ACADEMIC PROGRAMME GUIDE

BACHELOR IN COMPUTER APPLICATION

Batch 2018

CHITKARA UNIVERSITY
HIMACHAL PRADESH - NAAC Accredited

Chitkara University School of Computer Applications
Chitkara University, Himachal Pradesh, India

INDEX

1. **General Information**

   The academic program Guide is a comprehensive document detailing course scheme, associated credits per course and the distribution of each course in lecture, tutorial and Practical hours. It also details the eligibility criteria for admission, for award of degree, the assessment and evaluation procedures along with a glimpse of the pedagogical aspects of the programs.
   This Guide is to be used in association with the Academic Regulations of the University to make a complete rule set.
   The course schemes given in this document are approved by respective Board of Studies and the Academic Council of Chitkara University.

2. **Eligibility for Admission for BCA, BCA-MCA(I)**

   2.1   The admission in the course will be based on the merit of entrance exams or merit of the qualifying exams provided the candidate is eligible for admissions as per the eligibility criteria fixed by the Academic Council from time to time. Detailed criteria for the same will be as mentioned in the Prospectus released every year from time to time.

   2.2   The candidate should have good moral character and must be in good mental and physical conditions.

3. **Duration and Stages for BCA**

   3.1   Every academic year shall be divided into regular semesters / trimesters (known as term) for all the programs. The program of studies leading to a degree consists of required number of terms as approved by the Academic council.
   3.2   The maximum duration permissible for completion of degree is maximum 5 years.

Normal duration of the degree program	Maximum time allowed for completion of program
3 years	3 + 2 years

For BCA-MCA (Integrated)

3.3   The minimum duration of the BCA-MCA (I) programme is five years, and is divided into two stages with total often semesters. There shall be End Term Examination at the end of each semester, except in the case of internship at industry, which is evaluated by a jury appointed by the university. Stage 1 shall comprise of 6 semesters, and student shall be awarded BCA degree after successful completion of stage 1. Stage 2 shall comprise of 4 semesters of MCA.

Students who wish to pursue MCA (through progression from BCA) shall have to produce a notarized affidavit stating their intention to pursue MCA from Chitkara University under lateral entry scheme by the end of 4th semester. The automatic progression to MCA (sem. 3) shall be permissible only for those students who have no more than 5 reappears in the previous 6 semesters. Such students will have to clear all reappear examinations of stage 1 within two years of progression to stage 2.

Students having more than 5 reappears in the first 6 semesters of stage 1 _shall not be_ eligible for progression to stage 2 under this scheme, and a 3-year BCA degree will be awarded to such students on fulfillment of all requirements for award of BCA degree within 5 years of registration for the BCA-MCA(I) programme.

Students can opt to withdraw from the BCA-MCA (I) programme after successful completion of semester 6 of stage 1. Such students shall be offered a three-year BCA degree subject to fulfillment of all requirements for award of the same. However, the student willing to opt for withdrawal shall have to inform the university regarding the same before the completion of semester 4 of stage 1. A request in this regard shall have to be initiated by the student on a prescribed format, countersigned by the parents/registered local guardians. Those students who withdraw from the five-year BCA-MCA (I) program at any point of time during stage 1 will not be eligible for automatic progression to stage 2. In case any such student wishes to pursue MCA from Chitkara University, then the student shall have to apply for the same as a fresh candidate as per university norms and availability of seats.

The maximum duration for the BCA-MCA (Integrated) program is 7 years.

4.   Course Structure

4.1   The various courses prescribed for a Program may be **categorized** in terms of their academic affinity or their functional objectives as Core Courses and Elective courses.

Core Courses:- Core courses are compulsory set of papers which also includes those offered for specialization in the branch/discipline.

Electives courses:-The category called Electives is conceptually different and operationally wider. For each program there may be a specified number of electives classified as Program Electives or Open Electives.

A faculty advisor may be appointed to guide the students to opt for the elective courses those are relevant to the subject in which student is registered for the Degree.

Audit Courses:- In the case of Audit courses, a student may register for Courses in addition to those stipulated for the term of the program being pursued by him/her course to the following conditions:

(a) There should be no clash of examination dates.

(b) Approval of the Dean of School and the concerned HoD.

(c) Regarding the availability of capacity for accommodating the student.

The details are elaborated in the schemes and curriculum of the program. The schemes and curriculum of the program is approved by the respective board of studies of the course.

4.2   A credit is a convenient device to anticipate the number of hours per week of total effort including the class work of a student, as the system recognizes only the formal contact hours in the class room /studio and laboratory apart from self-study.

The term-wise program consists of a prescribed set of Courses described in the course scheme, adding to a certain total number of credits in each term.

The academic objectives of a program require a proper sequencing of not only individual courses but also of a cluster of Courses. For each program, the term-wise pattern presented in the course scheme conveys a sense of what comes first and what comes later.

BCA, BCA-MCA (I), Course Scheme
(Year wise, 1ˢᵗ Year Onwards)
(Batch-2018)

Year I:

Semester I			
Course Code	**Course Name**	**Hours (L+T+P)**	**Credit**
CA101	Introduction to Information Technology	4+0+0	4
CA102	Introduction to Information Technology-Lab	0+0+4	2
CA103	PC Assembly and Troubleshooting	3+0+0	3
CA104	PC Assembly and Troubleshooting Lab	0+0+2	1
CA105	Programming Concepts	5+0+0	5
CA106	Programming Concepts Lab	0+0+4	2
AM107	Foundation Course in Mathematics	5+0+0	4
Total			**21**

Semester II			
Course Code	**Course Name**	**Hours (L+T+P)**	**Credit**
CA107	Introduction to Programming Languages	4+0+0	4
CA108	Introduction to Programming Languages Lab	0+0+4	2
CA109	Computer Networks	4+0+0	4
CA110	Computer Networks Lab	0+0+4	2
CA111	UI Design for Website Lab	0+0+4	2
CA112	Software Engineering	4+0+0	4
AM108	Basics of Statistical Mathematics	5+0+0	5
Total			**23**

Year II:

Semester III			
Course Code	**Course Name**	**Hours (L+T+P)**	**Credit**
CA113	Fundamentals of Object Oriented Programming	4+0+0	4
CA114	Fundamentals of Object Oriented Programming Lab	0+0+4	2
CA115	Relational Database Management System	4+0+0	4
CA116	Relational Database Management System Lab	0+0+4	2
CA117	Web Programming using PHP	2+0+0	2
CA118	Web Programming using PHP Lab	0+0+4	2
CA119	Operating System Concepts	4+0+0	4
AM109	Discrete Mathematics	4+0+0	4
Total			**24**

Semester IV			
Course Code	**Course Name**	**Hours (L+T+P)**	**Credit**
CA121	Data Structures	4+0+0	4
CA122	Data Structures Lab	0+0+4	2
CA123	Client Side Scripting	4+0+0	4
CA124	Client Side Scripting Lab	0+0+4	2
CA125	Introduction to Java Programming	4+0+0	4
CA126	Introduction to Java Programming Lab	0+0+4	2
CA134	Environment Studies	0+0+0	0
CL203	Business Communication	4+0+0	4
Total			**22**

Year III:

Semester V			
Course Code	**Course Name**	**Hours (L+T+P)**	**Credit**
CA128	Cyber Security	3+0+0	3
CA129	Data Warehousing Concepts	4+0+0	4
CA130	Data Warehousing Concepts Lab	0+0+2	1
CA131	Digital Marketing	4+0+0	4
CA127	Software Testing	4+0+0	4
CA132	Programming in Python	0+0+4	2
CA133	Major Project	0+0+8	4
Total			**22**

(a) For Students opting for Regular Semester

Semester VI			
Course Code	**Course Name**	**Hours (L+T+P)**	**Credit**
CA135	Advanced Java	4+0+0	4
CA136	Advanced Java Lab	0+0+4	2
CA137	Advanced Digital Marketing	4+0+0	4
CA138	Programming Practicum	4+0+0	4
CA139	Introduction to Cloud & IoT	4+0+0	4
CA140	Logical Reasoning	48 Hrs	2
CL204	Life Skills	48 Hrs	4
Total			**24**

(b) For Students opting for Industrial Training (6 Month Duration)

Semester VI			
Course Code	**Course Name**	**Hours (L+T+P)**	**Credit**
CA141	Industrial Training		20
Total			**20**

5. Special Courses

To give a special educational flavor and goals of the various programs the structures provide for certain courses which must be pursued only after certain academic base has been achieved. There are various types of special courses available in multitude of programs in the University, viz. IP (Integrated Project), IOHT (Industry Oriented Hands on Training), IOHC (Industry Oriented hands on Courses), IOHE (Industry Oriented Hands on Experience, Thesis, Dissertation, and Seminar. The details of such special courses are given in respective Academic Program Guides (APGs).

