GITAM INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Deemed to be University, Estd. u/s 3 of UGC Act 1956)

VISAKHAPATNAM *HYDERABAD *BENGALURU

Accredited by NAAC with 'A^{+}' Grade

REGULATIONS AND SYLLABUS

of

Bachelor of Computer Applications

(w.e.f 2019-20 Admitted batch)

Website: www.gitam.edu

B.C.A (Bachelor of Computer Applications)
REGULATIONS
(w.e.f. 2019-20 admitted batch)

1. ADMISSION

1.1 Admission into B.C.A. program of GITAM University is governed by GITAM University admission regulations.

2. ELIGIBILITY CRITERIA

2.1. A pass in intermediate / +2 with a minimum aggregate of 50% marks in the qualifying examination.

2.2. Admission into B.C.A (Bachelor of Computer Applications) will be based on an All India GITAM Science Admission Test (GSAT) conducted by GITAM University and the rule of reservation, wherever applicable.

3. CHOICE BASED CREDIT SYSTEM

Choice Based Credit System (CBCS) is introduced with effect from the admitted Batch of 2015-16 based on UGC guidelines in order to promote:

- Student Centered Learning
- Cafeteria approach
- Inter-disciplinary learning

Learning goals/ objectives and outcomes are specified leading to what a student should be able to do at the end of the program.

4. STRUCTURE OF THE PROGRAM

4.1 The Program Consists of

i) Foundation Courses (compulsory) which give general exposure to a Student in communication and subject related area.

ii) Core Courses (compulsory).

iii) Discipline centric electives which

a) are supportive to the discipline
b) give expanded scope of the subject
c) give inter disciplinary exposure
d) Nurture the student skills

iv) Open electives are of general nature either related or unrelated to the discipline.

v) Practical Proficiency Courses
Laboratory and Project work.

4.2 Each course is assigned a certain number of credits depending upon the number of contact hours (lectures/tutorials/practical) per week.

4.3 In general, credits are assigned to the courses based on the following contact hours per week per semester.

- One credit for each Lecture / Tutorial hour per week.

- One credits for two hours of Practical per week.
- Eight credits for project.

4.4 The curriculum of the six semesters B.C.A program is designed to have a total of 125 credits for the award of B.C.A degree.

5. MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English.

6. REGISTRATION

Every student has to register himself/herself for each semester individually at the time specified by the Institute / University.

7. ATTENDANCE REQUIREMENTS

7.1 A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend that end - semester examination and he/she will not be allowed to register for subsequent semester of study. He/she has to repeat the semester along with his / her juniors.

7.2 However, the Vice Chancellor on the recommendation of the Principal / Director of the Institute/School may condone the shortage of attendance to the students whose attendance is between 66% and 74% on genuine grounds and on payment of prescribed fee.

8. EVALUATION

8.1 The assessment of the student's performance in a Theory course shall be based on two components: Continuous Evaluation (40 marks) and Semester-end examination (60 marks).

8.2 A student has to secure an aggregate of 40% in the course in continuous evaluation and semester end examination the two components put together to be declared to have passed the course, subject to the condition that the candidate must have secured a minimum of 24 marks (i.e. 40%) in the theory component at the semester-end examination.

8.3 Practical / Viva voce etc. courses are completely assessed under Continuous Evaluation for a maximum of 100 marks, and a student has to obtain a minimum of 40% to secure Pass Grade. Details of Assessment Procedure are furnished below in Table 1.

Table 1: Assessment Procedure

S. No.	Component of assessment	Marks allotted	Type of Assessment	Scheme of Examination
1	Theory	40	Continuous evaluation	(i) Three mid semester examinations shall be conducted for 15 marks each. The performance in best two shall be taken into consideration. (ii) 5 marks are allocated for quiz. (iii) 5 marks are allocated for assignments.
		60	Semester-end examination	The semester-end examination Shall be for a maximum of 60 marks.
	Total	100		
2	Practicals	100	Continuous evaluation	60 marks for performance, regularity, record/and case study. Weight age for each component shall be announced at the beginning of the semester. 40 marks (30 marks for experiment(s) and 10 marks for practical Viva-voce.) for the test conducted at the end of the Semester conducted by the concerned lab Teacher.
	Total	100		
3	Project work	200	Project evaluation	150 marks for evaluation of the project work dissertation submitted by the candidate. 50 marks are allocated for the project Viva-Voce. The project work evaluation and the Viva-Voce shall be conducted by one external examiner outside the University and the internal examiner appointed by the Head of the Department.

9. RETOTALING & REVALUATION

9.1 Re-totaling of the theory answer script of the semester-end examination is permitted on request by the student by paying the prescribed fee within one week after the announcement of the results.

9.2 Revaluation of the theory answer scripts of the semester-end examination is permitted on request by the student by paying the prescribed fee within one week after the announcement of the result.

10. PROVISION FOR ANSWER BOOK VERIFICATION & CHALLENGE EVALUATION:

10.1 If a student is not satisfied with his/her grade after revaluation, the student can apply for, answer book verification on payment of prescribed fee for each course within one week after announcement of revaluation results.

10.2 After verification, if a student is not satisfied with revaluation marks/grade awarded, he/she can apply for challenge valuation within one week after announcement of answer book verification result/ two weeks after the announcement of revaluation results, which will be valued by the two examiners i.e., one Internal and one External examiner in the presence of the student on payment of prescribed fee. The challenge valuation fee will be returned, if the student is succeeded in the appeal with a change for a better grade.

11. SUPPLEMENTARY EXAMINATIONS & SPECIAL EXAMINATIONS:

11.1 The odd semester supplementary examinations will be conducted on daily basis after conducting regular even semester examinations in April/May.

11.2 The even semester supplementary examinations will be conducted on daily basis after conducting regular odd semester examinations during November/December

11.3 A student who has completed his/her period of study and still has "F" grade in final semester courses is eligible to appear for Special Examination normally held during summer vacation.

12. PROMOTION TO THE NEXT YEAR OF STUDY

12.1 A student shall be promoted to the next academic year only if he/she completes the academic requirements of 60% of the credits till the previous academic year.

12.2 Whenever there is a change in syllabus or curriculum he/she has to continue the course with new regulations after detention as per the equivalency established by the Board of Studies (BoS) to continue his/her further studies.

13. BETTERMENT OF GRADES

13.1 A student who has secured only a pass or second class and desires to improve his/her class can appear for betterment examinations only in 'n' (where 'n' is no.of semesters of the program) theory courses of any semester of his/her choice, conducted in summer vacation along with the Special Examinations.

13.2 Betterment of Grades is permitted 'only once', immediately after completion of the program of study.

14. REPEAT CONTINUOUS EVALUATION

14.1 A student who has secured 'F' grade in a theory course shall have to reappear at the subsequent examination held in that course. A student who has secured 'F'

grade can improve continuous evaluation marks upto a maximum of 50% by attending special instruction classes held during summer.

14.2 A student who has secured 'F' grade in a practical course shall have to attend Special Instruction classes held during summer.

14.3 A student who has secured 'F' grade in a combined (theory and practical) course shall have to reappear for theory component at the subsequent examination held in that course. A student who has secured 'F' grade can improve continuous evaluation marks up to a maximum of 50% by attending special instruction classes held during summer.

14.4 The RCE will be conducted during summer vacation for both odd and even semester students. Student can register a maximum of 4 courses. Biometric attendance of these RCE classes has to be maintained. The maximum marks in RCE be limited to 50% of Continuous Evaluation marks. The RCE marks are considered for the examination held after RCE except for final semester students.

14.5 RCE for the students who completed course work can be conducted during the academic semester. The student can register a maximum of 4 courses at a time in slot of 4 weeks. Additional 4 courses can be registered in the next slot.

14.6 A student is allowed to Special Instruction Classes (RCE) 'only once' per course.

15. GRADING SYSTEM

15.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.

Table 2: Grades & Grade Points

Sl.No.	Grade	Grade Points	Absolute Marks
1	O (outstanding)	10	90 and above
2	A+ (Excellent)	9	80 to 89
3	A (Very Good)	8	70 to 79
4	B+ (Good)	7	60 to 69
5	B (Above Average)	6	50 to 59
6	C (Average)	5	45 to 49
7	P (Pass)	4	40 to 44
8	F (Fail)	0	Less than 40
9	Ab. (Absent)	0	-

15.2 A student who earns a minimum of 4 grade points (P grade) in a course is declared to have successfully completed the course, subject to securing an average GPA (average of all GPAs in all the semesters) of 5 at the end of the Program to declare pass in the program.

Candidates who could not secure an average GPA of 5 at the end of the program shall be permitted to reappear for a course(s) of their choice to secure the same.

15. GRADE POINT AVERAGE

16.1 A Grade Point Average (GPA) for the semester will be calculated according the

formula:

$$GPA = \frac{\Sigma [C * G]}{\Sigma C}$$

Where

C = number of credits for the course,

G = grade points obtained by the student in the course.

To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student's performance in all the courses taken, in all the semesters up to the particular point of time.

16.2 CGPA required for classification of class after the successful completion of the program is shown in Table 3.

Table 3: CGPA required for award of Class

Class	CGPA Required
First Class with Distinction	≥ 8.0*
First Class	≥ 6.5
Second Class	≥ 5.5
Pass Class	≥ 5.0

* In addition to the required CGPA of 8.0 or more the student must have necessarily passed all the courses of every semester in first attempt.

17. ELIGIBILITY FOR AWARD OF THE B.C.A DEGREE

17.1 Duration of the program: A student is ordinarily expected to complete B.C.A program in Six semesters of three years. However a student may complete the program in not more than Six years including study period.

17.2 However the above regulation may be relaxed by the Vice Chancellor in individual cases for cogent and sufficient reasons.

17.3 A student shall be eligible for award of the B.C.A Degree if he / she fulfills all the following conditions.

a) Registered and successfully completed all the courses and projects.
b) Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of his/her study within the stipulated time.
c) Has no dues to the Institute, hostels, Libraries, NCC / NSS etc, and
d) No disciplinary action is pending against him / her.

17.4 The degree shall be awarded after approval by the Academic Council.

18. DISCRETIONARY POWER

Notwithstanding anything contained in the above sections, the Vice Chancellor may review all exceptional cases, and give his decision, which will be final and binding.

