EDUCATIONAL CHARITABLE TRUST

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

Every great human enterprise is powered by the vision of one or more extraordinary individuals and is sustained by the people who derive their motivation from the founders. The Chairman of the Trust is Dr. P. Shyama Raju, a developer and builder of repute, a captain of the industry in his own right and the Chairman and Managing Director of the DivyaSree Group of companies. The idea of creating these top notched educational institutions was born of the philanthropic instincts of Dr. P. Shyama Raju to do public good, quite in keeping with his support to other socially relevant charities such as maintaining the Richmond road park, building and donating a police station, gifting assets to organizations providing accident and trauma care, to name a few.The Rukmini Educational Charitable Trust drives with the main aim to help students who are in pursuit of quality education for life. REVA is today a family of ten institutions providing education from PU to Post Graduation and Research leading to PhD degrees. REVA has well qualified experienced teaching faculty of whom majority are doctorates. The faculty is supported by committed administrative and technical staff. Over 13,000 students study various courses across REVA's three campuses equipped with exemplary state-of-the-art infrastructure and conducive environment for the knowledge driven community.

ABOUT REVA UNIVERSITY

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

REVA University located in between Kempegowda International Airport and Bangalore city, has a sprawling green campus spread over 45 acres of land and equipped with state-of-the-art infrastructure that provide conducive environment for higher learning and research. The REVA campus has well equipped laboratories, custom-built teaching facilities, fully air-conditioned library and central computer center, 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 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 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 topmost 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 recognized as a Centre of Skill Development and Training by NSDC (National Skill Development Corporation) under Pradhan Mantri Kaushal Vikas Yojana. The Centre conducts several add-on courses in challenging areas of development. It is always active in facilitating student's variety of Skill Development Training programs.

The University has collaborations with Industries, universities abroad, research institutions, corporate training organizations, and Government agencies such as Florida International University, 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 facilitate 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 Defense Dr. Sathish Reddy, Scientific Advisor, Ministry of Defense, 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 organizes 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 REVOTSVA 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 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. Convocation marks the end of the students journey at REVA, which is celebrated with much pomp and splendor. During this occasion, the students who have achieved top ranks in academic are felicitated. The founders have also instituted medals and prizes for sports achievers every year. The physical education department conducts regular yoga classes every day 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 honored with many more such honors and recognitions.

REVA University Vision

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

Mission

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

Objectives

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

ABOUT SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS

The School of Computer Science and Applications is shouldered by well qualified, experiencedand highly committed faculty. The state-of-the-art infrastructure digital classrooms, well equippedadvanced computer laboratory, conference rooms and the serene academic atmosphere at REVAUniversity 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 todoctoral degree. The curriculum of both graduate and post graduate degree programs have beendesigned 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 invarious core subjects / courses offered within the program. Further the school provides aninteractive, collaborative peer tutoring environment that encourages students to break downcomplex problems and develop strategies for finding solutions across a variety of situations anddisciplines. The school aims to develop a learning commUNITy of critical thinkers who serve asmodels of innovative problems solving in the university environment to enrich their academic andprofessional 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.

Programme Overview

Today the world is facing many security challenges attacking almost all electronic devices such as laptops, desktops and mobile devices etc. through malwares, social engineering attacks and ransomware, targeted attacks etc. The IT industry is need of experts to tackle such challenges.

As our daily lives become more and more dependent on Internet-based tools and services, and as those platforms accumulate more of our most sensitive data, the demand grows for experts in the field of Cyber Security. Wherever usage of computer's in shared environment, there exist a need of Cyber Security professional to protect/secure the data and infrastructure those are involved in shared computer devices. So cybersecurity has become the utmost priority for the organizations.

Out of the 3.5 million open cybersecurity positions are vacant as of 2021 and the demand for cyber security professionals are likely to grow in the years to come. Cybersecurity Ventures estimates more than 2 million openings will be in the Asia-Pacific region. 62% say their organization's cybersecurity team is under-staffed; 57% say they currently have unfilled cybersecurity positions on their team.

This programme aims to cater to the growing demand of Cyber security experts.

The Bachelor of Science Cyber Security is designed keeping in view the current situation and possible future developments, both at national and global levels. This programme is designed to give greater emphasis on Cyber Security. This programme on Cyber Security will teach both the fundamental concepts of how and why Cyber systems works, as well as Cyber security through malware software, anomaly detection, intrusion prevention systems, security information and event management. They will also become proficient in "Security" on various platforms. Besides a hands-on project, this program will include knowledge transfer by Industry experts. The lab sessions cover security application development and deployment, use of security tools and techniques. 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.

There is a dearth for security engineers, cyber security analysts, cyber forensic professionals and security architects. This programme aims in fulfilling the demand by sending graduates equipped for the industry.

Bachelor of Science in Computer Science with specialization in Cyber Security programme at **School of Computer Science and Applications** has been designed and developed by industry experts.

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.

Program Educational Objectives (PEO's)

The Programme Educational Objectives are to prepare the students to:

PEO-1	Be industry ready to assume the roles of Security Engineers, Cyber Security Analysts, Cyber Forensic Professionals and Security Architects and operate various security related commercial software tools to solve scientific and business problems.
PEO-2	Equip the Students to be recruited as Computer Application Developers, Algorithm Developers, Computer Programmers and to work alongside Engineering, Medical, ICT Professionals and Scientists to assist them in setting up security in their Domain of Interest.
PEO-3	Adopt philosophy/culture of lifelong learning for continuous improvement, which qualifies them to serve as Administrators in Public, Private Organizations or as Scientists at various levels in Research Establishments.
PEO-4	Understand Environmental, Legal, Cultural, Social, Ethical, Public Safety Issues and work as a member of a team and communicate effectively across team members that would assist them in setting up his/her own Enterprise.

PROGRAM OUTCOMES FOR B.Sc (HONS) in Cyber Security

After undergoing this Programme, a student will be able to:

- **PO 1: Disciplinary knowledge**: Demonstrate comprehensive knowledge and understand Computer Science with specialization in Cyber Security that form a part of B.Sc in Cyber Security
- **PO 2: Scientific reasoning**: Analyze and Understand concepts in Computer Science, critically Evaluate Ideas, imbibe Logical Reasoning and experiences in Programming, Algorithm Development and Application Development, to detect Cyber Vulnerabilities and resolve new Cyber Threats.
- **PO 3: Problem solving**: Extrapolate and apply competencies to solve different kinds of non-familiar problems, such as, design Security-Based Solutions, and develop a Security Architecture for an Organization.
- **PO 4: Environment and Sustainability**: Understand the issues with environmental influence and sustainable development and provide solutions for the same using domain knowledge in Cyber Security.

- **PO 5: Research-related skills**: Recognize Cause-and-Effect Relationships, Define Problems, Formulate Hypotheses, Test Hypotheses, Analyze, Interpret, and Draw Conclusions from Data, Establish Hypotheses, Predict Cause-and-Effect Relationships, Ability to Plan, Execute and Report the results of an Experiment or Investigation in Data Analytics related to Cyber Security.

- **PO 6: Ethics**: Conduct as a Responsible Citizen by recognizing the human role in Security Systems with an emphasis on Ethics, Social Engineering Vulnerabilities and Training.
- **PO 7: Cooperation/Team Work**: work effectively and respectfully with diverse teams; facilitate cooperative and coordinated effort being part of a group, and act together as a group or a team ap in the interest of a common cause.
- **PO 8: Communication Skills**: Express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate medium; 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 of socio-technological changes to identify and detect Cyber Vulnerabilities and resolve new Cyber Threats.

PROGRAMME SPECIFIC OUTCOMES:

After the successful completion of the Programme, the graduates will be able to:

1. Design Security Architecture, and *resolve security issues in computer networks and* maintenance of Cyber Security *systems to secure an IT infrastructure.*

2. Provide Security-Based Solutions with expertise and skill to solve real life problems like malware, phishing, spamming and other Cyber Threats, related to Cyber Security, by developing specific software products.

3. Design, Implement, and Monitor-Cyber Security Mechanisms, to ensure the protection of Information Technology Assets through Advanced Penetration Testing and Reverse Engineering to get to know the perspective of Cyber Criminals.