6. Registration for Next Semester

6.1   All students are eligible to register for next semester irrespective of number of backlogs unless a criterion is specified for any particular course.

6.2   A student is not permitted to register in a term if
   (i) He/She has dues outstanding to the University, hostel, or any recognized authority or body of the University, or
   (ii) His/Her grade sheet in his immediately preceding term is withheld, or
   (iii) He/She has been specifically debarred or asked to stay away from that   term

6.3   Late registration may be granted in case a student fails to register on the stipulated date. Students failing to register on the specified day of registration will be allowed to register only after permission from Dean of School and after paying the stipulated late fee. Any student who has not registered will not be allowed to attend classes.

6.4   The registration of the student may be cancelled, if at the later stage, it is   found that the student is not eligible for registration due to following reasons:
   (i) If the registration of a student in a Course is not found to be in accordance with the regulations, his/her registration in that Course will be cancelled and the grade obtained, if any, will be rejected.
   (ii) The registration of a student in a Course or complete set of Courses in a term can be cancelled by the concerned authority when he is found guilty in cases of unfair means, breach of discipline, etc. or when   he/she persistently and deliberately does not pay his dues.
   (iii) Absence for a period of four or more weeks at a stretch during a term shall result in automatic cancellation of the registration of a student from all the Courses in that term.

6.5   A student who is duly registered in a term is considered to be on the rolls of the university. After registration, if he withdraws from the term, or has been given prior permission to temporarily withdraw from the University for the term, or has been asked to stay away by an appropriate authority of the University will be

considered to be on the rolls of the University for that term. While such a student retains the nominal advantage of being on the rolls of the University the loss of time from studies and its consequences cannot be helped by the University.

6.6   If for any valid reason a student is unable to register in a term, he must seek prior permission of Dean of School to drop the term. If such permission has not been requested or after a request the permission has been denied, his name would be struck off the rolls of the University and he would no longer be a student of the University. His case will be automatically processed and the file will be closed. However, if such a student, after his name has been struck off the rolls of the University, is permitted to come back, his case can be considered at the sole discretion of the competent authority of the University with the provision that all his previous records as a former student are revived under the current academic and administrative structure, regulations and schedule of fees.

7. Pedagogical Aspects

The structural layout of the program and its courses requires that each course be divided in lecture, tutorial and practical sessions. Duration of each session as given in the column against the course in the course scheme is 55 minutes.

Lecture sessions: Lectures are delivered by traditional – chalk board method, supplemented by modern Information Communication technology (ICT) methods. The students are encouraged to ask questions and involve in group discussion to the extent allowed by the teacher. In some subjects where case study based methodology is adopted, the lectures are supplemented by discussions on case studies.

Tutorial Sessions: The tutorial sessions are small groups of students interacting with the teacher, solving application oriented analytical problems. The tutorial sessions are very interactive and inculcate problem solving skills in the students.

Lab / Practical Sessions: During lab / practical sessions, the students work on prescribed list of experiments and do what they have learnt in the Lecture / Tutorial sessions.

Integrated Projects: In each semester, the students identify their team mates (at the most 4 in each team) and work on a unique integrated project allotted to them by faculty / group of faculty members. The projects are allotted to them either at the

start of each semester or at a later stage (but not later than Sessional test I) in the semester. Integrated projects are designed by the faculty keeping in mind the courses the students have studied so far and are currently studying. Thus, the project statements are made such a way that the students while working on these projects apply the concepts learned so far and the deliverables are multi faceted. The students work on the Integrated Project during their lab hours.

8. <u>Attendance Requirements</u>

The university expects its students to be regular in attending the classes. 75% attendance (of all held sessions – lectures, tutorials, lab) is compulsory in a course in order to be eligible to appear for end term comprehensive examination. 10% concession in this mandatory requirement is possible only in extreme circumstances and at the sole discretion of the Vice Chancellor.

Students are encouraged for participating in co-curricular activities conducted by prestigious institutions at national/International level. Such students would be eligible for grant of special Duty Leaves (limited by a cap decided by the Vice Chancellor) to make up for the attendance, in case any class work is missed during this period. This privilege extended to students will not be termed as right and is limited to just the attendance benefit.

9. <u>Assessment and Evaluation</u>

9.1   In case of theoretical courses/subjects, the evaluations will be based on teacher assessment, quizzes, Sessional tests and end term examinations.

9.02   In case of the practical subjects (Laboratory/workshops/field works), the evaluation will be based on continuous assessments and end term exams/viva.

9.03   The evaluation of the project work/training will be based on the seminars, projects reports and end term viva by the expert committee.

9.04   To assess the students attainments in the subjects (Theory, Laboratory, sessionals), Seminars, project work etc., the system of continuous assessment is adopted by the University. In conformity to this there will be Sessional exams, Quizzes, Assignments, Seminars and end term exams, in addition to other continuous evaluation components.

9.05   A student may debarred from appearing in the end term examinations due to the following reasons:

(a) Disciplinary action taken against him/her.

(b) Attendance criteria is not fulfilled.

9.06   In case any student appears in the examinations by default, who has been debarred by the University, his/her results will be treated as null and void.

9.07   Reappear Examinations

If a student(s) fails to secure pass grades in a subject(s), he/she shall be allowed to reappear according to the following regulations:-

(a)   A student detained from appearing in end semester examination of a subject(s) due to shortage of attendance will have to attend the extra classes as offered by the concerned School in the next Semester during the non teaching days. They may appear in the University examination in the reappear subject(s) in the subsequent semester whenever the examination of the concerned subject(s) is held.

(b)   Those students who secured "F" or "I" grade in any subject(s) shall be placed under reappear. They may appear in the University examination in the reappear subject(s) in the subsequent semester whenever the examination of the concerned subject(s) is held.

(c)   In case a candidate is able to pass the program but fails to attain the minimum CGPA for the award of degree then he/she will be given a chance to attain the required aggregate by reappearing in the University examination in the course/subjects of his/her choice.

(e)   The components of evaluations, weightage and syllabus for reappear subject (s) are described in the respective "Academic Program Guide (APG)".

The evaluation will be continuous and the weightage of various components are as given in Table 1 (For Theory courses) and in Table 2 (for Practical Courses).

For Theory Courses	
Sessional Tests (STs)	40
End Term Examination	60
Total	**100**

Table 1: Evaluation components for Theory Courses

There are three Sessional Tests (STs) for all theory papers, the average of best two are considered. The End Term examination for practical courses includes conduct of experiment and an oral examination (viva voce).

For Lab Courses	
Lab Performance / File work	40
Internal Viva – Voce	20
End Term	40
Total	100

Table 2: Evaluation Components for Practical Courses

The medium of examination is English.

10. Letter award grading scheme:

10.01 The list of letter and non-letter grades, their applicability and connotation are given below:

(a) Letter Grades

% Marks Range of Total	Grade	Qualitative Meaning	Grade Point
80 – 100	O	Outstanding	10
70 – 79	A+	Excellent	9
60 – 69	A	Very Good	8
55 – 59	B+	Good	7
50 – 54	B	Above Average	6
45 – 49	C	Average	5
40 – 44	P	Pass	4
0 – 39	F	Fail	0
	I	Incomplete	0

(b) Non-letter Grades
Audit Courses will be graded as Excellent, Good, Fair or Poor.

10.02 The grade I (Incomplete) may be awarded in the following conditions:

(i) Where a case of unfair means is pending, a 'Grade I' is awarded till the

case is finalized

(ii) Where a case of indiscipline is pending, a 'Grade I' is awarded till the case is finalized

(iii) In cases of unfair means and indiscipline where the results for a particular examination are declared null and void

(iv) In cases, where the student does not complete his course work because of some reason viz, shortage of attendance / is absent in the end term examination

10.03   In case the grades are not received by the University as per the time schedule the, the Dean of School may make a specific authorization for the Course coordinator to report GA (Grade Awaited). The concerned Head of Department will also simultaneously advise Dean Examination about the estimated time by which the grades will be received. Whenever the report GA appears in the grade sheet, permission for further registration of such a student will be decided by Dean of School.

10.04   In case Dissertation is offered in more than one term, then the student may be given an interim report,(AC- Allowed to Continue), inters other than the final one. When there is satisfactory progress the student will be allowed to continue the dissertation for the remaining credits in the subsequent terms. For operational purpose the report AC will be same as I or GA. When the final grade in dissertation emerges, it will replace AC report in the previous terms.