Bachelor of Computer Applications (B.C.A.)
Scheme of Instruction
I SEMESTER

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS 101	Introduction to Information Technology	4	4	0	4	3	60	40
2	SCS 103	Introduction to Python Programming	4	4	0	4	3	60	40
3	SCS 105	Fundamentals of Digital Logic Circuits	4	4	0	4	3	60	40
4	SCS 107	Mathematics –I	4	4	0	4	3	60	40
5	SFC 105	Soft Skills	2	3	0	3	3	--	100
PRACTICALS :									
	SCS 121	Python Programming Lab	2	0	4	4	3	--	100
	SCS 123	Data Analysis using Excel & Multimedia Tool Lab	2	0	4	4	3	--	100
		Total	22	19	08	27	--	240	460

B.C.A. – II SEMESTER

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS 102	Web Technologies	4	4	0	4	3	60	40
2	SCS 104	Introduction to Object Oriented Programming with C++	4	4	0	4	3	60	40
3	SCS 106	Introduction to Operating Systems	4	4	0	4	3	60	40
4	SCS 108	Mathematics – II	4	4	0	4	3	60	40
5	SFC104	Communicative English	3	4	0	4	3	60	40
PRACTICALS :									
	SCS 122	Web Technologies Lab	2	0	4	4	3	--	100
	SCS 124	Programming with C++ Lab	2	0	4	4	3	--	100
		Total	23	20	8	28	-	300	400

B.C.A. – III SEMESTER

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS 201	Elementary Data Structures using C++	4	4	0	4	3	60	40
2	SCS 203	Introduction to UNIX programming	4	4	0	4	3	60	40
3	SCS 205	Principles of Software Engineering	4	4	0	4	3	60	40
4	SCS 207	Introduction to Data Communications & Networks	4	4	0	4	3	60	40
5	SFC 201	Environmental Science	2	3	0	3	3	--	100
PRACTICALS :									
	SCS 221	Data Structures using C++ Lab	2	0	4	4	3	--	100
	SCS 223	UNIX Programming Lab	2	0	4	4	3	--	100
		Total	22	19	8	27	-	240	460

B.C.A. – IV SEMESTER

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Durati +on in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS 202	Introduction to Database Management Systems	4	4	0	4	3	60	40
2	SCS 204	Elementary Statistics	4	4	0	4	3	60	40
3	SCS 206	Introduction to Java Programming	4	4	0	4	3	60	40
4	SCS 208	MEAN Stack Development	4	4	0	4	3	60	40
5	SCS 242 SCS 244	**Generic Elective – I** Introduction to Cryptography Fundamentals of Artificial Intelligence	4	4	0	4	3	60	40
PRACTICALS :									
	SCS 222	Data Base Management Systems Lab	2	0	4	4	4	--	100
	SCS 224	Java Programming Lab	2	0	4	4	3	--	100
	SFC 222	Professional Communication Skills Lab	2	0	4	4	3	--	100
			26	20	12	32		300	500

B.C.A. – V SEMESTER

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS 301	Object Oriented Analysis and Design	4	4	0	4	3	60	40
2	SCS 303	Introduction to R Programming	4	4	0	4	3	60	40
3	SCS 305	Introduction to Cloud Computing	4	4	0	4	3	60	40
4	SCS 307	Business Intelligence	4	4	0	4	3	60	40
5	SCS 341 SCS 343	**Generic Elective – II** Introduction to Data Mining Foundations of Data Science	4	4	0	4	3	60	40
PRACTICALS :									
	SCS 321	R Programming Lab	2	0	4	4	3	--	100
	SCS 323	Business Intelligence Lab Using Tableau	2	0	4	4	3	--	100
		Total	24	20	08	28	--	300	400

B.C.A. – VI SEMESTER

Sl. No.	Course Code	Name of the Course	Credits	Scheme of Instruction		Total	Scheme of Examination		
				Hours per Week			Duration in Hrs.	Maximum Marks	
				L/T	P			Sem. End Exam	Con. Eval
1	SCS 392	Project Work	8	0	3	--	--	50	150
		Total	8	0	--	--	--	50	150

Total Credits : 22 + 23+ 22 + 26 + 24 + 8 = 125

BCA - I SEMESTER

SCS 101: INTRODUCTION TO INFORMATION TECHNOLOGY

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble: The course is designed for an introductory core course in Information Technology to the UG students as IT is a rapidly advancing technology.

Course Objectives:

- To emphasize reasonably stable fundamental concepts on which Information technology is built.
- To make the student familiarize in IT and their applications to business processes.

UNIT – I

Data and Information: Introduction, Types of data, Simple model of a computer, Data processing using a computer, Desktop computer.

Acquisition of Numbers and Textual Data: Introduction, input units, internal representation of numeric data, Representation of characters in computers, Error Detecting codes.

Processing and Displaying Textual Data: Word processor, Desktop Publishing, Page Description language, Mark-up Languages. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Differentiate between data and information.(L1)
- Classify different types of data which are processed by computers .(L1)
- Explain the functions of the units of a desktop computer. (L3)
- Describe how data is processed by a computer.(L3)
- Enumerate various devices used to input numbers and character.(L1)
- Distinguish between internal and external representation of data.(L1)
- Explain why binary digits are used to represent numbers and characters in computers.
- Convert decimal numbers to binary and vice versa.(L3)
- Distinguish between encoding and conversion of numbers and explain when they are appropriate.(L1)
- Convert binary numbers to hexadecimal numbers.(L2)
- Encode numbers and characters using ASCII.(L3)
- Explain the need for error detection and the use of parity bits.(L3)

UNIT – II

Data storage: Introduction, Storage cell, Physical devices used as storage cells, Random access memory, Read only memory, Secondary storage, Compact disk read only memory (CDROM), Archival store.

Central Processing Unit: Introduction, Structure of a central processing unit, Specifications of a CPU, Interconnection of CPU with memory and I/O units, Embedded processors.

Output Devices: Video Display Devices, Touch Screen, Printers, Audio Output. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Explain the need to store data in a computer.(L2)
- Describe the different types of units used in a computer to store data and their characteristics.(L3)
- Explain the importance of Central Processing Unit (CPU) of a computer & how a CPU processes data and computes.(L2)
- Describe how a CPU is interconnected with other units of a computer and cooperates with them to solve problems.(L3)
- List the types of devices used with computers to output processed data.(L1)

- Explain how an audio output unit works and its application.(L2)

UNIT – III

Computer Networks: Introduction, Local Area Network (LAN), Applications of LAN, Wide Area Network (WAN), Internet, Naming computers connected to Internet, Future of Internet Technology.
Computer Software: Introduction, Operating system, Programming languages, Classification of programming languages, Classification of Programming Languages based on applications.
Processing Multimedia Data: Graphics Processing, Audio Signal Processing. **Acquiring Audio Data -** Basics of Audio Signals, Acquiring and storing Audio Signals, Compression of Audio Signals.
Acquisition of Video: Computing a moving Scene with a video camera, Compression of Video Data, MPEG Compression standard. (12)

Learning Outcomes:
By the end of this Unit, the student will be able to:

- Describe computer networks and their various types. (L2)
- Explain why computers are networked and the advantages of doing it. (L2)
- Describe how computers are connected to form computer networks. (L2)
- Trace the evolution of the Internet and explain how it works. (L1)
- Explain the difference between hardware and software and why software is essential to make a computer useful. (L1)
- Understand the difference between system and application software and their roles in a computer. (L1)
- Describe why an operating system is required for a computer and its functions. (L2)
- Explain why programming languages are required. (L2)
- Classify programming languages.(L1)
- Understand the difference between image processing, image generation and image recognition. (L1)
- Explain image morphing and animation. (L2)
- Differentiate between audio data editing, audio data generation and audio data recognition. (L1)
- Explain how analog audio signals can be converted to digital form. (L2)
- Calculate the number of bits required to store digitized audio signal for a specific time period. (L2)
- Explain why digitized audio data should be compressed. (L2)
- Explain the principles used in MP3 compression standard. (L2)
- Explain how moving pictures are captured, digitized, and stored. (L2)
- Explain why it is necessary to compress digitized video. (L2)
- Describe the methods used to compress video. (L3)

UNIT – IV

Data organization: Introduction, Organizing a database, Structure of a database, Database Management System, Example of database design, Non-text databases, Archiving databases.
Processing Numerical Data: Introduction, Use of spreadsheets, Numerical computation examples.
Business Information Systems: Introduction, Types of Information Needed by Organization. (10)

Learning Outcomes:
By the end of this Unit, the student will be able to:

- Explain the need to systematically organize data for storage in a computer memory. (L2)
- Explain what a database management system is and why it is needed. (L2)
- Explain how a database is organized as relations and describe the parts of a relation. (L2)
- Organize non-text databases such as audio files and image files for easy retrieval. (L2)

- Explain the need to back up databases to recover data resources lost or damaged due to accidents. (L2)
- How to use a spreadsheet program to solve numerical problems. (L2)
- Explain what business information is and why it is useful. (L2)
- How to classify information systems as operational, tactical, strategic and statutory. (L2)
- Understand management of organizations & specific functions, their hierarchical levels. (L1)
- Determine the information needs of managers in each level of the hierarchy. (L2)
- Distinguish between Transaction Processing System, Management Information System (MIS) and Decision Support System (DSS).(L1)
- Explain how to design an operational information system. (L2)
- Enumerate the steps in designing a business information system known as system life cycle. (L2)

UNIT-V

Some Internet Applications: Introduction, Email, World Wide Web, Information Retrieval from the WWW - Browsers.

E-Commerce: Introduction, Business to customer E-commerce, Business to business E-commerce, Customer to customer E-commerce, Advantages and disadvantages of E-commerce, E-commerce system architecture, Digital signature, Payment schemes in E-commerce, Electronic clearing service in E-commerce, Cash transactions in E-commerce, Payment in C2C E-commerce, Electronic data interchange, Intellectual property rights and E-commerce, Information technology act.

Social Impacts of Information Technology: Introduction, Social uses of www, Privacy, Security and integrity of information, Disaster recovery, Intellectual property rights, Careers in Information technology. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Search for information in the Internet using one of several search engines.(L2)
- Select a search engine appropriate for ones search requirements.(L2)
- Use a browser to download files and log on to a remote computer.(L2)
- Explain how Internet telephone works.(L2)
- Distinguish between downloading and streaming audio and video files.(L2)
- Calculate the time required to download audio and video files.(L3)
- Estimate the buffer size requirements for streaming audio and video files.(L2)
- List the advantages and disadvantages of e-commerce.(L1)
- Explain Electronic Data Interchange (EDI) in e-commerce.(L2)
- Describe how security is ensured in e-commerce using data encryption and digital Signature.(L2)
- Explain various electronic payment systems used in e-commerce.(L2)
- Identify legal issues in e-commerce.(L1)
- Explain how information technology is affecting our daily life.(L2)
- Distinguish between privacy. Security and integrity of information.(L2)
- Protect your computing resources and be able to recover from disasters. (L2)
- Explain what intellectual property rights are and how to avoid infringing them. (L2)

Text Books:

1.Introduction to Information Technology by V. Rajaraman, PHI Learning Pvt.Ltd. 2013.

Reference Books:

1. Computing Fundamentals by Peter Norton, Tata Mc. Graw Hill, 6th edition, 2006.
2. Fundamentals of Computers by E.Balagurusamy, Tata McGraw Hill, 2009.

Course Outcomes:

Upon completion of the course, the student is able to

- Understand what a data is and what the information is.(L3)
- Analyze how data is processed by a computer.(L4)
- Discuss Hardware and Software. (L6)
- Demonstrate the basic parts of the Computer.(L3)
- List different types of Data.(L4)
- Analyze how to Organize Data.(L4)
- Apply IT on Business processes.(L3)

BCA – I SEMESTER

SCS 103: INTRODUCTION TO PYTHON PROGRAMMING

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble:

Python is an Internet and systems programming language that is soaring in popularity in today's fast-paced software development environment, and its simple (yet robust), object-oriented (yet can be used as a procedural language), extensible, scalable and features an easy to learn syntax that is clear and concise. Python combines the power of a compiled object language like Java and C++ with the ease of use and rapid development time of a scripting language. Its syntax is so easy to understand that students are likely to pick it up faster than any of the other popular scripting languages in use today! Python is a fully object-oriented programming language, but students do not have to understand object-oriented concepts to start programming in Python.

Course Objective:

- To enable the student to understand the basic concepts of Programming using Python programming language.

UNIT – I

Introduction to Computers and Programming: Introduction, Hardware and Software, How Computers Store Data, How a Program Works, Using Python.

Core Python: What is Python, History, features, Installing, Running, Getting Started, Syntax and Style, Python Objects, Numbers, Keywords, Operators, Syntax, Compilers and Interpreters, The Python Interpreter. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Discuss how computers work, how data is stored and manipulated, and why we write programs in high level languages.(L2)
- Understand how to use Python, the IDE environment and how to obtain and install Python on your system.(L2)
- Describe what is python, its history, features, benefits.(L2)
- Explain the basic Python concepts and statements.(L2)
- Understand the proper syntax and style of Python , keywords, operators and its memory management ability.(L1)
- Explain the difference between compiler and Interpreter.(L1)
- Understand how the first python code looks like .(L2)
- Explain data types, operators, built-in-functions used in python and their syntax .(L2)

UNIT – II

Input, Processing, and Output: Designing a Program, Input, Processing, and Output, Displaying Output with the print Statement, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, More about Data Output.