Mapping of COs with Respect POs

Course Code	POS/ COs	PO1	PO2	PO3	PO4	PO5	PO6	P7	PO8	PO9	PSO1	PSO2	PSO3
B21AHK102	CO1	L	L	L	L	M	M	H	H	H	M	H	L
	CO2	L	L	L	L	L	M	H	M	H	L	H	L
	CO3	L	L	L	L	M	H	H	H	M	L	H	L
	CO4	L	L	L	L	L	H	H	H	H	L	H	L
B21AHH102	CO1	L	L	L	L	M	H	M	M	H	M	H	L
	CO2	L	L	L	L	M	M	H	M	H	L	H	L
	CO3	L	L	L	L	H	H	H	H	M	L	H	L
	CO4	L	L	L	L	H	M	H	H	M	L	H	L
B21AHA101	CO1	L	L	L	L	L	L	L	L	M	L	H	L
	CO2	L	L	L	L	L	L	L	H	M	H	L	H
	CO3	L	L	L	L	L	L	L	M	H	L	H	L
	CO4	L	L	L	L	L	L	L	H	H	H	L	H
B21AHE101	CO1	L	L	L	H	L	L	M	H	L	H	M	H
	CO2	L	L	L	L	L	L	M	H	L	H	M	H
	CO3	L	L	L	L	L	L	M	H	L	H	M	H
	CO4	L	L	L	L	L	L	M	H	L	H	M	H
B21DC0101	CO1	L	M	M		L	L				L	M	M
	CO2	L	H	M	M			L	L	H	L	M	L
	CO3	L	H	M	M			L	L	H	H	M	L

	CO4	L	H	M	M		L	H	L	M	M	L	L
B21DC0102	**CO1**	L	M	L		L	L				M	L	M
	CO2	L	H	M	M			L	L	H	L	M	L
	CO3	L	H	M	M			L	L	H	H	M	L
	CO4	L	H	M	M		L	H	L	M	L		M
B21DC0103	**CO1**	L	M	M		L	L	L		M	M	L	L
	CO2		H	M	M			L	L	H	L	M	M
	CO3	H	H	M	H		M	L	L	H	M	L	
	CO4	M	H	M	M		L	H	L	M	L	L	M
B21DC0104	**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
B21DC0105	**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
B21DC0106	**CO1**	L	M	L		L	L				M	L	M
	CO2	L	H	M	M			L	L	H	L	M	L
	CO3	L	H	M	M			L	L	H	H	M	L
	CO4	L	H	M	M		L	H	L	M	M	L	L
B21AHK202	**CO1**	L	L	L	L	L	L	L	L	M	L	H	L
	CO2	L	L	L	L	L	L	L	H	M	H	L	H
	CO3	L	L	L	L	L	L	L	M	H	L	H	L
	CO4	L	L	L	L	L	L	L	H	H	H	L	H

B21AHH202	**CO1**	L	L	L	H	L	L	M	H	L	H	M	H
	CO2	L	L	L	L	L	L	M	H	L	H	M	H
	CO3	L	L	L	L	L	L	M	H	L	H	M	H
	CO4	L	L	L	L	L	L	M	H	L	H	M	H
B21AHA201	**CO1**	H	H	M	L	H	L	H	H	H	H	H	M
	CO2	H	M	M	L	H	L	H	H	H	M	H	M
	CO3	H	M	M	L	H	L	H	H	H	M	H	M
	CO4	H	L	L	L	H	L	H	H	H	M	M	H
B21AHE201	**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
B21DC0201	**CO1**	L	M	H	L	M	M	H	M	M	L	M	M
	CO2	L	M	H	L	M	M	H	M	M	L	M	M
	CO3	L	M	H	L	M	M	H	M	M	M	M	M
	CO4	L	M	H	L	M	M	H	M	M	L	M	M
B21DC0202	**CO1**	L	M	M		L	L	L		M	L		M
	CO2		H	M	M	L		L	L	H	L	L	
	CO3	H	H	M	H		M	L	L	H	M	L	L
	CO4	H	H	M	H		M	L	L	H	L	M	M
B21DC0203	**CO1**	L	M	H	L	M	M	H	M	M	L	M	L
	CO2	L	M	H	L	M	M	H	M	M	L	M	L
	CO3	L	M	H	L	M	M	H	M	M	L	M	L
	CO4	L	M	H	L	M	M	H	M	M	L	M	L
B21DC0204	**CO1**	L	M	M		L	L	L		M	M	L	L

	CO2		H	M	M	L		L	L	H	L	M	
	CO3	H	H	M	H		M	L	L	H	L	L	M
	CO4	H	H	M	H		M	L	L	H	L	M	L
B21DC0205	**CO1**	L	M	H	L	M	M	H	M	M	L	M	L
	CO2	L	M	H	L	M	M	H	M	M	L	M	L
	CO3	L	M	H	L	M	M	H	M	M	L	M	L
	CO4	L	M	H	L	M	M	H	M	M	L	M	L
B21DC0206	**CO1**	L	M	H	L	M	M	H	M	M	L	M	M
	CO2	L	M	H	L	M	M	H	M	M	L	M	M
	CO3	L	M	H	L	M	M	H	M	M	M	M	M
	CO4	L	M	H	L	M	M	H	M	M	L	M	M

Mapping of PEOS with Respect POs and PSO's

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**P7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
PEO1	H	H	H	M	H	M	M	L	L	H	H	H
PEO2	H	H	H	L	M	L	M	M	M	H	M	M
PEO3	M	M	M	L	H	L	M	M	M	M	H	H
PEO4	M	M	M	H	L	H	H	H	H	M	H	M

REVA UNIVERSITY
Bengaluru, India

School of Computer Science & Applications

Bachelor of Science in Computer Science with specialization in Cyber Security

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	FC					
	B21AHA101	Language –I Additional English	FC					
2	B21AHE101	Communicative English – I	FC	1	1	0	2	3
3	B21DC0101	Mathematical Foundations for Computer Science	HC	2	1	0	3	4
4	B21DC0102	Digital Logic and Computer Design	HC	2	1	0	3	4
5	B21DC0103	Operating system using LINUX	HC	3	0	0	3	3
6	B21DC0104	Programming fundamentals using C	HC	3	0	0	3	3
Practical Courses								
7	B21DC0105	C LAB	HC	0	0	2	2	4
8	B21DC0106	LINUX LAB	HC	0	0	2	2	4
***Mandatory - (Non Creditable Courses)**								
9	B21ASM101	Environmental Studies	-	0	0	0	0	2
10	B21DCM102	Skill Development Program						
Total Credits				**12**	**4**	**4**	**20**	**30**

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	FC					
	B21AHA201	Language –II Additional English	FC					
2	B21AHE201	Communicative English-II	FC	1	1	0	2	3
3	B21DC0201	Information systems and Data Base management	HC	3	0	0	3	3
4	B21DC0202	Information security Management and Data Privacy	HC	2	1	0	3	4
5	B21DC0203	Data structures using C++	HC	3	0	0	3	3
6	B21DC0204	Data Communication and Networking	HC	2	1	0	3	4
Practical Courses								
7	B21DC0205	Data Structures Lab	HC	0	0	2	2	4
8	B21DC0206	DBMS LAB	HC	0	0	2	2	4
***Mandatory - (Non Creditable Courses)**								
9	B21LSM201	Constitution of India & Professional Ethics	-	0	0	0	0	2
10	B21DCM202	Skill Development Program						
Total Credits				**12**	**4**	**4**	**20**	**30**

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	FC					
	B21AHA301	Language –IIII Additional English	FC					
2	B21DC0301	Cyber Security Essentials	HC	2	1	0	3	4
3	B21DC0302	Object Oriented Programming with JAVA	HC	3	0	0	3	3
4	B21DC0303	Software engineering and Cyber Security Engineering	HC	2	1	0	3	4
5	B21DC0304	Network security and Cryptography	HC	3	0	0	3	4
6	B21DC0305	Cloud computing and Cloud Security	HC	2	1	0	3	3
7	B21DCS311	Web technologies	SC	2	0	1	3	4
	B21DCS312	Advanced Linux						
	B21DCS313	Android Security						
Practical Courses								
8	B21DC0306	JAVA LAB	HC	0	0	2	2	4
9	B21DC0307	Network security LAB	HC	0	0	2	2	4
***Mandatory - (Non Creditable Courses)**								
10	B21DCM301/ B21PTM301	Soft skills	-	0	0	0	0	2
11	B21DCM302	Skill Development Program						
Total Credits				**15**	**4**	**5**	**24**	**35**