10.05   The Cumulative Grade Point Average (CGPA) denotes the overall performance of a student in all courses in which he is awarded letter grades. It is the weighted average of the grade points of all the letter grades received by the student from the time of his entry into the University.

Calculation of CGPA:

The CGPA (calculated on a 10 point scale) would be used to describe the overall performance of a student (from the trimester of admission till the point of reckoning) in all courses for which LETTER GRADES will be awarded. GPA will indicate the performance of student for any particular semester/trimester. Formulas for calculation of GPA and CGPA have been provided as below:

$$GPA_i = \frac{\sum_{j=1}^{n} C_{ij} G_j}{\sum_{j=1}^{n} C_{ij}} \qquad\qquad CGPA = \frac{\sum_{i=1}^{N}\left(GPA_i * \sum_{j=1}^{n} C_{ij}\right)}{\sum_{i=1}^{N}\left(\sum_{j=1}^{n} C_{ij}\right)}$$

Where n = number of subjects in the trimester; N = number of trimesters; GPA$_i$ = GPA for the ith trimester; C$_{ij}$ = number of credits for the jth course in ith trimester; and G$_j$ = Grade point corresponding to the grade obtained in the jth course.

Example to Understand the Calculation of GPA

Suppose a student is registered in four courses 'W', 'X', 'Y' and 'Z' in a particular trimester as mentioned below in the Column - I of the table. Column - II in the table below depicts the number of credits, which those courses carried. At the end of the trimester, student was awarded with the grades as mentioned in Column – III in the table given below. Column – IV indicates the corresponding grade weight. Column – V and Column – VI indicate essentially the Credit value and Grade Points for every course completed by a student in that particular trimester.

Courses in which student registered (Col. I)	Credits (Col. II)	Letter Grade (Col. III)	Grade Value (Col. IV)	Credit Value (Col. V)	Grade Points (Col. VI)
Course W	3	B-	6	3 x 6	18
Course X	3	A-	8	3 x 8	24
Course Y	3	A+	10	3 x 10	30
Course Z	2	A+	10	2 x 10	20
Total	11			Total	92

Thus, the total GPA of the student would be =

$$GPA = \frac{Total\ grade\ pts.}{Total\ no.of\ credits} = \frac{92}{11} = 8.36$$

Suppose the GPA of the student in two successive terms is 7.0 and 8.0 with respective course credits being 12 and 11, then the

$$CGPA = \frac{7 \times 12 + 8 \times 11}{12 + 11} = \frac{84 + 88}{23} = 7.48$$

11   Promotion Rules

Any bonafide student, who appears for the examination conducted by the University, shall be promoted to the next higher semester and shall carry forward all course(s) / subject(s) in which he/she is declared fail. The student shall have to pass all papers within stipulated maximum duration as prescribed by the University to qualify for the award of degree. Further, any specific condition stipulated for a particular course, by the concerned regulatory body, shall be enforced.

12   Eligibility for award of degree

In addition to conditions given in section 8 of Academic Regulations, a CGPA of 4.5 is required to receive degree in Bachelor of Computer Application Programs. The minimum credits to be earned are given in table 4.

Course / Year	Bachelor of Computer Applications (For Semester Track)	For Co-op Track
Year I	44	44
Year II	46	46
Year III	46	42
Total	**136**	**132**

Table 4: Minimum credits to be earned for award of degree in BCA

13   Program Overview:

Program Name: Bachelor of Computer Applications

Duration: 3 Years

The Indian economy is on an extremely positive note; growth is across sectors, both in traditional industries and non IT sectors. In such an environment, corporate India will need young and talented youth to actively participate, manage, design, develop and lead several IT initiatives. It has not been better than this for aspirants of Bachelor of Computer Applications. The precise aim of this course is to develop and transfer the right

talent to meet the demand of corporate India and to bridge the gap between industry and academics.

Program Objectives:

PO1. To equip graduate with the skills, knowledge and attitude necessary to work as a responsible software professional.

PO2. To develop appropriate intellectual, professional and personal attributes to succeed in a competitive environment.

PO3. Train future industry professionals.

PO4. Impart comprehensive knowledge with equal emphasis on theory and practice.

PO5. To prepare tomorrow's responsible and sensible human being.

Placement Opportunities PSO:

PSO1: Computer professional in Computer Application development companies and may become graphic designer, programmer

PSO2: Employed as Software Engineer, Hardware engineer, Networking or Web Developer.

PSO3: To be able to go for Post Graduation in the field of Computer Applications or Business Applications

PSO4: Students can also opt for various Post Graduate Diploma Programs in Computer Applications like PGDCA, PGDIT etc, which are considered equivalent to an MCA and offer good placement opportunities

Year I, Semester I
CA101   Introduction to Information Technology (4+0+0)   [4 Credits]

Course Learning Outcomes(CLOs)
CLO1: Understand the computing basics, network applications, human computer interactions. Evaluate the fundamentals of computers, IT and the various related technologies.
CLO2: Appreciate the benefits of different number systems and be able to perform appropriate computations On different number systems as well as able to understand computer codes.
CLO3: Perform calculations using binary arithmetic. Evaluate the Boolean expressions and reduce those to simplified forms.
CLO4: Design digital circuits using the logic gates. Comprehend the need, benefits and functions of operating systems in computers.
CLO5: Realize the significance of open source movement and the various licenses available under open source paradigm. To understand basic concepts of Microprocessors.

Basics of Computer System: Evolution/Generations/Types of computer systems, Block diagram of computer, Application Areas of Computers.
Memory and Storage, Need, Types of computer memory. Data storage devices.
Number System: need, types, conversions from one number system to another number system. Arithmetic Operations (addition, subtraction, multiplication and division) on numbers of different number systems. Computer Codes.
Boolean Algebra: Concepts, Postulates, Principles, forms of Boolean expressions. Logic Gates and Logic Circuits
Computer Software: Introduction, types and categories. Programming languages: Need, categories.Outline view of translators I/O devices.
Computer Networking: basics, types, topologies, devices employed in networking. Introduction to Internet, cloud and cloud-based services, effects of cloud-based services on business. Brief introduction to networking protocols (http,https,ftp,telnet and dns).
Operating System: Need, functions, basic operations. Open source Software: History, principles, success, methodologies, various open-source licensing options.
Viruses: introduction to different kind of viruses and their anti dots. Introduction to net etiquettes.
Suggested Books:

1. Sinha, P. K. & Sinha P., 2010, "Computer Fundamentals", 4th Ed., BPB Publications
2. Norton P., 2008, "Introduction to Computers", 6th Ed., Tata McGraw-Hill.

CA103   PC Assembly and Troubleshooting (3+0+0)   [3 Credits]

Course Learning Outcomes(CLOs)

CLO1: Identify the main components for the PC.

CLO2: Learn about power supplies and the skills to trouble-shoot various power-related problems.

CLO3: Have an idea about the processor generations used in PCs starting from the first Intel generations to   current CPU families. Also, students will familiarize themselves with terms that are directly related to processors such as: caching, multi-threading, Dual-core technology, multi-processing, and pipelining. Computer faults that are related to CPU problems will also be familiar to students.

CLO4: Familiarize themselves with PC memories such as RAM and ROM devices. This includes RAM types, RAM upgrading, ROM BIOS, and the CMOS chip.

CLO5: Know about motherboards and the various technologies connected to main boards such as Chipsets, Buses, and various BIOS types. Terms such as PCI, ISA, AGP, MCA, POST, Bootstrap loader, IDE controllers, Regulators, Heat sinks, and others will be familiar to the students.

Physical identification of components of desktops/laptops. Brief overview of motherboards, expansion slots, system buses(Control, address and data buses), various kind of ports, cabinets and power supplies.

Introduction to BIOS, BIOS features, BIOS and Boot sequence, BIOS troubleshooting and BIOS upgrade.

Brief introduction and comparisons of Windows10, Linux and Apple operating system. Introduction of their respective file system. Installation sequence of Windows10 and Linux. Name of software drivers requirement for running computers (Sound, Camera, Chipset, Keyboard and display driver). Windows diagnostic tools (Defrag, clean up etc.)

Web browsers: Introduction to different kind of web browsers (Internet edge, Chrome, Firefox and safari) and their configuration settings (like privacy setting, parental control etc.)

Printers: Introduction to printer technologies. How to attach and install printers on respective operating system.