Decision Structures and Boolean Logic: The if Statement, The if -else Statement, Comparing Strings, Nested Decision Structures and the if -elseif -else Statement, Logical Operators, Boolean Variables. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Describe the program development cycle.(L2)
- Understand what a program is supposed to do before determining the steps that the program will perform.(L2)
- Explain the step by step process of a typical computer program.(L2)
- How use the print statement to display output in a Python program.(L2)

- To know about variable, data types, mathematical operators , operator precedence, data type conversion, assignment statement, expressions.(L2)
- How to read input from the keyboard, what are variable naming rules.(L2)
- What are escape characters, formatting.(L2)
- How to write simple programs in python that read input from the keyboard.(L2)
- Understand what is meant by decision structures and the syntax of different decision structures.(L2)
- How to use explain relational operators, Boolean variables & expressions, boolean operators and to use in decision structures to control the flow of a program.(L2)
- Write Pseudocode and flowcharts that are also introduced as tools for designing programs.(L2)
- Explain Nested decision structures and logical operators.(L2)
- Designing simple python programs using decision structures.(L2)

UNIT – III

Repetition Structures: Introduction to Repetition Structures, The while Loop: a Condition-Controlled Loop, The for Loop: a Count-Controlled Loop, Calculating a Running Total, Sentinels, Input Validation Loops, Nested Loops. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Understand what is repetition structures and how to create repetition structures using the while -loop and for –loop and flowcharts and their syntax. (L2)
- Differentiate condition-controlled loop & count-controlled loop. (L1)
- What is loop iteration. Does the while loop test its condition before or after it performs an iteration? (L2)
- Brief description of nested loops. (L2)
- Understand counters, running totals, infinite loops, accumulated variables, use of sentinel and general description of Input validation process. (L2)
- Designing simple python programs using while loop and for loop. (L2)

UNIT - IV

Data Structures: Lists, Quick Introduction to Objects and Classes, Tuple, Dictionary, Sequence, Set, Working with Strings. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- List the built-in data structures in python.(L1)
- Access values, update elements in list, delete list elements. (L2)
- Identify the difference between a list and a tuple. (L1)
- Access values in tuples, update, delete tuple elements. (L2)
- Access values in Dictionary, upde, delete dictionary elements. (L3)
- Specify the properties of Dictionary keys. (L1)
- Define OOP, class, object. (L1)
- How to use a string in python. (L2)
- Illustrate string methods. (L2)
- Working with strings. (L2)

UNIT - V

Functions: Introduction to Functions, Defining and Calling a Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants.

Files and Exceptions: Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Identify what is a function in Python. (L3)
- How to call a function in Python.(L3)
- Write python programs using functions.(L3)
- Define local and global variables.(L1)
- Understand how to pass arguments to functions.(L3)
- Understand the basics of files.(L2)

Text books:

1. Starting Out with Python, Tony Gaddis, Haywood Community College, Pearson, 2018.
2. Core Python Programming, Wesley J. Chun, Prentice Hall PTR, First Edition, 2000.

Reference Book:

1. How to Think Like a Computer Scientist: Learning with Python by Jeffrey Elkner, Allen B. Downey and Chris Meyers, Samurai Media Limited, 2016.

Course Outcomes:

Upon completion of the course, the student is able to

- Build knowledge about basic Python language syntax and semantics.(L5)
- Analyze programming skills in core python.(L4)
- What python programs and use concepts such as variables, conditional and iterative execution methods.(L1)
- Explain basic principles of Python Programming Language.(L5)

BCA – I SEMESTER

SCS 105: FUNDAMENTALS OF DIGITAL LOGIC CIRCUITS

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble: This Course provides the knowledge and fundamentals of logic gates, Encoders & decoders implementation and Number Conversion system. It also underpins other areas of the digital circuits such as Registers.

Course Objective:

- To know about Binary systems and Number conversions
- To know about the Boolean algebra, logic gates and its operations.
- To understand about Digital logic fundamentals, Design steps of flip flops, Shift registers, Counters etc.

UNIT – I

Binary Systems: Digital Systems, Binary numbers, Number base conversion, Octal & Hexa-Decimal Numbers, Complements, Signed Binary numbers, Binary codes, Binary storage and registers, Binary Logic. (9)

Learning Outcomes: By the end of this unit, the student will be able to

- Illustrate the conversion of the numbers from one number system to other and vice-versa.(L2)
- Illustrate the compliments of the numbers.(L2)

UNIT – II

Boolean Algebra and Logic Gates: Basic Definition, Axiomatic definition of Boolean Algebra, Theorems and properties, Canonical form & Standard Form, Other Logic Operations, Digital Logic Gates, ICs. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the Boolean Algebra theorems and properties.(L4)
- Discuss input, output symbols and the function of the logic gates.(L4)

UNIT – III

Gate Level Minimization: Introduction, Map Method, Four and Five variable maps, POS Simplification, Don't care conditions, NAND and NOR Implementation, Other two Level Implementation, Ex-OR function. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Illustrate Optimal gate level minimization.(L2)
- Show logic functions using NAND and NOR gates.(L2)

UNIT – IV

Combinational Circuits: Introduction, Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder - Subtraction, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoder, Encoder, Multiplexer. (9)

Learning Outcomes: -By the end of this unit, the student will be able to

- Define the basic procedure to analyze combinational circuits.(L1)
- Explain the different types of combinational circuits.(L2)
- Develop encoders and decoders. multiplexers etc.(L3)

UNIT - V

Synchronous Sequential Circuits: Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State reduction and Assignment, Design procedure.

Registers and Counters: Registers, Shift registers, Ripple Counters. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Outline of sequential circuits and flip-flops.(L2)
- Describe the State reduction and Design procedure.(L4)

Text Books:

1. Digital Design by M. Morris Mano, Michael D.Ciletti, Pearson edition, 4th edition. 2012.

Reference Books:

1. Fundamentals of Digital Logic Design by Stephen Brown and Zvonko Vranesic, Mc Graw Hill Education, 3rd edition, 2009.

Course Outcomes:

Upon completion of the course, the student is able to

- To examine Binary systems and Number conversions .(L4)
- To discuss about the Boolean algebra, logic gates and its operations.(L6)
- To build Digital logic fundamentals, Design steps of flip flops, Shift registers, Counters etc.(L6)

Prepared By: Ms.B.SatyaSaiVani Verified By: Dr.M.Srivenkatesh

BCA – I SEMESTER
SCS 107: MATHEMATICS - I

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble :

This course is introduced to learn fundamental topics in mathematics in undergraduate level such as Matrices, Solutions of Linear system of Equations, eigen values and eigen vectors, interpolation , solution of algebraic and transcendental equations, numerical differentiation and numerical integration

Course Objectives:

- To understand the matrices and their uses in real life problems
- To learn the basic concept and applications of matrices
- To identify and estimate the function or function value using various interpolation formulae for the given equal interval and unequal interval data
- Ability to implement numerical methods for differentiation as well as for integration.
- Ability to solve numerically algebraic and transcendental equations

UNIT - I

Matrices -I : Determinants, properties of determinants, matrices, matrices operations, transpose of a matrix, adjoint of a square matrix, inverse of a matrix, rank of a matrix. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Define determinant of a square matrix and properties of determinants.(L1)
- Discuss various matrices with examples.(L6)
- Evaluate adjoint and inverse of a square matrix for a given matrix.(L5)
- Choose appropriate method to find rank of a matrix.(L5)
- Extend the concepts of row operations and column operations to find rank of a matrix.(L2)

UNIT - II

Matrices -II : Solution of linear system of equations : Cramer's rule, matrix inversion method, Consistency of linear system of equations, eigen values and eigen vectors, Cayley-Hamilton theorem (without proof). (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Illustrate the concept of linear system of equations.(L2)
- Evaluate linear system of equations using Cramer's rule and Matrix inversion method.(L5)
- Explain consistency of linear system of equations with the help of finding rank of a matrix.(L5)
- Evaluate eigen values and eigen vectors of a matrix.(L5)
- Develop Cayley Hamilton theorem for a given matrix.(L6)

UNIT - III

Interpolation: Operators, Forward and Backward Difference Operations and Their Interrelation. Interpolation Formulae: Newton's Forward, Backward and Divided Difference Formulae, Lagrange's Formula. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain the need of forward and backward difference operators (L2)
- Apply forward and backward difference operators to interpolate the function value using Newton's forward and backward formulae.(L3)
- Evaluate the function value or function for the given table values using divided difference formula.(L5)

- Evaluate the function or function value for the given tabular values using Lagrange's formula. (L5)

UNIT - IV

Numerical Differentiation & Integration : Numerical Differentiation: Formulae for derivatives, **Numerical Integration** : Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Weddle's rule. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain the need of numerical differentiation and numerical integration.(L2)
- Summarize different types of rules to solve numerical integration problems.(L2)
- Evaluate the numerical differentiation problems using Newton's forward and backward formulae.(L5)
- Evaluate the numerical integration problems using trapezoidal rule, simpson's rule and weddle's rule and comparing with direct method.(L5)

UNIT - V

Solution of Algebraic and Transcendental Equations: Bisection Method, False Position Method, Gauss elimination method, Jacobi's iteration method, Gauss-Siedal iteration method. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Evaluate numerically the algebraic and transcendental equations.(L5)
- Explain procedure to solve an equation using bisection method and false position method.(L2)
- Evaluate problems using Gauss elimination method .(L5)
- Evaluate the problems using Jacobi's and Gauss-Seidal iteration methods .(L5)

Text Book :

1. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers, 43rd edition, 2015.

Reference Book:

1. Introductory methods of numerical analysis by S.S.Sastry, PHI, 5th edition, 2012.
2. Engineering Mathematics by B.V. Ramana, Tata Mc.Graw Hill, 1st edition,2006.

Course Outcomes:

Upon completion of the course, the student is able to

- Able to describe various matrices with examples.
- Able to evaluate operations on matrices.
- Able to choose appropriate method to find rank of a matrix.
- Illustrate the concept of linear system of equations.
- Able to evaluate linear system of equations using Cramer's rule and Matrix inversion method.
- Evaluate eigen values and eigen vectors of a matrix.
- Able to apply forward and backward difference operators to interpolate the function value using Newton's forward and backward formulae.
- Evaluate the function value or function for the given table values using divided difference formula and Lagrange's formula.
- Explain the need of numerical differentiation and numerical integration.
- Able to summarize different types of rules to solve numerical integrations and numerical differentiation.
- Able to evaluate numerically the algebraic and transcendental equations.
- Explain procedure to solve an equation using bisection method and false position method.
- Evaluate problems using Gauss elimination method, Jacobi's and Gauss-Seidal iteration methods.

Prepared By: Prof.N.Ravishankar Verified By: Dr.M.Srivenkatesh

BCA – I SEMESTER

SFC: 105 SOFT SKILLS

Hours per week: 3 Examination: 100 Marks

Credits: 2

Preamble:

Soft skills are in the need of the hour in the present scenario. It focuses on overall development of the students with an activity orientation and real time experiences. It helps the students to enhance their creativity, self esteem and confidence. The students will be exposed to real time challenges and get know how to meet the challenges.

Course Objectives:

To develop inter personal skills and be an effective goal oriented team player, to build confidence and develop leadership skills, to re-engineer attitude and understand its influence on behavior, to inculcate values and ethics, to make the student to realize the importance of goal setting and time management.