FOURTH SEMESTER

SL. NO	Code	Title	HC /SC /FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	B21AHK402	Language –III Kannada	FC	1	1	0	2	3
	B21AHH402	Language –III Hindi	FC					
	B21AHA401	Language –IIII Additional English	FC					
2	B21DC0401	Security of E-based-systems	HC	2	1	0	3	4
3	B21DC0402	Digital Watermarking and Steganography	HC	2	1	0	3	4
4	B21DC0403	Cyber and Web security using Python	HC	3	0	0	3	3
5	B21DCS411	Information Security Analysis and Audit	SC	2	1	0	3	4
	B21DCS412	Enterprise security management						
	B21DCS413	Biometrics						
6	B21DCS421	Big data Security	SC	2	1	0	3	4
	B21DCS422	Computer security and system Management						
	B21DCS423	Mobile and Adhoc network security						
Practical courses								
7	B21DC0404	Minor Project – 1	HC	0	0	2	2	4
8	B21DC0405	Cyber Security using Python LAB	HC	0	0	2	2	4
***Mandatory - (Non Creditable Courses)**								
9	B21DCM401/ B21PTM401	Soft skills	-	0	0	0	0	2
10	B21DCM402	Skill Development Program						
Total Credits				**12**	**5**	**4**	**21**	**32**

FIFTH SEMESTER

SL. NO	Code	Title	HC/ SC/ FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	B21DC0501	Ethical hacking	HC	3	0	1	4	5
2	B21DC0502	Ethics and laws of cyber security	HC	2	1	0	3	4
3	B21DC0503	Malware Analysis	HC	3	0	0	3	3
4		OPEN ELECTIVE	HC	3	0	0	3	4
5	B21DCS511	Machine Learning for Cyber security	SC	2	1	0	3	4
	B21DCS512	Cybercrime and digital forensics						
	B21DCS513	Information Warfare and Security						
Practical Courses								
6	B21DC0504	Malware Analysis-Lab	HC	0	0	2	2	4
7	B21DC0505	Minor project -II	HC	0	0	2	2	4
***Mandatory - (Non Creditable Courses)**								
8	B21DCM501 /B21PTM501	Soft skills	-	0	0	0	0	2
9	B21DCM502	Skill Development Program						
Total Credits				**13**	**2**	**5**	**20**	**30**

Open Elective Courses offered to other Schools

Sl. No	Code	Title	HC/ SC/ OE	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	B21DCO501	Introduction to networks and cyber security	OE	3	0	0	3	3

SIXTH SEMESTER

S.NO	Code	Title	HC/ SC /FC	Credit Pattern			Credits	Working Hrs
				L	T	P		
1	B21DC0601	Block Chain and Cryptocurrency Technology	H C	3	0	1	4	5
2	B21DCS611	Disaster Recovery	SC	3	0	0	3	4
	B21DCS612	Cognitive Psychology in Cyber security						
	B21DCS613	Server Hardening						
Practical Courses								
3	B21DC0602	MAJOR PROJECT	H C	0	0	8	8	16
***Mandatory - (Non Creditable Courses)**								
4	B21DCM601/ B21PTM601	Soft skills	-	**0**	**0**	**0**	**0**	**2**
5	B21DCM602	Skill Development Program						
Total Credits				**6**	**0**	**9**	**15**	**27**

CREDIT SUMMARY

Semester	Credits
First	20
Second	20
Third	24
Fourth	21
Fifth	20
Sixth	15
Total	**120**

CREDIT DISTRIBUTION

Semester	Hard Core (HC)	Fundamental Core (FC)	Soft Core (SC)	Open Elective (OE)	Minor/ Major Project	Total Credits
I	16	4	--	--	--	**20**
II	16	4	--	--	--	**20**
III	19	2	3	--	--	**24**
IV	13	2	6	--	2	**21**
V	12	--	3	3	2	**20**
VI	4	--	3	--	8	**15**
Total	**78**	**12**	**15**	**3**	**12**	**120**

**** Note:** Non _Creditable course: -> Skill Development Programme in all semesters

SUBJECT_CODE	Language I - Kannada	L	T	P	C
B21AHK102		1	1	0	2

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 REQUISITES

- 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.

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 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. d£À¥ÀzÀ: PÉgÉUÉ ºÁgÀ 2. ¥ÀA¥À: ¸ÁªÀiÁ£Àå ªÉÄ §UÉAiÉÄ ¨sÀªÀvÉÌÃ±À¥Á±À ¥Àæ¥ÀAZÀA? **3.** d£Àß: ¥ÉÆ®èªÉÄAiÉÄ ¯ÉÃ¸ÀÄ £À®ègÀ ªÉÄAiÉÆå¼ï		
UNIT II		**7HOURS**
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

REFERENCE BOOKS

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 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

FIRST SEMESTER

SUBJECT_CODE	Language I: Hindi	L	T	P	C
B21AHH102		1	1	0	2

Course Description

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

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:

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

Course Outcomes:

अध्ययन की समाप्ति पर अध्येता –

- सामाजिक मूल्य एवं नैतिक जवाबदेही को स्वीकार कर सकता है |
- साहित्य की प्रासंगिकता को जीवन में समझने की दक्षता रखता है |
- समाज में अंतर्निहित पद्दतियाँ एवं विचारधाराओं का व्याख्यान करने में सक्षम बन सकता है |
- साहित्य के माध्य
- म से प्रभावी एवं कुशल संचार का विकास करसकता है |

Course Contents:

UNIT I **7 Hours**

1 कहानी – तावान – प्रेमचंद

2 कहानी – उसकी रोटी – मोहन राकेश

3 व्यंग्य रचना – वैष्णव की फिसलन – हरीशंकर परसाई

UNIT II **7 Hours**

1. कहानी – वापसी - उषा प्रियंवदा
2. कहानी – नाम के बेटी तीसरी - सुधा अरोड़ा
3. निबंध – अच्छी हिन्दी – रवीन्द्रनाथ त्यागी

UNIT III **6 Hours**

1. कहानी – जल्लाद – पांडेय बेचन शर्मा 'उग्र'
2. रेखाचित्र – बुधिया कब आएगा – ज्ञानचंद मर्मज्ञ
3. एकांकी – अंधेर नगरी – भारतेन्दु हरिश्चंद्र

UNIT IV **6 Hours**

अनुवाद अनुच्छेद (में हिन्दी से अंग्रेजी)

संक्षेपण

सूचना : प्रत्येक इकाई 25 अंक के लिए निर्धारित है |

Text books:

1. हिन्दी पाठ्य पुस्तक – रेवा विश्वविद्यालय |

References:

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

SUBJECT_CODE	Language I: Additional English	L	T	P	C
B21AHA101		1	1	0	2

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:

The objectives of this course are:

- 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 Outcomes:

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 **7 Hours**

Values & Ethics

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 **6 Hours**

Natural & Supernatural

Literature: John Keats – La Belle Dame Sans Merci

Charles Dickens – The Signal Man

Hans Christian Anderson - The Fir Tree

Language: Collective Nouns

UNIT III **7 Hours**

Travel & Adventure

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 **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:

1. Tagore, Rabindranath. Gitanjali. Rupa Publications, 2002.
2. Wordsworth, William. The Complete Works of William Wordsworth. Andesite Press, 2017.
3. Munro, Hector Hugh. The Complete Works of Saki. Rupa Publications, 2000.
4. Shakespeare, William. The Complete Works of William Shakespeare. Sagwan Press, 2015.
5. Chindhade, Shirish. Five Indian English Poets: Nissim Ezekiel, A.K. Ramanujan, Arun Kolatkar, Dilip Chitre, R. Parthasarathy. Atlantic Publications, 2011
6. Dickens, Charles. The Signalman and Other Horrors: The Best Victorian Ghost Stories of Charles Dickens: Volume 2. Createspace Independent Publications, 2015.
7. Anderson, Hans Christian. The Fir Tree. Dreamland Publications, 2011.
8. Colvin, Sidney (ed). The Works of R. L. Stevenson. (Edinburgh Edition). British Library, Historical Prints Edition, 2011.
9. Bishop, Elizabeth. Poems. Farrar, Straus and Giroux, 2011.
10. Swift, Jonathan. Gulliver's Travels. Penguin, 2003.
11. Dickinson, Emily. The Complete Poems of Emily Dickinson. Createspace Independent Publications, 2016.
12. Brooke, Rupert. The Complete Poems of Rupert Brooke. Andesite Press, 2017.
13. King, Martin Luther Jr. &James M. Washington. I Have a Dream: Writings And Speeches That Changed The World. Harper Collins, 1992.

14. Keller, Helen. The Story of My Life. Fingerprint Publishing, 2016.
15. Green, David. Contemporary English Grammar Structures and Composition. New Delhi: MacMillan Publishers, 2010.
16. Thorpe, Edgar and Showick Thorpe. Basic Vocabulary. Pearson Education India, 2012.
17. Leech, Geoffrey and Jan Svartvik. A Communicative Grammar of English. Longman, 2003.
18. Murphy, Raymond. Murphy's English Grammar with CD. Cambridge University Press, 2004.