Troubleshooting: Trouble shooting procedure (Fault location, fault finding aids, test and measuring tools)

Suggested Book(s):

1. Minasi, M., & Petroutsos, E. (1999). The complete PC upgrade and maintenance guide (No. 1). San Francisco, CA: Sybex.
2. Mueller, S. (2003). Upgrading and repairing PCs. Que Publishing.

AM107   **Foundation Course In Mathematics (5+0+0)**   **[4 Credits]**

Course Learning Outcomes(CLOs)
CLO1: Student will construct and analyze the graphs of trigonometry functions. Students will apply the concepts of trigonometry to any angle in a rectangular co-ordinate plane.
CLO2: Describe how circle, parabola, ellipse and hyperbola form the sections of cone and drive the standard equations of conics.
CLO3: Understand the respective application areas such as maxima-minima and area of a plane region through an overview of differentiation and integration respectively.

Matrices & Determinants: Types, Properties, Inverse. Solution of Linear System of equations, Rank, Consistency of linear system of equations, Cayley Hamilton Theorem, Eigen values and Eigen vectors, Diagonalization of matrices. Expansion & Properties of Determinants, Cramer's Rule. Coordinate Geometry: Review, Equations of Straight Lines, Circle, Ellipse, Parabola, Hyperbola. Differentiation: Derivatives, Derivatives Of Sum, Differences, Product and Quotients, chain Rule, Composite functions, Logarithmic Differentiation, Maxima & Minima.
Suggested Books:

1. Foundation Mathematics by K.F.Riley and M.P.Hobson, Cambridge University Press.
2. Applied Mathematics (Vol.II) by Dr.J.S.Bindra and K.S. Gill, 5th revised edition.
3. Engineering Mathematics - I, Chitkara University Publications
4. Applied Mathematics – II, Bindra J S & Gill K S, Bindra Publications.
5. Calculus by Apostol, Tom M, Published by J.Wiley.

CA105   **Programming Concepts (5+0+0)**   **[5 Credits]**

Course Learning Outcomes(CLOs)
 CLO1 Understand the requirement of program in software development
 CLO2 Develop the logic building ability for given problem
 CLO3. Understand the program constructs and its related activities
 CLO4. Convert a given logic into a Psuedocode and flowcharts.
 CLO5. Write Algorithms
CLO6. Able to convert any given algorithm to its corresponding code.

Overview of Computers and Logic: Simple program logic, program development cycle, developing pseudo code statements, Flowcharts, need of sentinel values. Understanding programming and user environments, programming models.

Working with Data, Creating Modules, and Designing Quality Programs. Modularization, Creating hierarchy charts. Structured programming: need, paradigms and techniques for structuring and modularizing unstructured logic

Decision making: Evaluating Boolean expressions to make comparisons, various operators used in programming logic, precedence rules for operators.

Iteration: Concept, need, application, types of loops, nested loops, common mistakes using loops

Arrays: Concept, memory occupancy, array usage, traversal, manipulation of specific values in array, manipulating arrays to replace nested decisions, searching, parallel arrays.

Note: Implementation of above concepts/techniques to be implemented in C Language.

Suggested Books:
1. Farrell, Joyce, "Programming Logic and Design Comprehensive", sixth edition, Cengage Learning.
2. Yashwant, K. (1999), "Let us C, Array and Pointers", seventh edition, BPB publication.
3. Balagurusamy, E. (2002), "Programming in ANSI C", Tata McGraw-Hill Education.

Year I, Semester II
AM108   Basics of Statistical Mathematics (5+0+0)   [5 Credits]

Course Learning Outcomes(CLOs)
CLO1: Possess an ability to solve the problems of data interpretation using measures of central tendency,
measures of Variation and concepts of correlation and regression.
CLO2: Introduce and form matrices for present mathematical solutions in a concise and informative
manner. Use matrices to solve the problems of system of linear equations and solve various live
problems using matrices.
CLO3: To analyze and correlate many real life problems mathematically and thus find the appropriate
solution for them using theory of probability.

Statistics : Measures of Central Tendency : Arithmetic Mean, Weighted Arithmetic Mean, Median, Mode, Geometric Mean, Harmonic Mean, Measures of Variation : Range and its

coefficient, Mean Deviation, Quartile Deviation and its coefficient, Standard Deviation, Coefficient of variation and variance, Correlation and Regression Analysis.

Probability : Elementary events, Sample Space, Compound events, Types of events : Mutually exclusive, Independent Events, Additional Law of Probability, Conditional Probability, Multiplication Theorem of Probability, Baye's Theorem.

Integration: Fundamental Theorem of Calculus (statement only), Indefinite Integrals (simple problems), Substitution Method, Partial Fractions, By Parts Method, Area of a plane region.

Suggested Books:
1. Foundation Mathematics by K.F.Riley and M.P.Hobson, Cambridge University Press.
2. Engineering Mathematics - I, Chitkara University Publications
3. Applied Mathematics – II, Bindra J S & Gill K S, Bindra Publications.
4. Calculus by Apostol, Tom M, Published by J.Wiley.
5. Business Statistics – S.P.Gupta, M.P.Gupta, Sultan Chand & Sons.
6. Mathematical Statistics – S.P.Gupta, Sultan Chand & Sons.

CA112   Software Engineering (5+0+0)   [4 Credits]

Course Learning Outcomes(CLOs)
CLO01: How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.
CLO02: An ability to work in one or more significant application doma**ins.**
CLO03: Work as an individual and as part of a multidisciplinary team to develop and deliver quality
software.
CLO04: Demonstrate an understanding of and apply current theories, models, and techniques that
provide a basis for the software lifecycle.
CLO05: Demonstrate an ability to use the techniques and tools necessary for engineering practice

Introduction to Software Engineering/Software Development, Requirement Analysis Concepts and Principles , Design Concepts : The Design Process, Design Principles, The Design Model , Design Documentation, Coding, Top Down And Bottom Up Approach Of Programming, Structure, Level Of Testing, Test Cases, Test Criteria, Software Testing Strategies, Maintenances Characteristics, Software Project Scheduling And Designing,

Software Project Management, Cost Estimation, Project Scheduling, Project Staffing, Risk Management, Quality Assurance, Project Monitoring, Overview of Component based development.

Suggested Book(s):
1. Pressman, R. S. (2005). Software engineering: a practitioner's approach. McGraw Hill.

CA107   Introduction to Programming Language (5+0+0)   [4 Credits]

Course Learning Outcomes(CLOs)
CLO01: To provide the means to better understand the essence of defining concepts of programming languages, their types and features.

CLO02: To familiarize the students with the basic concepts of computer programming and advantages of top-down approach.

CLO03: Read, understand and trace the execution of programs written in C language.

CLO04: To present the syntax and semantics of the "C" language as well as data types offered by the language

CLO05: Practice and train the learners with dynamic memory in the world of work oriented applications.

CLO06: Use modular and functional decomposition to break problems down functionally, represent the resulting structures and implement these structures in code as functions and procedures.

Functions: Concept, Types, Library and User Defined Functions, Function calls- Call by Value, Call by Reference. Introduction to Arrays: Definition, Their Need and Importance, Types of Arrays, Initialization. Single and Multidimensional Arrays and functions. Strings: Definition, Reading and Writing Strings. String Manipulation, String Manipulations using Functions. Pointers: Concept and Usage, Pointers and Arrays, Pointer Arithmetic, String manipulation using pointers. Pointer to functions, Pointers and Strings, Array of pointers. Recursion, Storage classes, User Defined Data Types - typedef, enumerated data types, Structures: Declaring & initializing structures, Array of structures, Nested Structures, Pointers and structures. Self referential structures. Unions : Declaration, Accessing union members, Difference between Structures and union Types of memory allocations: Static and dynamic memory allocation. C support: Library Functions malloc () and calloc () and realloc(). File Handling: Introduction to Files, Their Importance and Need, Steps in

processing a file. File opening modes, Input and output operations of files, Direct/Random Access operations on functions

Suggested Books:

1. Kanetkar, Y. "Let Us C", 1999. BPB Publication New, Delhi, pp1-150.
2. Gottfried, B. S. (1996). Theory and Problems of Programming with C, Schaum's outline series.

CA109   Computer Networks (5+0+0)   [4 Credits]

Course Learning Outcomes(CLOs)

CLO01: Describe and analyse the hardware, software, components of a network and the interrelations.

CLO02: Explain networking protocols and their hierarchical relationship hardware and software.
Compare protocol models and select appropriate protocols for a particular design.

CLO03: Manage multiple operating systems, systems software, network services and security. Evaluate and compare systems software and emerging technologies.

CLO04: Explain concepts and theories of networking and apply them to various situations, classifying networks, analysing performance and implementing new technologies.