UNIT- I

SELF ANALYSIS: SWOT Analysis, Who am I, Attributes, Importance of Self confidence, Self Esteem, values and ethics. (10)

Learning Outcomes:

- Identify individual characteristics with the help of SWOT analysis to improve their standards and to overcome the weaknesses.(L3)
- Demonstrate the skills to enhance their level of confidence by different activities.(L2)
- Compare the present and past values and ethics so that the best can be implemented and inculcate them in one's life.(L5)

UNIT- II

Creativity: Out of box thinking, lateral thinking. (10)

Learning Outcomes:

- Elaborate and describe their experiences in thinking in different way.(L6)
- Demonstrate their innovative ideas with co participants of the class.(L2)
- Demonstrate the ability to analyze, evaluate the problems and find out the multiple solutions to the problem.(L2)

UNIT- III

Attitude: Factors influencing Attitude, Challenges and lessons from Attitude, Etiquette. (10)

Learning Outcomes:

- Examine the factors influencing attitude to have better understanding on one's personality.(L4)
- Find out the major challenges in developing the positive attitude.(L1)
- Apply the acceptable manners in day to day life to create the positive impact .(L3)
- Discuss the people and situations around and respond accordingly.(L6)

UNIT –IV

Motivation: Factors of motivation, Self talk, Intrinsic & Extrinsic Motivators.

Leadership and team work. (10)

Learning Outcomes:

- Discuss the importance of motivations in one's life to get success.(L6)
- Examine and differentiate different motives and find out the right one to implement.(L4)
- Improve and demonstrate the skills required to lead the team.(L6)
- Compare individual skills with required skills and participate in group activities actively.(L5)
- Analyze the situation and respond appropriately while working in the team.(L4)

UNIT –V

Goal Setting: Wish List, SMART Goals, Blue print for Success, Short Term, Long Term, Life Time Goals, **Time Management-** Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work. (10)

Learning Outcomes:

- Discuss the importance of time management in one's life. (L6)
- Utilize the time properly and planning the day, the week and the month.(L3)
- Explain the time wasters in one's day to day life.(L5)
- Determine the life time, long term and short term goal.(L5)

References:

1. Barun K. Mitra. Personality Development and Soft Skills, Oxford University Press, 2018.
2. S P Dhanavel. English and Soft Skills, Orient Blackswan, Hyderabad.
3. Soft Skills, Career Development Centre, Green Pearl Publications, 2015.
4. Hurlock Elizabeth B., Personality Development, Mc Graw Hill Education, India.
5. Swami Vivekananda, Personality Development, Advaita Ashrama.

Course Outcomes:

Upon completion of the course, the student is able to

- Emerge self-confident- identify and realize his/her strengths and weaknesses; and imbibe values of life.
- Demonstrate lateral and out-of-the box thinking
- Demonstrate positive attitude
- Appreciate different views of how people are motivated and apply different theories of motivation.
- Demonstrate leadership and team work skills
- Effectively draft minutes of the meeting, reports, cover letter and curriculum vitae
- Apply time management skills and set goals.

Prepared By: Dr.S.SushmaRaj Verified By: Dr.M.Srivenkatesh

BCA – I SEMESTER

SCS 121: PYTHON PROGRAMMING LAB

Hours per week: 4 Examination: 100 Marks

Credits: 2

Objectives: To write, test, and debug simple Python programs. To implement Python programs with conditionals and loops. Use functions for structuring Python programs.

Installing Python, executing Python, Python Standard Library, and Find where the python executables and standard library modules are installed on your system.

1. Start the Python interpreter in interactive mode.
2. Demonstrate to write, test, and debug simple Python programs.
3. Demonstrate Python syntax – identifiers, variables, keywords, Lines & Indentation, Quotation, and Comments.
4. Demonstrate the use operators- Arithmetic, Comparison, Assignment, Logical, Bitwise, Membership, Identity, and Operator Precedence.
5. Demonstrate assigning values to variable, Multiple Assignments, Standard Data Types- Numbers, Strings, Lists, Tuples, Dictionary, Data Type Conversion.
6. Demonstrate Decision Making & Loops-
    a. Check if a given number is divisible by 5
    b. Sum of N different numbers
    c. Sum and average of N different numbers
    d. Sum of numbers between 1 and 50 which are divisible by 3 and not by 5
    e. First N even numbers
    f. First N numbers divisible by 4
7. Demonstrate Built-in functions.
8. Demonstrate the use of Lists.
    a. Create a list and perform the following operations on the list:
    b. Display content of list
    c. Display length of list
    d. Display element in given position in the list
    e. Add elements to the list
    f. Remove elements from the list:
    g. Slice
    h. Sort
    i. Reverse
    j. Replace elements
    k. Join two lists
    l. Membership test
    m. Nested lists
9. Demonstrate the use of Dictionaries.
    a. Creating a Dictionary and perform the following operations:
    b. Get the values in a Dictionary
    c. Looping over dictionary
    d. Add elements to a dictionary
    e. combine two dictionaries

f. Delete elements of a dictionary
g. Test the presence of a key

10. Demonstrate the use of Tuples
    a. Creating a Tuple
    b. Accessing values in Tuple
    c. Updating Tuples
    d. Delete Tuple elements
    e. Basic Tuple Operations
    f. Indexing, Slicing, Matrixes
11. Demonstrate the use of Functions
    a. Smallest number from a set of numbers
    b. Largest number from a set of numbers
    c. Sum of even and odd numbers from a set of numbers
    d. Sort the elements of a matrix
    e. Read an N x N matrix. Check if the last element of each row is the sum of the all other elements in that row
12. Demonstrate Files
    a. Read a file and display all words containing all 5 vowels atleast once.
    b. Write a program to read student details (Name, roll number and CGPA) and write to file. Also display the file content.

Reference Books:

1. Head First Python by Barry, Paul, O Rielly Publications, 2nd Edition, 2010.
2. Core Python Programming by Wesley J. Chun, Prentice Hall, First Edition, 2000.
3. Learning Python by Lutz, Mark, O Rielly Publications, 4th Edition, 2009.

Course Outcomes:

Upon completion of the course, the student is able to

- Analyze what is HLL programming and the purpose of Python.(L4)
- Build to Install python and Start the Python interpreter in interactive mode .(L3)
- Utilize correct syntax and write simple programs. (L3)
- Utilize operators, Built-in functions, user-defined functions, Lists , Dictionary, Tuples.(L3)
- Construct with conditional statements, decision making &loops.(L6)
- Define fundamental knowledge on file concepts.(L1)

BCA – I SEMESTER

SCS 123: DATA ANALYSIS USING EXCEL & MULTIMEDIA TOOL LAB

Hours per week: 4 Examination: 100 Marks

Credits: 2

Objectives: To familiarize the student to explore powerful data analysis tool. To train the student to use the Adobe motion graphics creation tool to Animate, create animation and interactivity to produce visuals such as banner ads, slideshows, animations, and other forms of rich media

A. Data Analysis using Excel

1. **About Excel & Microsoft** - Uses of Excel, Excel software, Spreadsheet window pane, Title Bar, Menu Bar, Standard Toolbar, Formatting Toolbar, the Ribbon, File Tab and Backstage View, Formula Bar, Workbook Window, Status Bar, Task Pane, Workbook & sheets
2. **Work with Columns & Rows -** Selecting Columns & Rows , Changing Column Width & Row Height, Auto fitting Columns & Rows, Hiding/Unhiding Columns & Rows, Inserting & Deleting Columns & Rows, Cell, Address of a cell, Components of a cell – Format, value, formula, Use of paste and paste special.
3. **Demonstrate Functionality Using Ranges** - Using Ranges, Selecting Ranges, Entering Information Into a Range, Using AutoFill Creating Formulas. (4 hours) Using Formulas, Formula Functions – Sum, Average, if, Count, max, min, Proper, Upper, Lower, Using AutoSum.
4. **Use Advance Formulas -** Concatenate, Vlookup, Hlookup, Match, Countif, Text, Trim
5. **Demonstrate Spreadsheet Charts** - Creating Charts, Different types of chart, Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table.
6. **Perform Data Analysis**

B. Multimedia Tool - Adobe Animate

1. Create a new composition, then create elements and basic text
2. Import bitmap and vector images
3. Edit the properties of an element
4. Add keyframes to a composition to animate an element
5. Adding and animating element effects, such as drop shadows
6. Using the Pin tool to create animations
7. Veiling and unveiling elements on the Stage
8. Editing the duration of an animation – or a composition
9. Creating a fade
10. Applying eases
11. Using the Clipping tool
12. Creating and working with symbols
13. Creating interaction in a composition, such as rollover effects and clickable buttons

Reference Books:

1. Adobe Animation CC 2017 Release, Adobe Creative Team, Russell Chun, Adobe Press.
2. Adobe Flash CC , Russel Chun, Adobe Press.
3. Data Analysis With Microsoft Excel , Kenneth N. Berk , Patrick Carey, Cengage Learning.

Course Outcomes:

Upon completion of the course, the student is able to

- List Excel spreadsheets.(L1)
- Construct on basic data functions of Excel.(L6)
- Define Read data into Excel using various formats.(L1)
- Develop Format rows and columns.(L6)
- Discuss formulas in Excel and their copy and paste.(L6)

- Define Excel functions to organize and query data.(L1)
- Classify with IF, nested If, VLOOKUP.(L4)
- Discuss on Data filtering, Pivot tables.(L6)
- Distinguish works on line, Bar and Pie Charts, Pivot charts, Scatter Plots, Histograms.(L4)
- Develop a Multimedia graphics presentation.(L3)
- Define a cartoon.(L1)
- Define an animated movie.(L1)

BCA – II SEMESTER
SCS 102: WEB TECHNOLOGIES

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble:
Web Technologies helps to learn about the HTTP communication protocol, about the markup languages HTML, XHTML and XML, the CSS and XSLT standards for formatting and transforming web content, interactive graphics and multimedia content on the web, client-side programming using JavaScript.

Course Objectives:

- To develop a dynamic webpage by the use of java script.
- To connect a java program to DBMS and perform insert, update and delete operations
- To write a well formed / valid XML document.
- To write a server side java application called JSP to catch form data sent from client and store it on database.

UNIT-I

Internet Basics: Basic Concepts, Communicating on the Internet, Internet Domains, Internet Server Identities, Establishing Connectivity on the Internet, Client IP address, Transmission Control Protocols.
Introduction to HTML: Information files creation, Web Server, Web Client/Browser, Hyper Text Markup Language, Commonly used HTML Commands.
LISTS: Types of lists. (12)

Learning Outcomes: By the end of this unit, the student will be able to

- Describe the basic concepts of Internet and Internet related topics. (L2)
- Differentiate the different protocols used for different purposes.(L1)
- Understand the HTML commands, Web Servers and lists.(L3)

UNIT - II

Adding Graphics to HTML Documents: Using the Attributes- Border, Width, and Height, Align and Alt Attributes.
Tables: Introduction, The Caption Tag, Using the width and boarder, Cellpadding, Cellspacing, Using Background-Color property, Using the Colspan and Rowspan Attributes.
Linking Documents: Links, Images as Hyperlinks. FRAMES: Introduction to Frames. (10)

Learning Outcomes: -By the end of this unit, the student will be able to

- List out the different attributes in graphics. (L1)
- Implement the table attributes. (L3)
- Understand the concept of Frames. (L3)

UNIT – III

CSS2 - Introduction, Syntax, Selectors, Color Background Cursor, Text Fonts, Lists Tables, Box Model, Display Positioning, Floats.
Dynamic HTML: Cascading Style Sheets, Class, Using the TAG, External Style Sheets, Using the TAG. (12)

Learning Outcomes: -By the end of this unit, the student will be able to

- Understand the concepts of Cascading Style Sheets. (L3)
- Implement the Dynamic HTML tags. (L3)

UNIT – IV

Introduction To JavaScript: JavaScript in web pages, The Advantages of JavaScript, Writing JavaScript into HTML, Basic Programming Techniques, Operators and Expressions in JavaScript, JavaScript Programming Constructs, Conditional Checking, Super controlled-endless loops,

Functions in JavaScript, User defined functions, Placing text in a Browser, Dialog Boxes. (12)

Learning Outcomes: -By the end of this unit, the student will be able to

- Describe the advantages of JavaScript. (L2)
- Understand the basic programming techniques. (L3)
- Implement loops, functions in JavaScript. (L3)

UNIT – V

The JavaScript Document Object Model: Introduction, the JavaScript assisted style sheets DOM (JSSS DOM).