SUBJECT_CODE	Communicative English – I	L	T	P	C
B21AHE101		1	1	0	2

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:

The objectives of this course are to:

- 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 **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 **6 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 III **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 **10 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.

SUBJECT_CODE	MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE	L	T	P	C
B21DC0101		2	1	0	3

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 acquaint students with various statistical methods.
- To help students understand the basics of probability & statistics.
- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and Eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- To interpret discrete knowledge in Computer Science through graph theory and its applications.

Course Outcomes:

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

- Understand and apply statistical theory to analytics field.
- Realize the concepts of probability and its applications.
- Demonstrate and understanding of common numerical methods and how they are used to obtain approximate solution to otherwise intractable mathematical problems.
- Apply the acquired knowledge of graph theory, design discrete problems to solve by computers.

Course Contents:

UNIT I **10 Hours**

Descriptive Statistics: Meaning of Statistics and its definition-Functions-Scope/Characteristics-limitations. Collection of data Classification of data, preparation of frequency distribution and tabulation of data. Graphical representation of median and mode by - histograms, Cumulative frequency curves (Ogives). Measure of Central Tendency - Arithmetic Mean (Average), Partition values – Median, quartiles, and Mode and its applications. Methods of Dispersion Range, Quartile deviation, Standard deviations and Coefficient of Variation and its applications.

UNIT II **10 Hours**

Probability: Random experiments, trial, sample space, events. Approaches to probability- classical, empirical, subjective and axiomatic. Addition rules of probability. Conditional probability, independence of events and multiplication rule of probability. Bayes theorem (no proof any theorem) and its applications.

UNIT III **10 Hours**

Solution of Equations and Eigen value Problems: Solution of equation –Fixed point iteration: Bisection method – Newton's method – Solution of linear system by Gaussian elimination and Gauss-Jordon method– Iterative method – Gauss-Seidel method– Eigen value of a matrix by power method and by Jacobi method for symmetric matrix.

UNIT IV **10 Hours**

Graph Theory: Terminology, Definitions, Properties and Examples, Connectivity and Adjacency, Euler and Hamilton, Representation and Isomorphism, Planarity and Chromatic Number, Directed Graphs and Weighted Graphs, Trees and its properties and types.

Text Books:

1. Gupta. S.C and Kapoor V.K. Fundamentals of Mathematical Statistics, Sultan Chand and sons, (2001).
2. Grewal, B.S. and Grewal, J.S., "Numerical methods in Engineering and Science", Khanna Publishers, New Delhi.
3. Kenneth H Rosen, "Discrete Mathematics & its Applications" 7th edition, McGraw-Hill, 2010.

Reference Books

1. S.P.Gupta, “Statistical methods”- Sultan Chand & Sons, New Delhi, 2012 Edition.
2. Freund J.E., Mathematical Statistics, Prentice hall, (2001).
3. P K Srimani and M Vinayaka Murthy, “Probability and Statistics”, Subhas Stores, 2000
4. Berenson and Levine, Basic Business Statistics, Prentice- Hall India (1996, 6thedition)
5. Veerarjan, T and Ramachandran, T., “Numerical methods with programming in C”, Tata McGraw-Hill Publishing.Co.Ltd.
6. Chapra, S. C and Canale, R. P., “Numerical Methods for Engineers, Tata McGraw-Hill, New Delhi.
7. Sankara Rao K, “Numerical Methods for Scientists and Engineers”, Prince Hall of India Private Ltd, New Delhi.
8. P K Srimani and M Vinayaka Murthy, “Computer Oriented Numerical Methods & Linear Programming”, Subhas Stores, Bengaluru, 2011.
9. NarsinghDeo, Graph Theory with Applications to Engineering and Computer Science, PHI Learning Pvt. Ltd., 2004.
10. K S Deshikachar, M Vinayaka Murthy and Udaya Rani, “ Discrete Mathematical Structures with Application to Computer Science”, Subhas Stores, Bengaluru, 2012.
11. Tremblay and Manohar R, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill, New Delhi, 2003.
12. Jayant Ganguly: A Treatise on Discrete Mathematical Structures" Pearson, 2010.

SUBJECT CODE	DIGITAL LOGIC AND COMPUTER DESIGN	L	T	P	C
B21DC0102		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.

Prerequisites:

Different representations of truth table, logic gate, timing diagram, switch representation, state diagram, and state equations.

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:

- Understand and solve the number systems, codes, logic gates and Boolean Algebra.
- Realize the Boolean expressions using Karnaugh Maps with analysing various combinational and sequential Logic Circuits.
- Summarize the components of a computer , the basic I/O devices and secondary storage devices.

Course Outcomes:

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

1. Analyze the fundamental concepts and techniques used in Digital Electronics and to have command of the number systems and operations.
2. Classify Logic gates and to solve Boolean expressions using theorems of Boolean Algebra.
3. Realize the Boolean expressions using Karnaugh Maps with analyzing various combinational and sequential Logic Circuits.
4. Illustrate the basics of computer organization.

Course Contents:

UNIT I **10 Hours**

Number Systems and Arithmetic: Digital and Analog Signals and Systems, Number Systems, Base Conversion, Binary Arithmetic: Binary addition, Binary subtraction using 1' complement, 2's complement method, BCD code.

Logic Gates: AND, OR, NOT, Ex-OR, Ex-NOR, Universal Gates, **Boolean Algebra:** Postulates of Boolean Algebra, Theorems of Boolean Algebra, De-morgan's theorems, SOP and POS forms, Conversion of Boolean expression to Standard SOP and Standard POS form.

UNIT II **10 Hours**

Map Simplification: Minterm and Maxterms, Minimization Techniques for Boolean Expressions using Karnaugh Map, **Combinational Logic:** Adders, Subtractors, **Sequential Logic:** RS, JK, D and T Flip-flops, Registers, Shift Registers.

UNIT III **10 Hours**

Basic Computer Organization: Functional Units of computer, Basic operational concepts, Instruction codes, Computer registers, Basic computer instruction formats, timing and control, instruction cycle**.**

UNIT IV **10 Hours**

Basic Computer Design: Addressing Modes, Memory reference instructions, I/O and interrupt, Complete Computer Description, Design of basic computer.

Text Books:

1. M. Morris Mano, Digital Logic and Computer Design, PHI. 5th edition.
2. Mano M Morris, Computer system architecture, revised edition, ISBN-13: 978-9332585607 ISBN-10: 9332585601.(Chapter- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 8.5).
3. Carl-Hamacher, Computer-Organization, 5th Edition.(chapter 1.2, 1.3).

Reference Books:

1. Morris Mano Charles Kime, Logic and Computer Design Fundamentals M. Fourth Edition, Pearson Education Limited 2014
2. Thomas L, Floyd Digital Fundamentals Pearson Edition -11th Edition-2015- ISBN: 9780132737968

SUBJECT_CODE	OPERATING SYSTEM USING LINUX	L	T	P	C
B21DC0103		3	0	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.

Course Prerequisites:

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

Course Objectives:

- Student will be able to understand the basic components of a computer operating system, and the interactions among the various components.
- The course will cover an introduction on the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems.
- To learn about Processes, threads and various Scheduling policies.
- Understand and work multiple Linux operating System

Course Outcomes:

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

- Analyse theory and implementation of: processes, resource control physical and virtual memory, scheduling, I/O and files.
- Demonstrate and create shared memory segments, pipes ,message queues and can exercise interposes communication
- Understand the basic commands of Linux operating system and can write shell scripts Gain expertise in the security and kernel organization
- Implement file systems, directories and operate them with various memory management schemes, file system and I/O schemes.

Course Contents:

UNIT I **10 Hours**

OPERATING SYSTEM INTRODUCTION: Need of OS, Evolution of OS, Functions, Types of Operating Systems, Operating System Components & Services, System calls**.**

Process Management: Process Concept, Process Scheduling, Threads, CPU Scheduling Criteria, Scheduling algorithm. The Critical Section Problem, Semaphores, Classical problems of synchronization, Monitors.

UNIT II **10 Hours**

Deadlocks: System Model, Dead locks Characterization, Methods for Handling Deadlocks: Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.

Memory Management: Logical and Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Segmentation with paging, Virtual memory-Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing.

UNIT III **10 Hours**

Introduction and Installing of Red Hat and Ubuntu Linux Operating System, History, salient features, Linux system architecture, Linux command format, Directory commands, File related commands, Disk related commands. Shell types, shell command line processing,

Linux Commands :cls, cat, cal, date, calendar, who, printf, tty, sty, uname, passwd, echo, tput, bc, script, shell script features, system and user-defined variables, expr command, read and echo statement, command substitution, escape sequence characters, Exit Status of a Command. Shell script arguments, positional parameters, test command.