CLO05: Identify infrastructure components and the roles they serve, and design infrastructure including devices, topologies, protocols, systems software, management and security. Analyse performance of enterprise network systems.

CLO6: Effectively communicate technical information verbally, in writing, and in presentations.

Introduction to Computer Networks, Data Communication, Key components of data communication. Mode of Data communication, Network attributes (Point to Point, Multipoint). Physical Topologies, Network Models. Layered model to describe network functionality. TCP/IP model and the OSI model. Role of various layers in data transmission. Transmission Media (Guided and Unguided),Data Link Layer Design issues. Error Detection and Correction. Role of Network Layer, Network layer protocol, Internet Protocol and its feature for connectionless and best effort service. Routing Algorithms(Link state and distance vector), Subnetting with CIDR and VLSM, Congestion Control Techniques (Open Loop and Close Loop), Open Loop- Flow Control, Retransmission policy, Caching and Routing, Traffic Shaping (Leaky Bucket and Token Bucket), Close Loop: Choke Packets and Load Shedding. Elements of Transport Protocol: Flow Control

and Buffering multiplexing, UDP and TCP, TCP Protocol, Role of Application Layer and protocols of Application Layers

Suggested Books:

1. Behrouz. A Forouzan; "Data communication and Networking" third edition; TMH, 1993
2. Andrew S. Tanenbaum; "Computer Networks"; seventh edition, Prentice Hall, 2000

CA111   UI Design for Website Lab (0+0+4)   [2 Credits]

Course Learning Outcomes(CLOs)
CLO01: Develop and write HTML tags for web pages
CLO02: Describe the use of JavaScript in HTML
CLO03:Use of cascading style sheets will help to design the website better
CL004: Learn and implement websites
CL005: Manage to give privileges to the website directories
CL006: Learn to make static webpages

Introduction to HTML, Use of HTML, basic structure of HTML file. Text Formatting Tags, Introduction to Lists: Ordered Lists and Unordered Lists, Nesting of Lists, Handling **Images**: Using <img> tags and its attributes. Setting a picture as a background image. Creating Links: Anchor Tag <a>. Internal and external links. **Image-maps**: Create an image-map, with clickable regions.

Tables: Introduction, benefits. Basic tags and attributes related to tables. Nested tables, Usage of rowspan and colspan attributes. **Forms**: Benefits of using forms, creating a form using <form> tag. Form data transmission methods – GET and POST. Various form input type objects – textbox, button, label, textarea, select, etc. **Frames**: Introduction, creating frames, setting frame size, use of 'target' attribute, use of iframe

HTML Special Characters: Utility of special characters and specific name strings and numeric strings for certain commonly used special characters such as &, ©, ", <, >, ½, ¼, etc.

Introduction to Cascading Style Sheets: Introduction to CSS, benefits, using embedded CSS, external CSS and Inline CSS. Concepts of Classes, using <DIV> and <SPAN> tags.

Introduction to JavaScript: utility, writing JavaScript to HTML using <script> tag, JavaScript syntax, Data types, operators, expressions, arrays, functions. Alert dialog box, prompt dialog box, confirm dialog box

Suggested Book(s):
1. Lemay L., Colburn R., Kyrnin J., "Mastering HTML, CSS & Java Script Web Publishing", BPB Publications

Year II, Semester III

CA113 Fundamentals of Object Oriented Programming (4+0+0) [4 Credits]

Course Learning Outcomes(CLOs)

CLO01: Develop the logic by understanding the semantics and syntax of C++

CLO02: Modularize their complex problems using derived and user defined data types (data structures).

CLO03: Declare constructor to initialize variables.

CLO04: Understand the concept of reusability of a code using inheritance.

What is object oriented programming, Structure Of C++ program Keyword, Basic data type Derived data type Declaration of variables, Operators in C++, Control Structure, Function, Storage class specifier, Recursive function, Arrays , Structures, Union, Pointers, Pointers And Function, Pointers And Arrays, This Pointer, Classes, Arrays within class, Friend Functions, Constructor, Copy Constructor, constructor overloading , Destructor, Operator Overloading, Function Overloading, Inheritance, Virtual Base class, Abstract Class, Intro to Virtual Functions .

Suggested Book(s):
1. Venugopal, K. R. (2013). Mastering C++. Tata McGraw-Hill Education.

CA115 Relational Database Management System (5+0+0) [5 Credits]

Course Learning Outcomes(CLOs)
CLO1. Infer various database concepts for database management software.
CLO2. Analyze database requirements to determine the entities involved in the system and their relationship to one another.
CLO3. Implement major DBMS components and their function.

CLO4. Differentiate between various data models.

CLO5. Use database recovery management for maintaining database integrity.

CLO6. Model an application's data requirements using conceptual model tools like ER diagrams.

Database System Application and Purpose, Comparison between File based and Database System, Advantages and Disadvantages of DBMS, Database System Architecture: Data Independence and Mapping among Views. Components of DBMS, Responsibilities of

Database Administrator, Structure of DBMS. Entity Relationship Model: Entity and Relationships, ER Diagram Cardinality and Participation, Weak and Strong Entity. Representation of ER Diagram. Data Models: Hierarchical and Network Model, Relational Data model and Comparison of all the Models, Integrity Rules Relational Algebra: Union, Intersection, Division, Product Relational Calculus: Tuple Calculus, Domain Calculus. SQL: Introduction to SQL (DDL, DML, DCL), Query Representation, Constraints, Dependencies, Anomalies, Normal Forms.

Database Transaction and its states, properties of database transaction concurrency Management, Concurrency Related Problems, Dirty Read Concurrency Control, Deadlock Prevention, Deadlock Detection and Recovery, Granularity of Locking, Timestamp-Based Locking. Database Reliability and Recovery: Types of Failures, Detection Scheme, Checkpoints, Recovery Techniques, Shadow Paging Database Security and Integrity: Security and Integrity Threats, Defense Mechanisms., Security Policies, Authorization, Data Encryption, Data Integrity: Integrity Constraint.

Suggested Books:

1. Rob Coronel, "Database Systems", Seventh Edition, Gex Publications
2. Bipin C Dessi ,"Introduction to Database System" ,Seventh Edition, Galgotia Publication

CA119   Operating System Concepts (4+0+0)   [4 Credits]

Course Learning Outcomes(CLOs)
CLO1: Student should be able to identify the different types of Operating System and their components.

CLO2: Design and implementation of new system calls for any open source operating system.

CLO3: Implementation of existing resource management algorithms in Linux operating system.

CLO4: To identify various system security and protection issues.

CLO5: To completely administer the system using various Operating systems (Windows and Ubuntu) for managing its resources.

Types of computer systems, System Components, Operating System Services, System Calls/API, System Programs, Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication. Threads

Multithreading Models. CPU Scheduling, Scheduling Criteria Scheduling Algorithms Multiple-Processor, Scheduling Real Time Scheduling. Process Synchronization - The Critical-Section Problem. Synchronization Hardware, Introduction to Semaphores, System Model Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention , Deadlock avoidance, Deadlock detection

Memory Management: Swapping, paging, Segmentation, Segmentation with paging, Virtual Memory, Demand Paging, Process creation, Page Replacement Algorithms, Allocation of frames, Thrashing. File Concept Access Methods Directory Structure File System Mounting – File Sharing – Protection, File System Structure, File System Implementation Directory Implementation Allocation Methods Free-space Management. Kernel I/O Subsystems. Disk Structure – Disk Scheduling. Security Problem, User Authentication Problem, Program Threats, System Threats

Suggested Book(s):
1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", Sixth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.

CA117   Web Programming using PHP (2+0+0)   [2 Credits]

Course Learning Outcomes(CLOs)

CLO 1. Understand how server-side programming works on the web. PHP Basic syntax for variable types and calculations. Creating conditional structure. Storing data into various types of arrays.

CLO 2. Using PHP built in function and creating custom functions Understanding Global variables in form submission.

CLO 3. How to receive and process form submission data. Reading and writing cookies.

CLO 4. Manage state of web application using session management. Creating a database in phpMyAdmin. Reading and process data in MySQL database.

Introduction to LAMP/XAMPP, Apache Web Server: Installation and Configuration, MySQL: Installation and Administration, PHP Installation and Configuration, Testing and troubleshooting. XAMPP Installation, Manipulating Data, Identifiers, Constants and Variables, Conditional Structures and iteration, Functions and Constructs, PHP and the Web, Arrays, Strings and Regular Expressions, File Manipulation, Managing Date and Time, Managing E- mail, PHP and Database Connections, Stream and Network Programming, Security Issues.