Understanding Objects in HTML: Browser Objects, Handling (Web page) Events Using JavaScript. Forms used by A Web Site: The form Object, Other Built -In objects in JavaScript, User Defined Objects. (10)

Learning Outcomes: -By the end of this unit, the student will be able to

- Understand the JavaScript assisted style sheets. (L3)
- Differentiate the different Web Page Handling events using JavaScript. (L1)
- Implement a web page using different objects in JavaScript. (L3)

Text Book:

1. Web Enable Commercial Application Development Using HTML, Javascript, DHTML and PHP by Ivan Bayross, BPB Publications, 4th revised edition, 2010 .

Reference Books:

1. Complete Reference HTML by T. A. Powell, 3rd edition, TMH, 2003.
2. The Complete Reference - PHP by Steven Holzner, Tata McGraw Hill, 2008.
3. Web Technology and Design by Xavier, C, New Age International, 2013.

Course Outcomes:

Upon completion of the course, the student is able to

- Develop a dynamic webpage by the use of java script.(L6)
- Build a java program to DBMS and perform insert, update and delete operations.(L6)
- Construct to write a well formed / valid XML document. (L6)
- Design a server side java application called JSP to catch form data sent from client and store it on database.(L6)

Prepared By: Dr.M.Srivenkatesh Verified By: Dr.M.Srivenkatesh

BCA – II SEMESTER

SCS 104: INTRODUCTION TO OBJECT ORIENTED PROGRAMMING WITH C++

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble :

C++ is one of the most popular programming language. It contains object-orientation, a new programming concept used to create an object, in code, that has certain properties and methods or Units. The implementation of the Units helps to see the whole world in the form of objects. This course also helps in developing high quality software like system application software, drivers, client-server applications and embedded firmware.

Course Objectives:

- To understand the difference between procedure oriented programming and object oriented programming.
- To learn the basic concepts and applications of OOPS and practice object oriented analysis and design in the construction of robust, maintainable programs which satisfy the requirements of users.
- To identify and practice the object-oriented programming concepts and techniques, practice the use of C++ classes and class libraries, modify existing C++ classes, develop C++ classes for simple applications and implement features of object oriented programming in solving real world problems using Inheritance, Data abstraction, Encapsulation and Polymorphism.
- To understand the concept of file and handling function to perform file operations like accessing the data from file and store the data into file.

UNIT – I

Principles of Object Oriented Programming: Software Evolution, Procedure oriented Vs Object Oriented Programming Paradigm, Basic Concepts of OOPs, Benefits of OOP, Features and Applications of OOP, Structure of C++ program. Tokens, Expressions and control structures: Introduction, Tokens, Keywords, Identifiers and Constants, Basic Data types, User-Defined Data types, Derived Data Types and Sizes, Dynamic Initialization of variables, Reference Variables, Scope Resolution Operator, TypeCast Operator, Expressions and their types. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- List difference between procedure and object oriented programming, applications of OOP. (L1)
- Describe the basic concepts of object oriented programming. (L2)
- Develop and run simple C++ programs. (L3)
- Choose appropriate data type and operators in programs. (L3)
- Extend the concepts of C++ in developing efficient programs. (L3)

UNIT – II

Functions in C++: Function Prototype, call by reference, Inline functions, Default Arguments, Const arguments Function Overloading, Library Functions. Classes and Objects: Introduction, Specifying a class, making an outside function inline, Arrays within a class, Defining Member functions, Memory Allocation for Objects, array of Objects, Static Data Members, Static Member Functions, Friendly Functions. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Compare and contrast parameter passing techniques of C and C++. (L2)
- Illustrate the concept of classes and objects. (L3)
- Develop real world applications by using appropriate concepts. (L3)
- Use static members in programming. (L3)
- Compare and contrast inline functions with macros. (L2)

UNIT – III

Constructor: Constructor Parameterized Constructor, Multiple Constructors in a Class, Copy Constructor, Dynamic Constructors, Destructors. Operator Overloading: Definition, Overloading Unary, Binary operators, Overloading Binary Operators using Friends, Manipulation of Strings using operators. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Apply function overloading concept whenever required. (L3)
- Explain the need of friend function. (L2)
- Extend the concept of parameter passing techniques with objects. (L2)
- Outline the different types of Constructors. (L2)
- Use constructor and destructor in programming. (L3)

UNIT – IV

Inheritance: Introduction, Defining Derived Classes, Single Inheritance, Multiple Inheritance, Multi Level Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes. Constructors in Derived Classes. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Explain the need of reusability concept with inheritance.(L2)
- Summarize different types of inheritance.(L2)
- Extend the overloading concept on operators.(L3)
- Recall the basics of pointers from C language and extend to objects.(L1)
- Identify the need of 'this' pointer.(L1)

UNIT – V

Exception Handling: Introduction, Basics of Exception Handling, Exception Handling Mechanism, Throwing Mechanism, Catching Mechanism, Re-throwing exception, Specifying Exceptions. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Compare and contrast Basics of Exception Handling mechanism. (L2)
- Construct programs using Exception Handling Mechanism, Throwing Mechanism, Catching Mechanism, Rethrowing an exception, Specifying Exceptions.(L3)

Text Book:

1.Object Oriented Programming in C++ by E. Balagurusamy, 7th Edition, Tata McGraw Hill Publication, 2017.

Reference Books:

1.Object Oriented Programming with C++ by M.T. Somashekara, D.S. Guru, H.S. Nagendraswamy, K.S. Manjunatha, PHI Learning, 1st edition, 2012.

2. Mastering C++ by K.R Venugopal, T. Ravishankar, RajKumar, Tata Mc Graw Hill Publishing Company Limited, 2nd edition, 2006.

Course Outcomes:

Upon completion of the course, the student is able to

- Demonstrate of classes and objects.(L2)
- Discuss the concepts of inheritance and polymorphism.(L6)
- Develop constructors and destructors, friend function.(L6)
- Discuss overloading of operators in C++.(L6)
- Distinguish function overloading and function overriding.(L4)
- Explain exception handling in object-oriented programs. (L5)

BCA – II SEMESTER

SCS 106: INTRODUCTION TO OPERATING SYSTEMS

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble: Operating system illustrates abstractions, mechanisms and their implementations. It contains threads, synchronization, inter process communication, Scheduling algorithms, deadlock, memory management, virtual memory, and file system.

Course Objectives:

- To learn the fundamentals of operating systems.
- To understand of mechanisms of OS to handle processes and threads and their communication.
- To ability to learn the mechanisms involved in memory management.
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocol.
- To know the components and management aspects of concurrency management.
- To lean File system concepts.

UNIT – I

Introduction: What operating system does? Computer – System Architecture, Operating System structure, Operating System Operations, Distributed Systems, Special-purpose Systems, Computing Environments.

System Structures: Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, OS Design and Implementation. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe basic concepts of operating system.(L2)
- List the operating system structure and operations.(L1)
- Define distributed operating system.(L1)
- List the operating system services.(L1)
- Define type of system calls and system programs.(L1)
- List the OS Design and implementation.(L1)

UNIT – II

Process Management: Process Concept, Process Scheduling, Operations On Processes, Inter Process Communication.

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Illustrate the process concept and scheduling. (L3)
- Use of inter process communication. (L3)
- List the Scheduling criteria and algorithms. (L1)

UNIT – III

Process Synchronization: Background, Critical Section Problem, Peterson's Solution, Classic Problems of Synchronization.

Deadlock: System Model, Deadlock Characterization, Methods for Handling Deadlock, Deadlock Prevention, Avoidance and Detection, Recovery from Deadlock. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Illustrate Critical Section Problem and Peterson's Solution. (L3)
- List the Classic problems of Synchronization. (L1)
- Apply System model and Deadlock methods. (L3)

UNIT - IV

Memory Management: Memory Management Strategies, Background, Swapping, Contiguous, Memory allocation, Paging, Structure of the page table, Segmentation.

Virtual memory: Background, Demand paging, Page replacement, Allocation of frames, Thrashing, Other considerations. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Apply Memory Management Strategies.(L3)
- Illustrate Virtual memory.(L3)
- List the page replacement and thrashing.(L1)

UNIT – V

File System: File concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Illustrate File concept.(L3)
- Apply Access Methods. (L3)
- Use the Directory and Disk structure.(L3)
- List the File System, Mounting, File sharing.(L1)

Text Book:

1. Operating System Concepts by Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Wiley India Publication, 8th edition, Reprint 2012.

Reference Books:

1. Operating Systems: Internals and Design Principles by Stalling William, Prentice Hall, 7th edition, 2011.
2. Operating System by Dietel, Pearson Education, 3rd edition, 2004.
3. Modern Operating Systems by A.S. Tanenbaum, Prentice Hall, 3rd edition, 2007.

Course Outcomes:

Upon completion of the course, the student is able to

- Explain the concepts, structure and design of operating Systems. (L2)
- Design of operating system and its impact on application system design and performance. (L6)
- Demonstrate competence in recognizing and using operating system features.(L2)
- Explain analyses theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.(L2)
- Discuss paging performance, demand paging and page replacement.(L6)

Prepared By: Mr.B.Srinivasa Rao Verified By: Dr.M.Srivenkatesh

BCA – II SEMESTER
SCS 108: MATHEMATICS - II

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble:

This course is introduced to impart knowledge of basic computer concepts such as Mathematical Logic, Set Theory, Relations, Lattices and Boolean Algebra, and Graph Theory.

Course Objectives:

- To understand the basic concepts of set theory and relations
- To learn the basic concept and applications of functions and counting
- To evaluate inference theory problems in proposition calculus
- Ability to learn about lattices and Boolean algebra.
- To understand the concept of graphs, directed graphs and trees.