UNIT IV **10 Hours**

Conditional Control Structures-if statement, case statement, Looping Control Structure-while, until, for, statements. Filters commands, grep, sed, AWK.

Basic Linux Administration: Basic System administration, Managing users, Software Management, File System Management, RAID and LVM, Devices and modules, Kernel administration, virtualization, Backup Management, dump/restore.

Text books:

1. Abraham Silberschatz And Peter Baer Galvin, “Operating System Concepts”, 8th Edition, Pearson Education, 2002.
2. M.G.Venkateshmurthy, “Introduction To Unix & Shell Programming”, First Edition, Pearson Education, 2004.
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. William Stallings: Operating Systems, PHI, Latest Edition.
2. A.S. Tanenbaum: Modern Operating Systems, Latest edition Pearson/PHI.

SUBJECT_CODE	PROGRAMMING FUNDAMENTALS USING C	L	T	P	C
B21DC0104		3	0	0	3

Course Descriptions:

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

Course Prerequisites:

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

Course Objectives:

The objectives of this course are to:

- Explain the basic programming concepts with importance of Algorithm & Flow chart.
- Describe how a good program design can reduce coding and debugging time
- Analyze a problem into its logical set of sub problems and understand structured programming concepts.
- Illustrate the concept of data and memory management also introduce the concepts of Files for efficient storage of data

Course Outcomes:

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

- Design Algorithms and Flowcharts to solve real world problems.
- Identify the suitable structured constructs and use it to solve any real world problems.
- Explain the different categories of user defined functions and data structures to implement the concept of program and data organization.
- Illustrate files for permanent storage of data and pointers for efficient memory management.

Course Content:

UNIT I **10 Hours**

Introduction to Problem Solving-Introduction-The Problem Solving Aspect-Top Down Design-Implementation of Algorithms-Program Verification-Flow Chart.

Basics of C Programming: History of C, Importance of C, Basic Structure of C Programs, Introduction, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Declaration of Storage Class, Assigning Values to Variables. Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operator, Bitwise Operators, Special Operators.

UNIT II **10 Hours**

Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators. Formatted and Unformatted I/O .

Structured Constructs: Decision Making and Branching, Decision Making and Looping. 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.

UNIT III **10 Hours**

Built-in- functions - Mathematical and 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 IV **10 Hours**

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, Pointer Arithmetic, Pointer & Arrays, Pointer to functions, Pointer to structures. File Management in C: Introduction, Defining and Opening a File, Closing a File, Input/ Output Operations on Files.

Text Books:

1. R.G Dromey, "How to Solve it by Computer" Pearson, Fourteenth Impression, 2013. (Chapter 1 & 2).
2. E. Balaguruswamy, "Programming In ANSI C", 3rd edition, McGraw Hill Education, 2006. (Chapter 1 to 12).

Reference 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. Steven Feuerstein,”oracle PL/SQL Programming”,OREILLYpublications,Sixth edition 2014.

SUBJECT_CODE	C LAB	L	T	P	C
B21DC0105		0	0	2	2

Course Objectives:

The objectives of this course are to:

1. Implementation of Structured Programming Constructs
2. To design programs on Arrays
3. Illustrate Modular Programming using functions
4. Implement File Management Concepts

Course Outcomes:

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

1. Analyse the structure of C Program
2. Implement the structured constructs to solve real world problems
3. Illustrate the user defined functions and data structures
4. Manage files for permanent storage of data and pointers for efficient memory management

C LAB PROGRAMS

PART-A

1. Program to check whether a given integer is odd or even
2. Program to find the biggest of three numbers.
3. Program to swap the contents of two numbers using bitwise XOR operation
4. Program to convert given binary number into decimal and vice versa
5. Program to find the GCD and LCM of two integers
6. Program to generate prime numbers in a given range
7. Program to sort the given numbers in ascending order using bubble sorting

8. Program to search a given number from the array using linear search
9. Program to find factorial of a number using function
10. Program to read and display the contents of a text file using file handling

PART-B

1. Program to find the roots of a quadratic equation
2. Program to add and multiply two matrices
3. Program is to illustrate how user authentication is made before allowing the user to access the secured resources. It asks for the user name and then the password. The password that you enter will not be displayed, instead that character is replaced by '*'
4. Program to read your name and encrypt and decrypt your name using substitution cipher
5. Program to implement RSA (Encryption and decryption) method
6. Program to find the sum of all elements of an array using pointers as arguments
7. Program to read and display array of employee information using structur
8. Program to create a file called “emp.rec” and store information about a person, in terms of his name, age and salary.

SUBJECT_CODE	**LINUX LAB**	**L**	**T**	**P**	**C**
B21DC0106		**0**	**0**	**2**	**2**

Course Objectives:

1. To provide introduction to UNIX Operating System and its File System
2. To gain an understanding of important aspects related to the SHELL and the process
3. To develop the ability to formulate regular expressions and use them for pattern matching.
4. To provide a comprehensive introduction to SHELL programming, services and utilities.

Course Outcomes:

After the completion of the course

Students will able to:

1.Identify the basic Unix general purpose commands.

2.Apply and change the ownership and file permissions using advance Unix commands.

3.Use the awk, grep, perl scripts.

4.Implement shell scripts and sed.

5.Apply AWK commands.

LINUX LAB PROGRAMS

PART A

1. Write a non-recursive shell which accepts any no. of arguments and prints them in the reverse order
2. Write a shell script that accepts two file names as arguments, checks if the permission for these files are identical and if the permissions are identical output common permissions and otherwise output each filename followed by its properties
3. Write a shell script that takes a valid directory name as an argument and recursively descends all the subdirectories, finds the maximum length of any file in that hierarchy and write this maximum value to the standard output
4. Write a shell script to find the home directories of the login id sent as argument
5. Write a shell script to implement terminal lock
6. Write a shell script to convert characters from upper case to lower
7. Write a shell script to convert the contents of any number of files passed at the cmd line argument
8. Write a shell script to display all the links available for the specified file at 1st argument and at directory as 2nd argument
9. Write a shell script to set the long list of file along with the inode number
10. Write a shell script to find the creation time of a file else send an error msg
11. Write a shell script to represent the date in the calendar by a * or **
12. Write a shell script to find the smallest and the largest of three no's from the key board

PART B

13. Write an AWK script to accept a string with its length more than 10 else reject.

14. Write an AWK script to compute the mathematical expressions
15. Write an AWK script that accepts a list of filenames and delete all lines with a specific word files
16. Write an AWK script to count the occurrence of every word of file 1 in file 2
17. Write an AWK script to calculate the login time
18. Write an AWK script to determine the logger name within one minute
19. Write an AWK script to find N power M
20. Write an AWK script to display all line between start and end line
21. Write an AWK script to find the employees who has employee id greater than 200
22. Write an AWK script to find the average and grade for every student
23. Write an AWK script to concatenate every 3 lines of input with a comma.
24. Write an AWK script to salary of an employee.

SUBJECT_CODE	Language II: Kannada	L	T	P	C
B21AHK202		1	1	0	2

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®ÌÉÃ ¸É«Ä¸ÀÖgï JgÀqÀÄ PÉærmïUÀ¼À£ÀÄß ºÉÆA¢zÉ.

PRE REQUISITES

- 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.