Suggested Book(s):

1. Setting Up LAMP : Getting Linux, Apache, MySQL, and PHP Working Together, Rosebrock, Eric.; Filson, Eric., Sybex

AM109   **Discrete Mathematics (5+0+0)**   **[4 Credits]**

Course Learning Outcomes(CLOs)

CLO1: To investigate and solve a variety of live problems related to sets, Relations and Functions.

CLO2: To understand and apply the theory and techniques of Lattice, Logic and Boolean algebra.

CLO3: To comprehend Graph Theory and its relevance within the context of computer science and finding solutions of live problems related to shortest path etc.

CLO4: To solve real life problems using combinatorics

Set Theory: Sets and Elements, Types, Venn Diagrams, Set Operations, Duality, The Inclusion − Exclusion principle, Partitions. **Relations:** Representation, Composition, Types, Properties, Equivalence & Partial Ordering relations. **Functions:** Types, Domain, Co-domain and Range, Into Functions, One-to-One, Onto & Invertible Functions, Cardinality, Composition, Function as a relation.
Lattices: Laws, Types : Bounded, Distributive, Complemented Lattices. **Boolean Algebra :** Duality, Basic Theorems Boolean Algebras as Lattices, SOP form of Sets, SOP form of Boolean Algebras, Logic Gates, Boolean Functions, Truth Tables, Circuits, Karnaugh's map.
Graph Theory: Types, Eulerian Paths and Circuits, Hamiltonian graphs, Bipartite Graphs, Weighted graphs, Cut vertices and Cut Edges, Matrix representation, Multi graph, Planar and Non-planar graph, Graph coloring, Isomorphism of graphs, Homeomorphic graphs , Shortest Path Problems: Dijkstra's
Permutation, The Pigeonhole principle, Combination.
Suggested Book(s):

1. Schaum's Outline: Discrete Mathematics, by S. Lipschutz, M. Lipson, Second Edition, Adapted by Varsha Patil

Year II, Semester IV
CA121   Data Structures (5-0-0)   [4 Credits]

Course Learning Outcomes(CLOs)
CLO01: Define basic static and dynamic data structures and relevant standard algorithms for them: arrays, stack, queue, dynamically linked lists, trees.
CLO02:Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures
CLO03: Select basic data structures and algorithms for autonomous realization of simple programs or program parts

Data structures: Need and application, Brief concept of Complexity analysis with various notations. Various Algorithm Conventions. Introduction to array as first data structure. Types of arrays Operations on Arrays, Significance of sorting an array. Sorting techniques. Insertion Sort Advanced sorting techniques. Introduction to linked list as another data structure, linked list versus array, types of linked lists, Operations of linear linked list, Applications of linear and circular linked list: Introduction to two-way list: Operations on two way list, Stack, Operations and Application of stack, Queue, Operations on Queue, Tree, binary search tree.

Suggested Book(s):
   1. Schaum's Outlines Data structures by Seymour Lipschutz

CA123   Client Side Scripting (4+0+0)   [4 Credits]

Course Learning Outcomes(CLOs)

CLO01: Understand the purpose of client side scripting.
CLO02: Decide when to use offline and hosted jQuery and DOM.
CLO03: Utilize the full strength of jQuery using chaining.
CLO04: Apply different iteration on the wrapper set.
CLO05: Implement different filters on wrapper set will be achievable by the students.
CLO06: Explore core jQuery features which would help in designing GUI.

jQuery concepts, jQuery & standards mode, DOM, Executing jQuery code.
Using a hosted version of jQuery, Executing jQuery code when DOM is parsed without using ready(), jQuery chaining. Using destructive jQuery methods, Aspects of the jQuery function.

Extracting elements from a wrapper set, using them directly without jQuery, Checking to see if the wrapper set is empty, Using .each() when implicit iteration is not enough, Elements in jQuery wrapper set returned in document order.

Custom jQuery filters can select elements when used, Using the is() method to return a Boolean value, Differences between filtering by numeric order vs. DOM relationships, Selecting elements by id when the value contains meta-characters, Grokking the :nth-child() filter, Nesting selector filters, Selecting elements by searching attribute values using regular expressions , Difference between selecting direct children vs. all descendants.

Filters, Passing filter() a function instead of an expression, Traversing up the DOM.

Creating, operating, and adding HTML on the fly, Grokking the index() method, Grokking the text() method, Update or remove characters using a regular expression.

Grokking the .contents() method, Disable/enable form elements, determine if a form element is disabled or enabled.

Selecting/clearing a single check box or radio button, Selecting/clearing multiple check boxes or radio button inputs, Determining if a check box or radio button is selected or cleared.

Determine if a form element is hidden, Setting/getting the value of an input element, Setting/getting the selected option of a select element, Setting/getting selected options of a multi-select element, Setting/getting text contained within a <textarea>, Setting/getting the value attribute of a button element, Editing select elements.

Attaching/removing events, Programmatically invoke a specific handler via short event methods , jQuery normalizes the event object, Event object attributes.

Event object methods, Adding a function to several event handlers, Cancel default browser behavior.

Cancel event propagation, Cancelling default behavior and event propagation via return false.

Suggested Book(s):
1. jQuery Succintly, Cody Lindley, Syncfusion
2. JavaScript & jQuery, The Missing Manual, David Sawyer, O'REILLY

CA125   Introduction to Java Programming (4+0+0)   [4 Credits]

Course Learning Outcomes(CLOs)

CLO1: Create Java applications that leverage the object- oriented features of the java language, such as encapsulation, inheritance and polymorphism

CLO2: Enable the students to understand about usage of JAVA concepts in developing rapid applications.
CLO3: Create an event-driven graphical user interface by using Java technology GUI components
CLO4: Create an applet which can be executed on web browser through which student can gain insight of interactive web development.
CLO5: Enable the student to understand the concept of window based programming by making use of awt components.

History and Goals of Java, Java Virtual Machine, Garbage Collection, JAVA BASICS, Identifiers and Keywords, Primitive Data Types, Integral, Operators, Branching and Looping, OO Programming, Creating a Data Type, Arrays: Declaring, Creating, and Accessing Arrays, Initializing Array , Multidimensional Arrays, Copying Arrays, Advanced Class Concepts, exceptions, stream I/O, Servlets, WebSphere Studio Application Developer Integration Edition, WebSphere Studio Enterprise Developer, Basic Operations with RAD Views and Perspectives, Searching, Setup Compiler Class Path, JRE Switching, Refactoring, Changing Class, Method, and Variable Name, Moving a Class to a Different Package, Extracting Code to a Method, Pull-up Method, Migrating Workspace from WSAD v5.x ,Project Interchange Feature, Migrating J2EE.

Suggested Book(s):
1. Programming with Java by E Balagurusamy,Advanced Java Technology by Dreamtech Press

CA134   Environment Studies (0+0+0)   [0 Credits]

Year III, Semester V
CA128   Cyber Security (3+0+0)   [3 Credits]

Course Learning Outcomes(CLOs)

CLO01: Understand the Information Technology Act of India (ITA)
CLO02: Protect themselves from various Cybercrimes.
CLO03: Understand the various kind of vulnerabilities.
CLO04: Defend the personal data from botnets.
CLO05: Understand the frauds used through handheld devices such as mobile phone and PDA.
CLO06: Importance of ACI (Authentication, Confidentiality and Integrity) in Cyber.