UNIT - I

Set Theory and Relations: Sets, Set Operations, Algebra of Sets, Classes of Sets, Power Sets, Partitions, Relations, Representations of Relations, Composition of Relations, Types of Relations, Partial Ordering Relations, n-ary Relations. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the basic concepts of sets and operations on sets.(L2)
- Describe different types of relations and representations of relations. (L2)
- Evaluate composition of relations.(L1)
- Explain the procedure to draw Hasse diagrams for partial order relations.(L2)
- Explain the concept of n-ary relations.(L2)

UNIT - II

Functions and Counting : Functions, One-to-One, onto and Invertible Functions, Mathematical, Exponential and Logarithmic Functions, Basic Counting Principles, Permutations, Combinations, The Pigeonhole Principle, The Inclusion – Exclusion Principle. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- List the difference between various functions.(L1)
- Describe the basic concepts of counting principles. (L2)
- Explain the concepts of permutations and combinations (L2)
- Evaluate the problems using the Pigeonhole principle.(L5)
- Evaluate the problems with the help of inclusion-exclusion principle.(L5)

UNIT - III

Logic and Propositional Calculus: Propositions and Truth Tables, Tautologies, Logical Equivalence, Algebra of Propositions, Arguments, Logical Implication, Propositional Functions, Quantifiers. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Evaluate truth tables for all propositions with and without connectives .(L5)
- Evaluate logical equivalence formulas using truth tables and also without using truth tables.(L5)
- Use logical implication and equivalence formulas in proposition calculus.(L5)
- Outline the different types of propositional functions.(L5)
- Outline the different types of Quantifiers. (L5)

UNIT – IV

Lattices and Boolean algebra: Ordered, Sets, Hasse Diagrams, Lattices, Distributed Lattices & Complimented Lattices, Boolean algebra, Sum of Products form for Boolean algebra. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain the need of Hasse diagrams in lattices. (L2)
- Summarize different types of lattices. (L2)
- Define the Boolean algebra using lattices.(L5)
- Evaluate the problems on lattices.(L5)
- Evaluate the problems on Boolean algebra.(L5)

UNIT - V

Graph Theory: Graphs, Multi graphs, Directed graphs, Isomorphic Graphs, Paths, Connectivity Complete, Regular and Bipartite Graphs, Planar Graphs, Tree Graphs, Spanning Trees, Kruskal Algorithm, Warshall Algorithm for Path Matrix and Shortest – Path Matrix. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Analyze and Classify various types of graphs.(L4)
- Construct graphs as per the definition. (L3)
- Explain tree graphs with examples. (L2)
- Apply the concept of Krushkal algorithm to find minimum spanning tree of a given connected graph.(L3)
- Evaluate shortest path matrix using shortest path algorithm. (L5)

Text Books:

1. Discrete Mathematics (Schaum's Outline Series) by Seymour Lipschutz, Marc Lipson, Tata Mc-Graw Hill, 2nd edition.
2. Discrete Mathematics and its applications by Kenneth H. Rosen, Tata Mc-Graw Hill.

Reference Book:

1. Discrete Mathematical Structures with applications to Computer Science by Tremblay and R.Manohar, Tata McGrawhill education.

Course Outcomes:

Upon completion of the course, the student is able to

- Able to describe the basic concepts of sets and operations on sets.
- Describe different types of relations and representations of relations.
- Able to explain the procedure to draw Hasse diagrams for partial order relations.
- Able to differentiate various functions.
- Explain the concepts of permutations and combinations and Pigeonhole principle.
- Evaluate logical equivalence formulas using truth tables and also without using truth tables.
- Use logical implication and equivalence formulas in proposition calculus.
- Able to outline the different types of propositional functions and types of Quantifiers.
- Explain the need of Hasse diagrams in lattices and summarize different types of lattices.
- Define the Boolean algebra using lattices.
- Able to classify various types of graphs.
- Explain tree graphs with examples.
- Able to find minimum spanning tree of a given connected graph and shortest path matrix.

BCA – II SEMESTER

SFC 104 : COMMUNICATIVE ENGLISH

Hours per week: 4 End Examination: 60 Marks

Credits: 3 Sessionals: 40 Marks

Preamble

The course is a unified approach to enhance language skills of learners with an aim to hone their LSRW skills and to increase their employability. It enables the learners improve their communication skills which are crucial in an academic environment as well as professional and personal lives.

Course Objectives:

To enable students to use English in day-to-day communication, t build up their confidence in the usage of English, to enhance vocabulary, to expose them to prose and poetry and enable them to learn language through simple literature. Also to develop their written communicative competence.

UNIT- I

The Scientific Point of view – J.B.S Haldane

Synonyms & Antonyms, One word substitutes,

Words often confused, Phrasal Verbs. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- How to become familiar with formal vocabulary that is common in academic texts.(L1)
- Demonstrate their understanding of synonyms and antonyms in active learning.(L2)
- Analyze and Strengthen their vocabulary base in one word substitution.(L4)
- Experiment with phrasal verbs in their day to day communication.(L3)

UNIT- II

I am not that Woman – Kishwar Naheed

To Autum – John Keats

Foreign Phrases, Tenses, Concord (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Develop vocabulary to comprehend academic and social reading and listening texts.(L6)
- How to recognize frequently used foreign words and phrases related to areas of immediate relevance.(L1)
- How to use present, past and future tenses with appropriate time markers.(L1)
- Identify the subject in a sentence and determine the verb that agrees with it.(L3)

UNIT –III

The Boy who Broke the Bank – Ruskin Bond

Idiomatic expressions, Proverbs, Correction of sentences (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Develop strategies to understand vocabulary in the text.(L6)
- Find appropriate meaning of idiomatic expressions.(L1)
- Construct and familiarize with commonly used idiomatic expressions and use them correctly.(L6)
- Explain the meanings of proverbs and interpret classic examples of proverbs.(L5)
- Demonstrate the ability to recognize and correct basic sentence faults and grammatical errors.(L2)

UNIT -IV

A Marriage Proposal – Anton Chekov

Letter Writing, Paragraph Writing, Essay Writing, Note Making, Precis Writing (10)

Learning outcomes:

By the end of the course, the student will be able to:

- perceive the content in the academic text and recognize the organization and purpose of reading a text
- recognize and demonstrate the use of appropriate vocabulary, style and tone in formal letters.
- Apply principles of clarity and coherence to sentences and paragraphs in writing essays
- Learn to organize, record, review and condense the information

UNIT- V

Dialogue Practice, Reading Comprehension, Notices and Circulars, Minutes of the Meeting, Report Writing, Cover Letter and Curriculum Vitae (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Structure natural, lucid and spontaneous dialogues.(L1)
- Identify new vocabulary through contextual clues.(L4)
- Apply scanning skills to comprehend specific details.(L3)
- Draft formal notices, circulars and minutes of the meetings.(L2)
- Write in an appropriate style for an academic report.(L1)
- Demonstrate an ability to target the cover letter and resume to the presenting purpose.(L2)

Text Book:

Board of Editors. Engage with English, Orient Blackswan, Hyderabad,2019.

References:

N. Krishna Swamy & T. Sri Raman. Current English for Colleges, Macmillan Margaret Maison, Examine your English, Macmillan.

Course Outcomes:

Upon completion of the course, the student is able to

- Develop proficiency in vocabulary.
- Use grammatical structures correctly.
- Apply idiomatic expressions in day to day conversation.
- Demonstrate efficacy in writing components.
- Effectively draft - minutes of the meeting, reports, persuasive cover letter and curriculum vitae.

BCA – II SEMESTER
SCS 122: WEB TECHNOLOGIES LAB

Hours per week: 4 Examination: 100 Marks
Credits: 2

Objectives: To learn the basics in web designing using HTML, CSS, and Java Script

1. Write a HTML document to demonstrate Formatting tags.
2. HTML document to demonstrate Ordered lists, unordered Lists, definition Lists.
3. Write an HTML document to create table header rows, data rows, caption and attributes of the table tag.
4. Write an HTML document to cell padding and cell spacing, Bgcolor, Colspan and Row span attribute.
5. Write an HTML document using frameset and the targeting named frames.
6. Create Style Sheet and implement the following:
    - CSS Styling(Background, Text Format, Controlling Fonts),Working with block elements and objects, Working with Lists and Tables , CSS Id and , Box Model(Introduction, Border properties, Padding Properties, Margin properties)
    - CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector)
    - CSS Color, Creating page Layout and Site Designs.
7. Write a JavaScript to demonstrate different data types.
8. Write a JavaScript to demonstrate different operators.
9. Write a JavaScript to demonstrate for loop and while loop.
10. Write a JavaScript to demonstrate arrays.
11. Write a JavaScript to demonstrate dialog boxes.
12. Write a JavaScript to demonstrate user defined functions.
13. Write a JavaScript to demonstrate built-in functions.
14. Write a JavaScript to create login application using form elements.

Reference Books:

1. Complete Reference HTML by T. A. Powell, 3rd edition, TMH, 2003.
2. HTML, XHTML, and CSS Bible by Steven M. Schafer, Wiley India, 5th Edition.
3. Beginning CSS: Cascading Style Sheets for Web Design by Ian Pouncey, Richard York, Wiley India.
4. Web Technology and Design by Xavier, C, New Age International, 2013.

Course Outcomes:

Upon completion of the course, the student is able to

- Develop a dynamic webpage by the use of java script.(L6)
- Construct to write a well formed / valid XML document. (L6)
- Design a server side java applications.(L6)

Prepared By: Dr.M.Srivenkatesh Verified By: Dr.M.Srivenkatesh

BCA – II SEMESTER

SCS 124: PROGRAMMING WITH C++ LAB

Hours per week: 4 Examination: 100 Marks

Credits: 2

Objectives: To make the students to understand the features of object oriented principles and familiarize them with virtual functions, templates and exception handling. Be able to write a C++ program to solve a well specified problem.

1. Write a program that contains a function to exchange (swap) values of two arguments by using pointers and References parameters.
2. Write a program to check the given string is palindrome or not using a private member function.
3. Write a program to Demonstrate Inline Function.
4. Write a program to add corresponding elements of two 2-D matrices using friend function. Create two classes each capable of storing one 2-D matrix. Declare the matrices under private access specifier and access them outside the class.
5. Write a program for finding area of different geometric shapes (Circle, Rectangle and Cube) using function overloading.
6. Write a Program to generate Fibonacci Series by using Constructor to initialize the Data Members.
7. Write a program to demonstrate a copy constructor.
8. Write a Program to demonstrate Constructors in derived class using friend function.
9. Write a program to demonstrate single inheritance distinguishing public and private derivation.
10. Write a program to illustrate the implementation of both Multilevel and Multiple (Hybrid) inheritance.
11. Write a program to reverse of a string using operators.
12. Write a program to find transpose of a given matrix of mxn size using unary operator overloading.
13. Write a program to add two matrices of mxn size using binary operator overloading.
14. Write a program to demonstrate the usage of virtual functions.
15. Write a program to find average marks of the subjects of a student. Throw multiple exceptions and define multiple catch statements to handle division by zero as well as array index out of bounds exceptions.

Reference Book:

1. Object Oriented Programming in C++ by E. Balaguruswamy, 4rd Edition, Tata McGraw Hill Publication.

2 .Let Us C++ by Yashavant P.Kanetkar,2nd Edition,,BPB Publications,

Course Outcomes:

Upon completion of the course, the student is able to

- Demonstrate of classes and objects.(L2)
- Develop the concepts of inheritance and polymorphism.(L6)
- Develop constructors and destructors, friend function.(L6)
- Implement Operator overloading, Virtual functions, Exception Handling. (L6)

Prepared By: Dr.M.Srivenkatesh Verified By: Dr.M.Srivenkatesh

BCA – III SEMESTER

SCS 201: ELEMENTARY DATA STRUCTURES USING C++

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble :

C++ is one of the most popular languages, contains object-orientation, Data Structures Using C++most popular. This course helps in developing data structures and algorithms in real time applications like arrays ,stacks, queues, linked lists, trees and graphs.

Course Objective:

- To understand the linear and non linear data structures available in solving problems.
- To know about the sorting and searching techniques and its efficiencies.
- Usage of the data structures and algorithms in real time applications and ability to design their own data structure according to the application need.
- To understand about stacks, queues, linked lists, trees and graphs.

UNIT - I

Fundamental Concepts: Introduction to Data Structures, Types of Data Structures, and Implementation of data structures, Analysis of Algorithms.

Complexity of algorithms: Space complexity, Time complexity.

Linear Data Structure Using Arrays: Sequential Organization, Linear Data Structure.

Using Sequential Organization: Arrays, Array as an Abstract Data Type, Memory Representation and Address Calculation, The Class Array, Inserting an element into an array, Deleting an element, Pros and Cons of Arrays, Applications of arrays, Sparse Matrix. (7)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the basic concepts of Data Structures.(L2)
- Choose appropriate algorithms of Complexity.(L3)
- Use Linear array.(L3).
- Outline the Applications of arrays and Sparse Matrix.(L2)

UNIT - II

Stacks: Primitive operations, Stack Abstract Data Type, Representation of Stacks Using Sequential Organization (Arrays), Applications of Stack, Expression Evaluation and Conversion Polish notation and expression.