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 IV		**6 HOURS**
1. ¥ÀÆtðZÀAzÀæ vÉÃd¹é: ¸ÀºÀd PÀÈ¶ (DAiÀÄÝ ¨sÁUÀ)		

REFERENCE BOOKS

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
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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«ÄÃPÉë, ¥ÀæPÁ±ÀPÀgÀÄ ¸Àé¥Àß §ÄPï ºË¸ï, ¨ÉAUÀ¼ÀÆgÀÄ. 2013

SECOND SEMESTER

SUBJECT_CODE	Language II: Hindi	L	T	P	C
B21AHH202		1	1	0	2

COURSE DESCRIPTION

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

PRE REQUISITES

- 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:

- संदर्भानुसार उचित भाषा का प्रयोग करने की दक्षता को छात्रों में उत्पन्न करना |
- साहित्य के माध्यम से समाज एवं मानवीय मूल्यों को समझाकर, उन मूल्यों की रक्षा हेतु प्रेरित करना |
- छात्रों में पुस्तक पठन एवं लेखन की अकृतिम प्रवृत्ति स्थापित करना |
- 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 I **7 Hours**

1 कबीरदास के दोहे – कबीरदास

2 कविता – प्रतिज्ञा की अर्जुन - मैथिलीशरण गुप्त

3 कविता – वीरों का कैसा हो बसंत – सुभद्रकुमारी चौहान

UNIT II **7 Hours**

1. तुलसीदास के पद –तुलसीदास

2. कविता – संध्या सुंदरी – सूर्यकांत त्रिपाठी 'निराला'
3. कविता – करमवीर – अयोध्या सिंह उपाध्याय 'हरिऔंध'

UNIT III **6 Hours**

1. मीराबाई के पद – मीराबाई
2. कविता – मधुशाला – हरिवंशराय बच्चन
3. कविता – हम झुक नहीं सकते – अतलबिहारी बाजपाई

UNIT IV **6 Hours**

अनुवाद अनुछेद (अंग्रेजी से हिन्दी)

सृजनात्मक व्यक्तित्व

अ महादेवी वर्मा, प्रेमचंद

आ महात्मा गांधी, अब्दुल कलाम

TEXT BOOKS:

- हिन्दी पाठ्य पुस्तक – रेवा विश्वविद्यालय |

REFERENCE BOOKS:

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

SUBJECT_CODE	Language II: Additional English	L	T	P	C
B21AHA201		1	1	0	2

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:

The objective of this course are to

- 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 Outcomes:

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 Content:

UNIT I **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 **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 **7 Hours**

Literature: Kamala Das – An Introduction

Rabindranath Tagore – The Exercise Book

Jamaica Kincaid – Girl

Writing Skills: Dialogue Writing

UNIT IV **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:

1 Agrawal, K.A. *Toru Dutt the Pioneer Spirit of Indian English Poetry - A Critical Study*. Atlantic Publications, 2009.
2 Latham, Edward Connery (ed). *The Poetry of Robert Frost*. Holt Paperbacks, 2002
3 Gale, Cengage Learning. *A Study Guide for Tomas Rivera's The Harvest*. Gale, Study Guides, 2017.
4 Basu, Tejan Kumar. *The Life and Times of C.V. Ram*an. Prabhat Prakashan, 2016.
5 Rozewicz, Tadeusz. *New Poems*. Archipelago, 2007.
6 Manohar, Murli. *Critical Essays on Dalit Literature*. Atlantic Publishers, 2013.
7 Hansda, Sowvendra Shekhar. *The Adivasi Will Not Dance: Stories*. Speaking Tiger Publishing Private Limited, 2017.
8 Jacobs, Harriet. *Incidents in the Life of a Slave Girl*. Createspace Independent Publication, 2014.
9 Das, Kamala. *Selected Poems*. Penguin Books India, 2014.
10 Tagore, Rabindranath. *Selected Short Stories of Rabindranath Tagore*. Maple Press, 2012.
11 Gale, Cengage Learning. *A Study Guide for Jamaica Kincaid's Girl*. Gale, Study Guides, 2017.
12 Kipling, Rudyard. *The Absent-Minded Beggar*. Hardpress Publishing, 2013.
13 Doyle, Arthur Conan. *The Hound of the Baskervilles*. General Press, 2017.
14 Dixson, Robert J. *Everyday Dialogues in English*. Prentice Hall India Pvt Ltd., 1988.

15 Turton, Nigel D. *ABC of Common Errors*. Mac Millan Publishers, 1995.

16 Samson, T. (ed.) *Innovate with English.* Cambridge University Press, 2010.

17 Kumar, E Suresh, J. Savitri and P Sreehari (ed). *Effective English*. Pearson Education, 2009

SUBJECT_CODE	Communicative English – II	L	T	P	C
B21AHE201		1	1	0	2

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 Content:

UNIT I **7 Hours**

Remedial Grammar: Questions& Negatives; Questions Tags

Writing Skills: Email Writing

Activities: Group Discussions

Literature: Alphonse Daudet - The Last Lesson

UNIT II **7 Hours**

Remedial Grammar: Past Simple & Past Perfect

Writing Skills: Report Writing

Activities: Book & Movie Reviews

Literature: Lord Alfred Tennyson – Ulysses

UNIT III **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 **7 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

SUBJECT_CODE	INFORMATION SYSTEMS AND DATA BASE MANAGEMENT	L	T	P	C
B21DC0201		3	0	0	3

Course Description:

The course, Information Systems and Database Management System, provides an introduction to the management of database systems. The course emphasizes the understanding of the fundamentals of information 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-based approach to learning.

Prerequisites:

Basic knowledge of data base**.**

Course Objectives:

The objectives of this course are to:

- To analyse the core concepts in data and information management
- To inculcate foundation knowledge in database concepts.
- Understand the concepts and methodologies of database design and gives student knowledge related to database design.
- Introduces the basics of querying through a variety of database problems

- Demonstrate the current trends in databases and management.

Course Outcomes:

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

- Analyse the role of data, information, and databases in organizations, Describe the concepts of the structured databases and Data base design using the Entity-Relationship data model
- Understand the concepts of relational data model including relations, tuples, attributes, domains, constraints, and operators
- Demonstrate the role of data, information, and databases in organizations, Challenges in handling in today's data and role of NoSQL in Big data Management
- Understand Big data Management through aggregate data modelling and learn MongoDB- A document NoSQL Database.

Course Content:

UNIT I **10 Hours**

Data-information-Data Management-importance of Data Management - Database System Applications – View of Data – Database Languages – Relational Databases — Transaction Management – Database Architecture – Database Users and Administrator.

Databases Design – Data Modelling Overview – Entity-Relationship Model – Constraints – Removing Redundant Attributes – E-R Diagrams – Reduction to Relational Schemas.

UNIT II **10 Hours**

Relational Model: Structure of Relational Databases – Database Schema – Keys – Schema Diagrams – Relational Query Languages – Relational Operations- Constraints – Querying.

Components of SQL, data types, operators, DDL Commands: CREATE, ALTER, DROP, for tables & views. DML Commands: SELECT, INSERT, DELETE & UPDATE; Clauses: ORDER BY, GROUP BY and HAVING; SQL Joins; Aggregate functions, Nested and correlated queries.

UNIT III **10 Hours**

Data lifecycle - Information systems. Types of Data -Structured, unstructured data, semi-structured data. Data Management - Static vs Dynamic Data-Data warehouses- DWH Architecture -Enterprise Data Model - Data Lakes- Managing Data in Motion.

Introduction to Big Data-Challenges in Big Data management- the three V's. Introduction to NoSQL Data lifecycle - Information systems. Types of Data -Structured, unstructured data, semi-structured data. Data Management - Static vs Dynamic Data-Data warehouses- DWH Architecture -Enterprise Data Model - Data Lakes- Managing Data in Motion.

Definition of NOSQL-Challenges in traditional RDBMS, History of NOSQL, Handling Unstructured data with NoSQL, Need for NOSQL- Big Data and NoSQL, Need for schema less databases.

UNIT IV **10 Hours**

Aggregate data models. Distribution models, Types of NOSQL Data base models- key-value Column store, document data models and Graph Data models, CAP theorem.

Introduction to Document databases, Introduction to Document stores, Exploring MongoDB, MongoDB data model, Storing Data in and Accessing Data from MongoDB, querying in MongoDB using examples.

Text Books:

- Elmasri,Navthe, Fundamentals of Database System- Pearson Education.
- Pramod. J. Sadalge, Martin Fowler, NoSQL distilled, A brief guide to emerging world of Polyglot persistence. Addison-Wesley 2013
- The Definitive guide to MongoDB, The NoSQL Database for Cloud and Desktop Computing, Apress 2010

Reference Books:

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

Reference Websites

1. Sudarshan, Korth - Database System Concepts (McGraw-Hill Education).
2. Shashank Tiwari, Professional NOSQL" , 2011, WROX Press

SUBJECT_CODE	INFORMATION SECURTY MANGAEMENT AND DATA PRIVACY	L	T	P	C
B21DC0202		2	1	0	3

Course Description:

In this course we will explore information security through some introductory and gain an insights of the scope and context of the subject. This includes a brief introduction to authentication, security management and

Prerequisites:

network and computer security that gives you an exposure to the study of information security and develop understand some key information security concepts.

Basics of data base management

Course Objectives:

The objectives of this course are to:

- Discover fundamental concepts of system security management and risk management.
- Explore understanding in authentication and encryption key management .
- Analyze the security architecture and frameworks.
- Inspect various network attacks and examine Information Technology Infrastructure Library and Security Management.