Introduction to Cyber Crime: Definition and origins of the world, cyber crime and information security, cyber criminals, classification of cyber crimes, cybercrime and ITA. Cyber Offense: Categories of Cybercrime, How criminals plans the attack, social engineering, cyber stalking, cybercafé and cybercriminals, Botnet, cloud computing. Cloud Computing Cyber Crime: Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and wireless computing era, Security challenges posed by mobile devices, Registry setting for Mobile Devices, Authentication service security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for organizations. Tools and Methods used in Cybercrime: Proxy Server and anonymizers, Phishing, Password cracking, Keyloggers and spywares, Virus and Worms, Trojan Horse and Backdoors, Stegnography, Dos and DDos Attacks, SQL Injection, Buffer Overflow, Attacks on wireless network Cyber security Organizational Implications : Cost of cyber crimes and IPR issues, Web Threats for Organizations, Security and Privacy Implications from cloud computing, Social Media Marketing, Social Computing and the Associated Challenges for Organizations ,Organizational guidelines for Internet Usage, Safe Computing, Guidelines and Computer Usage Policy, Incident Handling: An essential component of cyber security, Forensic Best Practices for Organizations, Cybercrime and Cyber terrorism: Social Political, Ethical and Psychological Dimensions: Intellectual Property in the Cyberspace, The ethical dimension of cybercrime, The psychology, mindset and skills of hackers and other cybercriminals, Ethical Hackers Cybercrime: Illustrations, examples and mini-cases: Real Life examples, mini cases

Suggested Book(s):
1. Singer P.W. and Friedman A., 2014, "Cyber Security and Cyber War ", First Edition, Oxford Publication

CA129   Data Warehousing Concepts (4+0+0)   [4 Credits]

Course Learning Outcomes(CLOs)

CLO01: Differentiate between the types of data and learn about historical reasons and goals for development of data warehouse technology
CLO02: Identify the major frameworks of data warehousing, data analytics and business intelligence (BI).
CLO03: Understand how to start-small and think-big using data integration technologies
CLO04: Realize the potential use of multidimensional model and OLAP in data analysis

Introduction to Data, Structured, Semi-Structured and Unstructured Data. Data Warehousing: Need, characteristics, Ralph Kimball's Approach vs. W.H. Inmon's Approach, Goals of Data warehousing, Data Sources, Extract, Transform, Load, Data Integration, Technologies, Data Quality and Data Profiling, Data Warehousing Components : Sourcing, Acquisition, Cleanup and Transformation Tools. Access Tools.

Warehouse Architecture, Data Warehouse and Data Marts, Multidimensional Data Modeling: Basics, Types, Techniques, Fact Table, Dimensional Model, Typical Dimensional Models: Star Schema, Snowflake Schema,

Introduction to Meta Data: Repository, Management, Trends, Categorization of OLAP Tools: ROLAP and MOLAP

Introduction to Business Intelligence, Business Intelligence Users and Applications, Business Intelligence Roles and Responsibilities

Suggested Book(s):
1. Alex Berson, Stephen J. Smith, Data Warehousing, Data Mining, & OLAP , Tata Mcgraw
2. R.N. Prasad, Seema Acharya , Fundamentals of Business Analytics, Wiley Publishing

CA131   Digital Marketing (5+0+0)   [4 Credits]

Course Learning Outcomes(CLOs)

CLO01: Know about the requirements of digital marketing services among different online domains
CLO02: Work in one or more significant online application domains in terms of increase their ranking on   various search engines.
CLO03: Apply digital marketing services by demonstrating various tools and techniques
CLO04: Provide online presence to business through website and social media
CLO05: Aware about the growth and effectiveness of digital marketing among online business holders

Digital Marketing Strategy: Introduction, Key terms and concepts, Understanding marketing strategy, Building blocks of marketing strategy; Crafting a digital marketing strategy.

Content Marketing Strategy: Introduction, Key terms and concepts, Defining content marketing, Strategic building blocks, Content creation, Content channel distribution, Tools of the trade, Advantages and challenges.

Web Presence: How to increase online presence and drive more traffic for a website, Search result visibility in Google for chosen keyword and phrases, Using e-mail marketing to drive traffic for a website, Posting social media content for lead generation, Tools to create and manage content, Use of Blogging as content strategy.

Content Management: Writing and posting content on the web and in social networks, creating content: info graphics, the perfect blog and video; create lead and sales funnels; Create, manage and implement a content marketing strategy; Monitoring and recording results to improve content marketing campaigns; Successful content marketing examples, strategies and case studies.

Suggested Book(s):
1. Venakataramana Rolla, "Digital Marketing Practice guide for SMB: SEO, SEM and SMM", CreateSpace Independent Publishing Platform, 1 st edition.
2. Damian Ryan Kogan "Understanding Digital Marketing: Marketing strategies for Engaging the Digital Generation", 3 rd edition.
3. Shivani Karwal, "Digital Marketing Handbook: A Guide to search Engine Optimization, Pay Per Click Marketing, Email Marketing and Content Marketing", CreateSpace Independent Publishing Platform, 1 st edition.

CA127   Software Testing (4+0+0)   [4 Credits]

Course Learning Outcomes(CLOs)

CLO01: Basics of testing and learning about errors and bugs
CLO02: Scope of testing and its levels
CLO03: Differentiate between black box and white Box testing.
CLO04: Building test cases and test plan.
CLO05: Differentiate between Validation and Verification.

A perspective of Testing, Examples : Basic Testing Vocabulary, Basic definitions, Test cases, Insights from a Venn diagram, Identifying test cases, Error and fault taxonomies, Levels of testing. Examples: Generalized pseudo code, The triangle problem, Defects and identification of defects, The Multiple Roles of the Software Tester (People Relationships), Scope of Testing, Testing Constraints, Levels of Testing, The "V" Concept of Testing.

Test Administration and Test Plan: Test Planning, Customization of the Test Process, Prerequisites to test planning, understand the Characteristics of the Software Being Developed, Build the Test Plan, Write the Test Plan.

Testing Techniques: Structural versus Functional Technique Categories, Verification versus Validation, Static versus Dynamic Testing. Path Testing, Data Flow Testing, Boundary value analysis, Robustness testing, Worst-case testing, Special value testing, Examples, Random testing, Equivalence classes, Equivalence test cases for the triangle problem, System Testing.

Test Cases: Test case Design, Building test cases, Test data mining, Test execution, Test Reporting, Defect Management, Test Coverage – Traceability matrix.

Test reporting: Guidelines for writing test reports, Test Tools used to Build Test Reports. Bug reporting using Excel Sheets.

Automation Testing Basics: Basics of automation testing, Factors for choosing a particular tool, An overview for the major functional testing tools, Overview of Test management and bug tracking tools.

CA132   Programming in Python (0+0+4)   [2 Credits]

Course Learning Outcomes(CLOs)

CLO01: Python fundamentals and its general purpose behaviour.
CLO02: Various ways to perform operations on numbers and strings.
CLO03: Internal data structures like list, sets, tuples and dictionaries.
CLO04: Professional way of writing code using modular approach.
CLO05: The way of developing applications using object oriented approach.
CLO06: Approaches to make GUI applications.

Introduction to Objects & Python's Math Library: Understanding variables and basic operations on number and string data, dealing with basics of math library (pow, sqrt, round, exp, pi, ceil, floor), displaying strings and numbers, while statement.

String Object Methods: understanding string methods like upper(), lower(), isdigit(), isallnum(), isalpha(), isnumeric(), split(), endswith(), startswith(), join(), count(), strip() and exploring string iterations, basic if statement.

Number Object Operations: working with number literals, dealing with hexadecimal, octal and binary numbers, basic arithmetic operations, mix type conversion, integer to float and float to integer conversion, formatting numbers.

List Object: creating empty list, initializing list, list indexing and slicing operations, input method, single and multidimensional arrays, Concatenating multiple lists, generating range based lists, nested lists.

Introduction to Dictionaries: creating empty dictionaries, initializing dictionaries, Accessing dictionary items, merging, and deletion. understanding dictionary specific methods, and dictionary comprehension.

Exploring Statements and Syntax: Iterations, branching, assignment statement and expression statement and exploring print method.

Introduction to python Modular Programming: declaring and calling user defined methods, recursive calls and returning multiple values via return statement, Understanding local and global scopes, argument passing techniques (normal arguments: matched by position, keyword arguments: matched by name, default arguments, Using * and ** during calling time and receiving time.

Object-Oriented Programming In Python: Creating classes, objects, attributes, classes v/s dictionaries, constructors and idea of inheritance.

GUI Programming: Understanding and Installing PyQT4 and QT Designer Interface, Using GUI controls like push-buttons, text-boxes, radio buttons, checkboxes, labels, managing resource files, combo boxes, list boxes, menu's and sub menu's, calendar control and other controls, Understanding signal and slots, Dealing with PyQt4 event handling mechanism. Push button events, checkbox and radio button events, menu events, combo box and list box events etc.

Suggested Book(s):
1. Lutz, Mark. Learning Python. " O'Reilly Media, Inc.", 2013.
2. Barry, Paul. Head first Python. " O'Reilly Media, Inc.", 2010.
3. Swaroop, C. H. "A Byte of Python." Enllaç web (2003).

CA133   Major Project (0+0+8)   [4 Credits]

Course Learning Outcomes (CLOs)

CLO01: Apply Skills learnt in real time applications.
CLO02: Understand Industry standards and requirements.

The students will be given an exposure to the world of software development. Students will be required to work in teams, and develop working software application that has some utility for the target audience. Students will use their knowledge to integrate and mingle with software, hardware, networking, tools etc. that they have learned to use during the previous semesters. The purpose of project shall be to make the learners conversant with

the complete life cycle of the software project, and also to make them appraise the need, benefits and methods of documentation.