Queues: Concept of Queues, Queue as Abstract Data Type, Realization of Queues Using Arrays, Circular Queue, Advantages of using circular queues, Array implementation of priority queue. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- List the difference between Stacks and Queues.(L1).
- Develop Applications of Arrays and Stacks(Polish notations).(L3).
- Apply Circular queue and advantages of using circular queues.(L3).
- Describe Array implementation of priority queue.(L2).

UNIT - III

Linked Lists: Introduction, Linked List, Comparison of sequential and linked organizations, Linked list terminology, Primitive operations, Realization of Linked Lists using arrays, Linked list using dynamic memory management.

Linked List Abstract Data Type: Data structure of node, Insertion of a node, Linked list traversal, Deletion of a node, Types of linked list, Linear and Circular linked lists, Linked Stack, Linked Queues**.** (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe Linked List.(L2)
- Apply Primitive operations.(L3)
- Use Linked list using dynamic memory management.(L3)
- Outline the Circular linked list, Linked stack and Linked Queues.(L2)

UNIT - IV

Trees: Introduction, Basic terminology, Types of Trees, Binary Tree, Properties of a binary tree, Binary Tree Abstract Data Type, Array implementation of binary trees, Linked implementation of binary trees, Binary Tree Traversal, Conversion of General Tree to Binary Tree.

Binary Search Tree: Basic Concepts, Traversals, Creation, Insertion, Deletion of binary search trees. (8)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain the need of Trees.(L2)
- Describe the basic concepts Binary Search Tree.(L2)
- Use traversals, Creation, Insertion, Deletion of binary search trees.(L3)

UNIT - V

Graphs: Introduction, ADT of Graph, Representation of Graph, Graph Traversal, Spanning Trees.

Searching: Search Techniques, Sequential Search, Binary search.

Sorting: Types of sorting, General sort concepts, Bubble sort, Insertion sort, Selection sort Quick sort**.** (8)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the Graphs.(L2)
- Explain the need of search Techniques.(L2)
- Use sorting types.(L3)

Text Book:

1. Data Structures using C++ by Varsha H.Patil, Oxford University Press, New edition, 2012.

Reference Books:

1. Fundamentals of Data Structures in C++ by Ellis Horowitz, Sartaj Sahni Anderson, Freed, 2nd edition 2008.
2. Data Structures using C++ by D.S.Malik, Cenage Learning, 2nd edition, 2009.

Course Outcomes:

Upon completion of the course, the student is able to

- Develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include: arrays, linked lists, binary trees, heaps, and hash tables. (L6)
- Develop knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.(L6)
- Analyze and compare algorithms for efficiency using C++.(L4)
- How to implement projects requiring the implementation of the above data structures using C++.(L1)

Prepared By: Mr.B.Srinivasa Rao Verified By: Dr.M.Srivenkatesh

BCA – III SEMESTER

SCS 203: INTRODUCTION TO UNIX PROGRAMMING

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble :

Unix is popular multi user operating system in the world. We learn unix tools and concepts. We can write shell programming in Unix programming languages. It is aimed to give security of files and directories of Unix operating system.

Course Objectives:

- To make the student to learn ownership and permissions of the files and directories.
- To train the student to acquaint about Vi- a standard Unix text editor.
- To make the student to write shell script programs.
- To enable the student on how to give the security of Unix files and directories through login and password.

UNIT - I

Getting started: The operating system-The Unix operating system-knowing your machine-knowing your machine-briefing session.

The Unix architecture and command usage: Unix architecture-features of Unix-Locating commands-Internal and external commands-command structure. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe unix operating system and machine-briefing session.(L2)
- Illustrate the Unix architecture.(L3)
- Use internal and external commands.(L3).

UNIT - II

General-purpose utilities- cal, date, echo, printf, bc, passwd, who, tty.

The file system: Filename, The parent-child relationship, The Home Directory, pwd, cd, mkdir, rmdir, ls-Absolute Pathnames-Relative Pathnames, ls-The UNIX file System. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Use cal and other commands in Unix.(L3)
- Describe file syste in Unix.(L2)
- Illustrate parthname, relative pathnames and Unix file systems.(L3)

UNIT – III

Handling ordinary files: cat, cp, rm, mv, more, lp, file, wc, od, cmp, comm., diff,zip and unzip.

Basic file attributes: ls –l, chmod, Directory Permissions, Changing file ownership. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe ordinary files.(L2)
- Identify the need of diff, zip and unzip commands in Unix.(L1)
- Illustrate Basic file attributes in Unix.(L3)

UNIT – IV

The vi Editor: vi Basics-Input Mode-Entering and Replacing Text-Saving Test and quitting-Editing Text.

The Shell: The shell's Interpretive Cycle-Shell Offerings-Pattern Matching-The wild-cards-Escaping and Quoting-Redirection-Pipes-tee-Command substitution-Shell Variables.

The Shell: The shell's Interpretive Cycle-Shell Offerigs, Pattern Matching-The Wild-cards-Escaping and Quoting-Redirection-Pipes-tee-Command Substitution-Shell variables.

More file attributes: file systems and Inodes-Hrd links-Symbolic Links and ln-The Directory-find.

Simple Filters: head, tail, cut, paste, sort, uniq ,tr.
Filter using regular expressions: grep-sed. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Use vi Editor and other editors in UNIX.(L3)
- Explain the need of the shell, redirection, pipes, tee and other commands in Unix.(L2)
- Describe file system, links, Directory, find.(L2)
- Identify the need head, tail, cut, paste, sort, uniq, tr, grep, sed commands in Unix.(L1)

UNIT – V

Essential Shell Programming: Shell Scripts, read-The if Conditional-The case Conditional-the case Conditional-expr-while looping-for looping. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Construct programs using Shell Script.(L3)
- Use read ,if ,case statements in Unix.(L3)
- Describe while, for looping in Unix.(L2)

Text Book:

1. Unix Concepts and Applications by Sumitabha Das, Mc Graw Hill , 4th Edition, 2014.

Reference Book:

1. UNIX Concepts and Programming by Murugan Sethuraman, Denet and Company, 2006.

Course Outcomes:

Upon completion of the course, the student is able to

- Learn the concepts, design, structure, features of the UNIX operating system.(L5)
- Learn the basic UNIX Utilities.(L5)
- Learn the shell script commands.(L5)
- Learn and write UNIX shell script programming.(L5)

BCA – III SEMESTER

SCS 205: PRINCIPLES OF SOFTWARE ENGINEERING

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble:

Software engineering is the process of analyzing user needs followed by designing, constructing, and testing end user applications.It is done through the use of software programming languages. It is an application of engineering principles to software development.

Course Objectives:

- To enable the student to understand the Software Engineering process models.
- To know about Agile development and Requirements of engineering.
- To Understand about Architectural design, Implementation and testing strategies.

UNIT - I

Introduction to software Engineering: Professional software development, Software Engineering Ethics, Case studies.

Software processes: Software process models, Process activities, Coping with change, The rational unified process. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Describe the basic concepts of Software engineering.
- Outline the software process activities and its case studies.

UNIT - II

Agile software development: Agile methods, Plan-driven and agile development, Contents, Extreme programming, Agile project management, scaling agile methods.

Requirements Engineering: Functional and non-functional requirements, The software Requirements Document, Requirements specification, Requirements engineering processes, Requirements elicitation & analysis, Requirements validation, Requirements management. (12)

Learning Outcomes: By the end of this unit, the student will be able to

- List the different agile methods where requirements and solutions evolve through collaboration between self-organizing cross-functional teams.(L1)
- List the difference between functional and non-functional requirements.(L1)
- Describe the process of software engineering requirements.(L2)

UNIT - III

System modeling: Context models, Interaction models, Structural models, Behavioral models, Model-driven engineering. (8)

Learning Outcomes: By the end of this unit, the student will be able to

- Briefly explain the different system models.(L2)
- Describe the Model driven engineering.(L2)

UNIT - IV

Architectural design: Architectural design decisions, Architectural views, Architectural patterns, Application architectures. (8)

Learning Outcomes: By the end of this unit, the student will be able to

- Describe the Architectural design process with labeled diagram.(L2)
- List the application architectures and its views.(L1)

UNIT - V

Design and Implementation: Object-oriented design using the UML, Design patterns, Implementation issues, Open source development.

Software Testing: Software testing, Development testing**,** Test driven development, Reuse testing, User testing. (8)

Learning Outcomes: By the end of this unit, the student will be able to

- Describe the Design implementation using UML.(L2)
- List the different design patterns and its implementations issues.(L1)
- List the different types of Software testing.(L1)

Text Book:

1. Software Engineering by Ian Somerville, Pearson publishers, 9th edition, 2013.

Reference Books:

1. Software Engineering: A Practitioner's Approach by Roger S Pressman, Tata McGraw Hill, 6th edition, 2005.
2. Fundamentals of Software Engineering by Rajib Mall, PHI Learning Pvt. Ltd., 3rd edition, 2009.

Course Outcomes:

Upon completion of the course, the student is able to

- Adapt the Software Engineering process models.(L6)
- Discuss Agile development and Requirements of engineering.(L6)
- Discuss Architectural design, Implementation and testing strategies.(L6)

Prepared By: Ms.K.Yasudha Verified By: Dr.M.Srivenkatesh

BCA – III SEMESTER

SCS 207: INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKS

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble:

Data communications and networking may be the fastest growing technologies in our culture today. This course is to provide students with an overview of the basic concepts of Data Communication and fundamentals of computer networks. The course gives knowledge on data communication concepts and techniques in layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols.

Course Objectives:

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Allow the student to gain expertise in some specific areas of networking

UNIT - I

Data Communications, Networks, Network Models- OSI Model, TCP/IP Protocol Suite.

Digital Transmission - Transmission Modes**, Multiplexing, Transmission Media.** (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Understand the concepts of data communications and networking. (L1)
- Discuss Data communications components, data representation, and data flow. (L1)
- Discuss network topologies, categories of networks, and the general idea behind the Internet. (L1)
- Have an overview of the organizations that set standards in data communications and networking. (L1)
- Illustrate the OSI layers, functions and its protocols. (L1)
- Differentiate between OSI model and TCP/IP model. (L1)
- Differentiate parallel and serial transmission. (L1)
- Describe the goals of multiplexing. (L1)
- Brief understanding of the three main multiplexing techniques. (L1)
- Basic understanding of the transmission media-guided and unguided media. (L1)

UNIT - II

Switching-Datagram Networks: Routing Table, Efficiency, Delay, Datagram Networks in the Internet.

Wired LANs: Ethernet, IEEE standards. (8)

Learning outcomes:

By the end of the course, the student will be able to:

- Define Switch. (L1)
- Describe the need for switch. (L1)
- List the three traditional switching methods. What are the most common today. (L1)
- Describe packet –switched network. (L1)
- List four major components of a packet switch and their functions. (L1)
- Briefly discuss the IEEE standard project 802. (L1)
- Explain the categories of standard Ethernet. (L1)

UNIT – III

Error Detection and Correction: types of errors, redundancy, detection versus correction, forward error correction versus re-transmission, CRC, Cheksum.