Course Outcomes:

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

- Understand the basic concepts of managing information security and co-ordinate responses to risk management.
- Demonstrate the role of authentication tokens and encryption key management.
- Explain web services security and security framework.
- Illustrate how to manage network security and application security.

Course Content:

UNIT I Security Management Concepts and Principles **10 Hours**

Integrated Threat Management: Introduction to ITM. Pros and Cons of an ITM Solution, Evaluating an ITM Solution. **Understanding Information Security Management Systems**: Introduction to Information Security Management System. Benefits of ISMS.

Risk Management: Identifying the Kinds of Information an Enterprise or University Should Try to Gather, External Sources, Internal Sources. Information Risk Management: The Nature of Risk, The Process of Risk Management.

UNIT II **10 Hours**

Access Control Techniques:

Authentication Tokens: Evolution of the Need for Authentication Tokens. Tokens as a Candidate for Strong Authentication, Common Types of Tokens, Asynchronous Tokens, Synchronous Tokens, Tokens under Attack. **Authentication and the Role of Tokens**: Overview of Authentication Factors, Working of tokens, Token Management**. Encryption Key Management in Large-Scale Network Deployments:** Large-Scale Network Issues, Encryption Options: Link-Level Encryption, Application-Level Encryption, Network-Level Encryption. Limitations of the IPSec Encryption, Separation of the Key Management Solution.

UNIT III **10 Hours**

SECURITY ARCHITECTURE AND DESIGN

Service-Oriented Architecture and Web Services Security: Foundations for Web Services and Web Services-Security, Security Assertion Markup Language, Web Services Security Standards.

Security Frameworks: Introduction, Description of Frameworks: Control Objectives for Information and Related Technology, Federal Information Systems Management Act, Information Security Forum, Information Technology Infrastructure Library, Management Frameworks.

Facsimile Security: Secure Faxing, Fax Advantages and Security Issues, Secure Fax Designation.

UNIT IV **10 Hours**

Internet, Intranet, and Extranet Security:

Network Attacks and Countermeasures: Phishing Definition, Evolution of Phishing, Phishing Delivery Mechanisms, Phishing Attacks. URL Obfuscation Attacks, Other Attacks: Cross-site scripting attacks, Preset session attacks. Technical Approaches to the Problem: Inbound Spam Filters, Protect the Desktop, Removal of HTML E-Mail, Browser Enhancements. Stronger Password Log-Ons.

Application security:

Information Technology Infrastructure Library and Security Management: Introduction, Information Technology Infrastructure Library, History of ITIL, Security Management, Descriptions: Service Support Details, Incident Management, Problem Management, Change Management, Configuration Management, Release Management. Service Delivery Overview, the Security Management Process.

TextBooks:

1. Harold F. Tipton, CISSP. Micki Krause, Information Security Management Handbook Sixth Edition. Auerbach Publications
2. Malcolm Harkins, Managing Risk and Information Security, Apress, 2012.

Reference Books:

1. Nina Godbole, Information Systems Security: Security Management, Metrics, Frameworks and Best Practices, Wiley, 2017.
2. Daniel Minoli, Information Technology Risk Management in Enterprise Environments, Wiley, 2009.

SUBJECT_CODE	DATA STRUCTURES USING C++	L	T	P	C
B21DC0203		3	0	0	3

Course Descriptions:

In this course we will explore the various structures of data through some introductory topics and gain an insight of the scope and context of the subject. This includes a brief introduction to object oriented programming concepts, class and objects, that gives you an exposure to basics and advanced concepts to understand some key concepts of data structures using C++ .

Prerequisites:

Basic concepts and programming knowledge using C.

Course Objectives:

The objectives of this course are to:

- Impart knowledge of object oriented programming concepts and implement them in C++.
- Acquire the knowledge of using class and objects in object-oriented programming.
- To design and implementation of various basic and advanced data structures.
- Develop Applications using Linear and Non-Linear Data Structures.

Course Outcomes:

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

- Analyze the different Programming paradigm such as procedure oriented and object oriented programming methodology and conceptualize elements of Object oriented methodology.
- Understand data structure as applied to specified problem definition.
- Perform operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.

Linked List: Definition, Types of Linked List, Singly linked list: Traversing, Insertion, Deletion. Doubly Linked list operations.

- Evaluate linear and Non-linear data structures.

Course Content:

UNIT I **10 Hours**

Introduction: Procedure Languages, Overview of OOPS principles, Introduction to classes & Objects, 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.

Classes & Objects: Introduction, Class Specification, Class objects, Class members, Data Members, Member functions, Class member visibility, private, public, protected. Constructors and Types of Constructors, Overloaded Constructor, Destructors.

UNIT II **10 Hours**

Basics of Data Structures: Introduction to Data Structures, Data structure Types, Review of Arrays-Inserting and deleting operations, Structures, Unions, Pointers and Dynamic Memory Allocation Functions.

Linear Data Structures:

Stack: Definition, Array representation, Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another.

Queue: Definition, Array representation, Types of queues: Simple queue, Circular queue, Double ended queue, Priority queue.

UNIT III **10 Hours**

Searching and Sorting: Linear Search, Binary Search and Comparison of Linear and Binary Search, Insertion Sort, Selection Sort, Bubble, Quick Sort and Merge Sort.

UNIT-IV **10 Hours**

Non Linear Data Structures: Need for non-linear structures,

Graphs; Introduction to Graph, Graph Traversal Techniques,

Trees: Binary Tree, Properties of Binary Tree and Tree Traversal.

Text Books:

1. Lafore Robert, "Object Oriented Programming in Turbo C++", Galgotia Publications, 2012.
2. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill Publications, 2011.
3. Ashok N Kamthane, "Introduction to Data Structures in C", Pearson Education (S) Pvt Ltd., New Delhi: 2005.

Reference Books:

1. HerbertSchildt, "C++: The Complete Reference" Osborne McGraw-Hill, Third edition, 1998.
2. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan (2008), Fundamentals of Data Structure in C, 2nd Edition, University Press, India.

SUBJECT CODE	DATA COMMUNICATION AND NETWORKING	L	T	P	C
B21DC0204		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:

This Course will enable students to

- Identify the different components and their respective roles in a communication System.
- Describe the importance and functions of the OSI layers Physical, data link, network and transport layer.
- Elaborate a data link protocol and define how it controls the transfer of frames.
- Explain the routing policies and protocols.

Course Outcomes:

Upon completion of the course, the student should be able to:

- Understand the fundamentals of data communications and networks by gaining knowledge of data transmission concepts.
- Illustrate the operations of OSI layers.
- Design the algorithms used to design data networks.
- Analyse the layers in the Internet and OSI models and describe their functions

Course Contents:

UNIT I **10 Hours**

Uses of computer networks, Network Hardware, Network Software, Reference Models, Network Standardization. The Physical Layer: Guided Transmission Media, Wireless Transmission, Digital modulation and multiplexing, Switching: Circuit switching, packet switching. Mobile telephone system.

UNIT II **10 Hours**

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 II **10 Hours**

Host to Host Delivery: Internetworking, addressing and Routing Network layer design issues, Routing algorithms: ARP, IPV4, ICMP, IPV6 and ICMPV6, Congestion control algorithms, Quality of Service, The network layer in the internet.

UNIT IV **10 Hours**

Transport Layer: Process to Process Delivery: UDP; TCP congestion control and Quality of service**.**

Application Layer: Client Server Model, Socket Interface, Domain Name System (DNS): Electronic Mail (SMTP) and file transfer (FTP) HTTP and WWW. Local area Network: Ethernet - Traditional Ethernet, Fast Ethernet, Gigabit Ethernet; Token bus, token ring; Wireless LANs - IEEE 802.11.

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:

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

SUBJECT_CODE	DATA STRUCTURES USING C++ LAB	L	T	P	C
B21DC0205		0	0	2	2

Course Objectives:

The objectives of this course are to:

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

Course Outcomes:

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

- Explain the process of writing, compiling and executing programs in C++ using appropriate predefined functions in C++.

- Choose appropriate data structure as applied to specified problem definition.
- Perform operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Choose appropriate data structure as applied to specified problem definition.

Lab Experiments

Part-A

1. Write a C++ Program to perform Insertion and Deletion Operation using arrays.
2. Write a C++ program to convert infix arithmetic expression to post fix expression.
3. Perform Stack operations using Array implementation.
4. Write a C++ program to simulate the working of Circular Queue using an array.
5. Write a C++ Program to perform Create and Display operations using Linked List.
6. Write a program to search an element from a list. Give user the option to perform Linear or Binary search.
7. Write a program using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.
8. Write a C++ program to implement graph traversal techniques BFS.