Year III, Semester VI
CA140   Logical Reasoning   (48 Hrs)   [2 Credits]

Course Learning Outcomes(CLOs)

CLO01: Apply Calculations and statistics in problem solving.
CLO02: Enhance upon the critical and Analytical reasoning.
CLO03: Revise mathematical concepts used for practical problems. .
Quantitative Aptitude

Calculation, Number System , Simplification, Surds & Indices, Square & Square roots, Formula Based Problems, HCF & LCM, Percentages, Averages, Ratio & Proportion, Allegation, Profit & Loss & Discount, Simple & Compound Interest & Installment, Partnership, Set Theory, Venn Diagrams, Time & Distances, Trains, Boats & Streams, Races & Game Skills, Time & Work, Pipes & Cisterns, Chain Rule, Geometry, Mensuration-Area, Perimeter, Surface Area & Volume , Permutation & Combination, Probability, Sequence & Series, Equation Linear, Quadratic Equation, Trigonometry, Logarithm
Data Interpretation
Data Tabulation -1 &2, Pie Charts -1&2, Bar Graph – 1 &2, Line Graph – 1& 2, Data Sufficiency
Reasoning Aptitude
Number Series, Alphabet Series, Inserting of Missing Character, Number Sequence, Alpha Numeric Sequence, Time Sequence, Ranking Sequence, Arithmetical Reasoning, Quantitative Analysis, Problem on Ages, Clocks, Calendars, Cube Cutting, Cubes & Dices, Coding – Decoding, Sense of Direction, Blood Relations, Puzzles 1: Classification, Puzzles 2: Sitting Arrangement –Linear , Circular, Puzzles 3: Comparison, Puzzles 4: Sequential Order of Things, Puzzles 5: Condition & Grouping, Puzzles 6: Family Relations, Mathematical Operations & Symbol Notations, Syllogisms, Odd man out, Visual reasoning, membership

CA135   Advanced Java   [4 Credits]

Course Learning Outcomes(CLOs)

CLO1: Create Java applications that leverage the object- oriented features of the java language, such as encapsulation, inheritance and polymorphism

CLO2: Enable the students to understand about usage of JAVA concepts in developing rapid applications.

CLO3: Create an event-driven graphical user interface by using Java technology GUI components

CLO4: Create an applet which can be executed on web browser through which student can gain insight of interactive web development.

CLO5: Enable the student to understand the concept of window based programming by making use of awt components.

Introduction to basic concepts of java.

Meaning of Collection Framework, Hierarchy of Collection Framework, List Collection (ArrayList, LinkedList & Vector).

Iterable & Collection Interface ,Collection Interface Methods, Properties of List Collection, ArrayList v/s linked list, ArrayList to Vector and Vector to Linked List, ArrayList Traversal, Linked List Specific Methods.

Deque Interface Supporting LIFO and FIFO, Set Usages (HashSet and TreeSet), Usage of List Iterator.

Event handling: Event Delegation Model, Event Classes,Source of Event and Event Listener Interfaces, Adapter classes.

AWT (Abstract Window Toolkit): AWT basics, AWT hierarchy introduction, AWT component class.

Layout manager: border layout, grid layout, flow layout, Box layout.

Swing: introduction, hierarchy of java swing classes, JComponents class methods,creating frame in swing, using JButton, Jlabel, JTextField, JCheckBox , JRadioButton, JComboBox, JList. AWT and swing difference.

JDBC: introduction, working with MySQL database, registering the drivers, connecting to database.

Preparing SQL statement,retrieving data from MySQL database.

Suggested Book(s):

E.Balagurusamy,"Programming with Java", TATA McGraw-Hill Publishing.

David Flanagan, "Java in a Nutshell", 4th edition,OReilly Media Publications

E. Balagurusamy," Programming with Java", TATA McGraw-Hill Publishing

CA139   Introduction to Cloud & IoT   [4 Credits]

Course Learning Outcomes(CLOs)

CLO1 : History and Evolution of Cloud and IOT
CLO2: Learn various frameworks of IOT and visualization techniques.
CLO3: Learn Physical and Logical Devices for IOT

Cloud Computing Overview, Cloud Computing History & Evolution, Components of Cloud Computing ,Requirements of Cloud Computing.

Benefits & disadvantages of Cloud Computing, Cloud computing types: Deployment Models, Service Models: Understanding services and applications by type.

Framework: The NIST Model, Cloud Cube Model, Capacity Planning: Defining baseline and metrics, Load testing, Network capacity, Scaling.

Understanding Virtualization: Virtualization Technologies, Load balancing and Virtualization, Understanding Hypervisors, Security Concerns related to cloud, Securing cloud: Security mapping, securing data, Encryption.

Using the mobile cloud: connecting to the cloud, Feature phones and the cloud, using smart phones with the cloud.

Introduction to Internet of Things: Definition & Characteristics of IOT, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, Domain Specific IOTs: Home Automation, Environment, Cities, Energy, Retail, Agriculture, Logistics, Industry, Health & Lifestyle.

IOT Platforms Design Methodology: Introduction, IOT Design Methodology steps, Case study on IOT system for Weather monitoring.

IOT physical devices and Endpoints: Basic building blocks of an IOT device, Raspberry Pi, Raspberry Pi interfaces, About the board, Internet of Things Security: Introduction, Overview of Governance, Privacy and Security Issues.

Suggested Book(s):

 "Cloud Computing", 1st Edition, Velte Anthony, Velte Toby, Elsenpeter Robert, McGraw Hill Professional.

    "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Francisda Costa, apress Publications, 2013

CA137 Advanced Digital Marketing (4+0+0) [4 Credits]

Course Learning Outcomes(CLOs)

CLO01: Demonstrate the understanding of Digital marketing and media concepts.

CLO02: Effectively run advertisements on Search Engines.

CLO03: Get website listed for top search engine results.

CLO04: Implement best practices for creating, measuring, and optimizing display ad campaigns.

CLO05: Effectively build your users lists, deliver e-mails & generate relevant clicks.

CLO06: Understand mobile marketing measurement and analytics**.**

Key Terms of digital marketing; Definition; Types of digital marketing: SEO, SEM, Content Marketing, SMM, PPC, Affiliate Marketing, Email Marketing; Importance of digital marketing; Challenges of digital marketing; Applications of Digital Marketing.

Importance of Domain name; Choosing a domain name; Discovering how domain name works; Good and bad domain names; Registering your domain name; Hosting: Different types of hosting, Hosting your website.

Guiding principles for business site; Specifying content, look and feel for website; Techniques used to gather information about site visitors, Uses for visitor data.

Keyword selection, Keyword density, Common Keyword Problems, Keyword value pyramid, Adding Meta- Tags: Meta keyword tags, Meta description tag; Anchor text; Page title.

Getting found with search engines, Developing an effective publicity strategy. Understanding SEO, Types of SEO: Black hat and white hat, Using SEO on your site, Do's and Don'ts of SEO

Optimizing content, Link Building: Steps; E-Mail Marketing; Optimization: On page and off page optimizations. Steps for page optimization.

SEO Tools and monitoring. Implementation of SEO. Search Engine marketing. Implementation of SEO;

Page Rank. The goal of search engine and how they work; Search Engines and spams. Myths about google.

Power of Google: Analytics- Using Adwords and Adsense.

Affiliate Marketing: Overview. The affiliate marketing ecosystem. Controlling your affiliate marketing. Avoiding affiliate marketing dangers. PPC.

Advanced SMM: Introduction. Common Mistakes with Social Media. Framework to create a social media strategy. Organizing Assets.

Set Up Global Targeting: Facebook, LinkedIn, Twitter. Developing Content Strategy with social Media. Additional resources for SMM.

Suggested Book(s):

AARON MATTHEW WAL L "Search Engine Optimization Book"
SEOP "Social Media Marketing: Valid and Time-tested ways to grow your business"
DIANA URBAN "The Complete Guide to Global Social Media Marketing"

CA141   Industrial Training   [20 Credits]

Course Learning Outcomes(CLOs)

CLO01: Apply Skills learnt in real time applications.
CLO02: Understand Industry standards and requirements.
CLO03: Understand the working of IT industry
CLO04: Hands on live projects, its delivery and maintenance.

The students shall be required to undergo training in a software development organization. The student will be required to work directly under the guidance of software developers and shall learn the nuances of software development according to the working standards of the organization. The progress of the students will be monitored closely through the internal supervisors to whom the students shall be required to report from time to time. The internal supervisors will also maintain liaison with the company to procure and maintain reports about the student's progress.