Part-B

1. Write a C++ program to perform concept of Constructor and Destructor.
2. Write a C++ Program to perform Memory allocation during run time.
3. Write a C++ program to swap 2 numbers using pointers.
4. Perform Queue operations using Array implementation.
5. Write a C++ Program to sort the elements using Quick Sort.
6. Write a C++ Program to sort the elements using Merge Sort.
7. Write a C++ program to perform Tree Traversal.
8. Write a C++ program to implement graph traversal techniques DFS.

SUBJECT_CODE		L	T	P	C
B21DC0206	DBMS Lab	0	0	2	2

Course Contents:

Lab Experiments

Part-A

LAB 01: Student-Teacher Database

Consider the following Entities and their Relationships for Student-Teacher database.

Student (s_no int, s_name varchar (20), s_class varchar (10), s_addr varchar (30))

Teacher (t_no int, t_name varchar (20), qualification varchar (15), experience int)

Relationship between Student and Teacher is many to many with descriptive attribute subject.

Constraints: Primary Key, s_class should not be null.

Solve the following Queries in Suitable Oracle:

1. List the names of students of class 'BSc(CS)'.

2. List the names of the students to whom 'Prof. Kiran' is teaching.

3. List the details of all teachers whose names start with the alphabet 'S'.

4. List the names of teachers teaching subject 'ADBMS'.

5. Find the number of teachers having qualification as 'Ph. D.'.

6. Find the number of students living in 'Mysore'.

7. Find the details of maximum experienced teacher.

8. Find the names of students of class 'BSc(CS)' and living in 'Bangalore'.

9. List the names of all teachers with their subjects along with the total number of students they are teaching.

10. List the names of students who are taught by most experienced teacher.

LAB 02: Book-Author Database

Consider the following Entities and their Relationships for Book-Author database.

Book (b_no int, b_name varchar (20), pub_name varchar (10), b_price float)

Author (a_no int, a_name varchar (20), qualification varchar (15), address varchar (15))

Relationship between Book and Author is many to many.

Constraints: Primary Key, pub_name should not be null.

Solve the following Queries in Suitable Oracle :

1. List details of all books written by ‘Kiran’

2. Count the number of books published by ‘Pearson’ publication.

3. List book details for which book price is between 300.00 and 500.00.

4. List all author details sorted by their name in descending order.

5. Change the publisher name from ‘TMH Publications' to 'Jagruti Publications'.

6. List the details of all books whose names start with the alphabet ‘R’.

7. List author wise details of books.

8. Display details of authors who have written more than 2 books.

9. List the details of all books written by author living in ‘Pune’.

10. Display details of authors who have written maximum number of books.

LAB:03

Student-Competition Database

Consider the following Entities and their Relationships for Student-Competition database.

Student (sreg_no int ,s_name varchar(20), s_class char(10))

Competition (c_no int ,c_name varchar(20), c_type char(10))

Relationship between Student and Competition is many to many with descriptive attributes rank and year.

Constraints: Primary Key, c_type should not be null,

rank should be greater than 0,

c_type can be ‘sport’ or ‘academic’.

Solve the following Queries in Suitable Oracle:

1. List out all the competitions held in the school for class 4th.

2. Count all the students who have secured 1st rank in running race from year 2019 to 2021.

3. Delete the record of student ‘Amit Kale’ which has taken part in drawing Competition.

4. List out all the competitions held in the school under ‘academic’ in year 2019.

5. List the names of all the students who have secured 3rd rank in dance competition in year 2019.

6. List out all the competitions held in the school for class 8th in year 2019.

7. List the names of all the students who have secured 1st rank in more than two competitions.

8. Change the rank to 1st of student ‘Subodh Kadam’ which has taken part in dance

Competition.

9. List the names of students of ‘BSc(CS)’ class participated under ‘sport’.

10. List the competition wise participated student’s names.

LAB 04:

Movie-Actor Database

Consider the following Entities and their Relationships for Movie-Actor database.

Movie (m_name varchar (25), release_year integer, budget money)

Actor (a_name varchar (20), role char (20), charges money, a_address varchar (20))

Producer (producer_id integer, p_name char (30), p_address varchar (20))

Each actor has acted in one or more movies. Each producer has produced many movies and each movie can be produced by more than one producers. Each movie has one or more actors acting in it, in different roles.

Constraints: Primary Key, role and p_name should not be null.

Solve the following Queries in Suitable Oracle :

1. List the names of the actors and their movie names.
2. List the names of movies whose producer is 'Mr. Karan Johar'
3. List the names of the movies with the minimum budget.
4. List the names of movies released after year 2011.
5. Display count and total budget of all movies released in year 2014.
6. List the names of actors who have acted in maximum number of movies.
7. List the names of movies produced by more than one producer.
8. List the names of movie and actor name, with maximum actor charges.
9. List the names of actors who have acted in at least one movie, in which Mr. Amir Khan has acted.
10. Display total number of actors acted in movie 'Dhoom'.

LAB 05:

Person-Area Database

Consider the following Entities and their Relationships for Person-Area database.

Person (pnumber integer, pname varchar (20), birthdate date, income money)

Area (aname varchar (20), area_type varchar (5))

An area can have one or more persons living in it, but a person belongs to exactly one area.

Constraints: Primary Key, area_type can be either 'urban' or 'rural'.

Solve the following Queries in Suitable Oracle :

1. List the names of all persons living in 'Pune' area.

2. List the details of all people whose names start with the alphabet 'P'.

3. Count area wise persons whose income is above _____.

4. List the names of all people whose income is between _____and _____.

5. List the names of all people whose birthday falls in the month of September.

6. List names of persons whose income is same.

7. Display area wise maximum income of person.

8. Update the income of all person living in rural area by 5%.

9. Delete the record of person which has income below _____.

10. Count the total number of person according to area_type.

Part-B MongoDB LAB

CRUD Operations in MONGODB

1: Student Database

Create a Student database with the fields: (SRN, sname, degree, sem, CGPA)

i. Insert 10 documents.
ii. Display all the documents.
iii. Display all the students in BCA.
iv. Display all the students in ascending order.
v. Display first 5 students.
vi. Display students 5,6,7.
vii. List the degree of student "Rahul".
viii. Display students details of 5,6,7 in descending order of Age.
ix. Display the number of students in BCA.
x. Display all the degrees without _id.
xi. Display all the distinct degrees.
xii. Display all the BCA students with CGPA greater than 6, but less than 9.
xiii. Display all the students in BCA and in 6th Sem.

2. Employee Database

Create an employee database with the fields: {eid, ename, dept, desig, salary, yoj, address {dno, street, locality, city}}

i. Insert 10 documents.
ii. Display all the employees with salary in range (50000, 75000).
iii. Display all the employees with designation.
iv. Display the Salary of “Rahul”.
v. Display the city of employee “Rahul”.
vi. Update the salary of developers by 5000 increment.
vii. Add field age to employee “Rahul”.
viii. Remove YOJ from “Rahul”.
ix. Add an array field project to “Rahul”.
x. Add p2 and p3 project to “Rahul”.
xi. Remove p3 from “Rahul”.
xii. Add a new embedded object “contacts” with “email” and “phone” as array objects to “Rahul”.
xiii. Add two phone numbers to “Rahul”.

3.Book Database

Create a book Data Base with the fields: (isbn, bname, author [], year, publisher, price)

i. Insert 5 documents.
ii. List all the documents.
iii. List all book names except year and price.
iv. Display all the books authored by rudresh.
v. List all the books published by pearson.
vi. List the publisher of book java.
vii. List the author, publisher and year of the book let us see.
viii. Display the price of “let us see” except _id.
ix. Sort and display all books in ascending order of book names.
x. Sort and display only 3 books in descending order of price.
xi. Display all the books written by herbet and kuvempu.
xii. Display all the books either written by herbet and kuvempu.
xiii. Display all the books where rama is the first author.

4. Food Database

Create a Food Database with the fields: (food id, food cat, food name, chef name [ ], price, ingredients [], hotel name, hotel address {no, street, locality, city})

i. Insert 10 documents.

ii. List the price of pizza with ingredients.
iii. Display the item in the price range(500,800).
iv. Display the item prepared by x and y.
v. Display the item prepared by x or y.
vi. Add one chef to the food pizza.
vii. Add ingredients to the food Burger.
viii. Delete last ingredient added to the food burger.
ix. Delete all the ingredients from the food biryani.
x. Add food type to the food Burger.
xi. Modify the burger price by 200.
xii. Add or insert a new food item with the food Id "f08 "using upsert as True.
xiii. Increment the price of all food item in food cat: fastfood by 120.

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 Hours
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