Flow and Error control, Noisy Channels –stop-and-wait repeat request, go-back-n automatic repeat request, selective repeat automatic repeat request, piggy backing. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Define Error and different types of errors. (L1)
- Discuss the concept of redundancy in error detection and correction. (L1)
- Distinguish between forward error correction versus error correction by retransmission. (L1)
- Explain Cyclic Redundancy Check. (L1)
- Discuss Checksum - error detection method. (L1)
- Compare and contrast flow control and error control. (L1)
- List the three protocols of noisy channels . (L1)
- Compare and contrast the Go-Back-NARQ Protocol with Selective-RepeatARQ. (L1)

UNIT – IV

Network Layer:**IPv4 address**-address space, notations, classful addressing, network address translation(NAT),**IPv6 address**-structure, address space **Address Mapping**-mapping logical to physical address -ARP, mapping physical to logical address- RARP,BOOTP and DHCP. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Define logical address and physical address. (L1)
- What is IP address and the number of bits in an IPv4 address and IPv6 address. (L1)
- What is dotted decimal notation in IPv4 addressing. (L1)
- What are the differences between classful addressing and classless addressing in IPv4.
- List the classes in classful addressing and define the application of each class (unicastmulticast, broadcast, or reserve). (L1)
- Change the following IP addresses from dotted-decimal notation to binary notation and vice versa. (L1)
- Briefly discuss the protocols ARP, RARP, BOOTP, DHCP, and IGMP. (L1)
- What is NAT and How can NAT help in address depletion. (L1)

UNIT - V

Transport layer: connectionless versus connection-oriented services, reliable versus unreliable, three protocols, User Datagram Protocol(UDP)-well-known ports for UDP, user datagram, checksum, UDP operation, use of UDP,TCP-TCP services, TCP features, segment.

Application Layer: Domain Name System. Name Space, Distribution of Name Space, DNS in the Internet, Resolution. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Understand Process to process delivery. (L1)
- Differentiate connectionless versus connection-oriented services and reliable versus unreliable. (L1)
- Compare the TCP header and the UDP header. (L1)
- What is DNS? (L1)
- Advantage of a hierarchical name space over a flat name space for a system the size of the Internet. (L1)
- What are the three domains of the domain name space. (L1)

- How does recursive resolution differ from iterative resolution? (L1)

Text Book:

1. Data Communication and Networking by Behrouz A Forouzan, Tata McGraw Hill, 4th edition, 5th reprint, 2007.

Reference Books:

1. Data and Computer Communications by William Stallings, Pearson Publications, 9th edition, 2011.
2. Data Communication and Computer Networks by Ajit Pal, PHI Learning 1st edition, 2013.

Course Outcomes:

Upon completion of the course, the student is able to

- Explain computer networks and the Internet. (L2)
- Able to differentiate among and discuss the four levels of addresses (physical, logical, port, and specific used by the Internet TCP/IP protocols.(L3)
- compare and contrast the data transmission modes: serial and parallel as well as synchronous, asynchronous, and isochronous with relevant examples.(L5)
- Identity types of bit errors and explain the concept of bit redundancy.(L3)
- List internetworking principles and how Internet protocols IP, IPv4 and IPv6 operate. (L1)
- List the concept of reliable and unreliable transfer protocol of data and how TCP and UDP.(L1)
- List Application Layer Services.(L1)

BCA – III SEMESTER
SFC 201: ENVIRONMENTAL SCIENCE

Hours per week: 3 Examination: 100 Marks
Credits: 2

Preamble:

The dynamic changes in the Environment require as precise understanding to adjust to the changes. This paper provides a base line understanding of Environmental changes problems.

Course Objectives:

To enable student understand importance of environmental science
To introduce student to ecosystem and its process, sources and effects of Environmental Pollution.
To sensitize student regarding day to day social & environmental issues.

UNIT -I

The multidisciplinary nature of environmental studies: Definition, Scope and Importance, Need for Public awareness.

Natural Resources: Classification, Renewable and Non Renewable Resources.

Renewable Resources: Forest, Water and Energy Resources.

Non Renewable Resources: Mineral, Food and Land resources, (Uses, reasons for over-utilization and effects) (10)

Learning Outcome: By the end of the unit the student

- Discuss importance of Environmental Science & Natural Resources.(L6)

UNIT -II

Eco-system: Structure of an Ecosystem, Producers, consumers and de-composers, Structure of Terrestrial Ecosystems (Forest Ecosystem, Grassland Ecosystem, and Desert Ecosystem) and Aquatic Ecosystems (Pond Ecosystem and Ocean Ecosystem).

Function of an ecosystem: Food chains, food web and ecological pyramids, Energy flow in the ecosystem. (10)

Learning Outcome: By the end of the unit the student

- Define appreciate ecosystems and its process.(L1)

UNIT -III

Environmental Pollution: Causes, effects and control measures of Air, Water, Soil pollution, Thermal pollution and Nuclear hazards and Municipal solid waste management.

Environmental problems: Global Environmental Problems, Green house effect, Ozone layer depletion, acid rains and Climate change.

National Environmental Problems: Deforestation, Causes and Effects, Environmental Problems associated with dams, mining and environmental effects. (10)

Learning Outcome: By the end of the unit the student

- Discuss knowledge as sources and effects of Environmental Pollution .(L6)

UNIT -IV

Social Issues and the Environment: Environmental ethics, Issues and possible solutions. Waste land reclamation, Consumerism and waste products.

Environmental Legislation: Environment Protection Act, Air Act, Water Act, Wildlife Protection act and The Biological Diversity Act. Disaster definition, Classification, Disaster Management: Explosion, Earth quake, Hazardous materials spill/release. (10)

Learning Outcome: By the end of the unit the student.

- Will get exposure towards social problems and gain understand on environmental legislation.

UNIT -V

Human Population and the Environment: Population growth, variation among nations, Population explosion, Family welfare program. Environment and human health, human rights, value

education, HIV/AIDS, Women and Child welfare, Role of information technology in environment and human health. (10)

Learning Outcome: By the end of the unit the student

- Will be to explain patterns of population growth and problems associated with it.

Text Books:

1. Text Book of Environmental studies for Undergraduate courses by Erach Bharucha, Orient Black Swan. 2nd edition.
2. Environmental Science: A Global Concern by William P. Cunningham and Baraba Woodworth Saigo, McGraw-Hill, 8th edition.
3. A text book of Environmental Science by P. C. Joshi and Namita Joshi, A.P.H. Publishing Corporation.
4. A text book of Environmental Science by Arvind Kumar, A.P.H. Publishing Corporation
5. Environmental Science by S C Santra, Published by New Central Book Agency (NCBA); (5th Reprint).
6. Ecology & Environment by P. D. Sharma, Rastogi Publications.

Course Outcomes:

Upon completion of the course, the student is able to

- List the importance of Environmental Science & Natural Resources.(L1)
- Discuss appreciate ecosystems and its process.(L6)
- Discuss knowledge as sources and effects of Environmental Pollution.(L6)
- Discuss towards social problems and gain understand on environmental legislation.(L6)
- Explain patterns of population growth and problems associated with it.(L5)

BCA – III SEMESTER

SCS 221: DATA STRUCTURES USING C++ LAB

Hours per week: 4 Examination: 100 Marks

Credits: 2

Objective: To develop skills to design and analyze simple linear and non linear data structures and identify the appropriate data structure for the given problem and to write and execute programs in C++.

1. Implementation of Array Operations.
2. Implementation of Sparse Matrix Addition, Multiplications.
3. Array implementation of stack.
4. Array implementation of Queue.
5. Implementation of circular queue ADT using an array.
6. Implementation of conversion of expressions.
7. Implementation of Postfix Expression Evaluation.
8. Implementation of Singly Linked List operations, insertion, deletion, display, reverse.
9. Implementation of Linked Stack Operations.
10. Implementation of Linked Queue Operations.
11. Implementation of Binary Search Tree Creation, Traversals.
12. Implementation of Graph Traversals.
13. Implementation of Linear Search, Binary Search.
14. Implementing the following sorting methods.
    a. Bubble sort
    b. Insertion sort
    c. Selection Sort
    d. Quick Sort

References Books:

1. Data Structures with C++ by John R. Hubbard, TMH, 1st edition, 2004.
2. Data Structures using C& C++ by Rajesh K Shukla,Wiley Publications, 2009.
3. Data Structures using C++ by Varsha H Patil, Oxford University Press, New edition, 2012.

Course Outcomes:

Upon completion of the course, the student is able to

- Able to develop and implementation of Array operations.(L3)
- Examine the working of Spares Matrix Addition, Multiplications ,conversion expression(L4).
- Able to develop and implement Stack, queue, circular queue,(L3)
- Understand various linked list operations.(L2)
- List the concepts of Binary Search Tree Traversals, Graph Traversals, Linear Search, Binary Search able develop applications. (L4)
- Understand sorting methods Bubble sort , Insertion sort, Selection sort, Quick sort. (L2)

Prepared By: Mr.B.Srinivasa Rao Verified By: Dr.M.Srivenkatesh

BCA – III SEMESTER
SCS 223: UNIX PROGRAMMING LAB

Hours per week: 4 Examination: 100 Marks
Credits: 2

Objective: To give an overview of the UNIX Operating System, its Architecture, Directory Structure and Command Usage.

1. Practice the commands encountered in the syllabus.
2. Write a shell script to compare two strings.
3. Write a shell script to find the length of the strings.
4. The marks obtained by a student in 5 different subjects are input through the keyboard. The student gets a rank as per the following rules: Percentage above or equal to 60, First Rank Percentage above 50 and 59, Second Rank, Percentage above 40 and 49, Third Rank, Percentage less than 40, Fail. P
5. Write a shell script to display file permissions along with their names.
6. Write a shell script to prints date, no of users and personal status.
7. Write a shell script which accepts a number and displays the list of even numbers from given numbers.
8. Write a shell script that prints out date information in this order: TIME, DAY OF WEEK, DAY NUMBER, MONTH, YEAR Like 20:10:42 Mon 29 Jun 2015.
9. Write a shell script to display the following details in a pay slip.
   Payslip Details: 1. House Rent Allowance, 2. Dearness Allowance, 3. Provident Fund
10. Write a shell script to reverse the digit.
11. Write a program to check whether a given number is even or odd.
12. Program to generate Fibonacci series up to N.

Reference Books:

1. Unix Concepts and Programming by Murugan Sethuraman, Denet and Company, 2006.
2. Unix Concepts by Sumitaba Das, TMH Publications, 4th edition, 2006.

Course Outcomes:

Upon completion of the course, the student is able to

- Able to develop and understand unix commands.(L3)
- Understand various Unix commands. (L2)
- Able to develop and implement shell script programs.(L3)
- Construct applications using control structure and shell commands.(L6)

Prepared By: Mr.B.Srinivasa Rao Verified By: Dr.M.Srivenkatesh

B.C.A. - IV SEMESTER
SCS 202: INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble:

A database management system (DBMS) is system software for creating and managing databases. It provides users and programmers with a systematic way to create, retrieve, update and manage data.

Course Objectives:

- To study in detail about the Fundamentals of Database Management Systems, Various applications of DBMS**.**
- To understand the Entity-Relationship modeling, SQL, Data Normalization and Database design.
- To know about the Database Architecture and design models.

UNIT - I

Introduction: Database-Systems Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Object based and Semi structured Databases, Data Storage and Querying, Transaction Management, Data Mining and Analysis, Database Architecture, Database Users and Administrators, History of Database Systems. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the purpose of Database system and its applications.(L6)
- List the different Database languages.(L1)
- Outline the Database architecture and also explains about RDBMS.(L2)

UNIT - II

Relational Model: Structure of Relational Databases, Fundamental Relational Algebra Operations, Additional Relational Algebra operations, Extended Relational Algebra operations, Null Values, Modification of the Database. (12)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the structure of Relational Databases (L6)
- List the different operations of relational models and Null values.(L1)

UNIT - III

SQL: Data Definition, Basic Structure of SQL Queries, Set Operations, Aggregate Functions, NullValues, Nested Sub queries, Complex Queries, Views, Modification of the Database, Joined Relations. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- List the different SQL queries.(L1).
- Discuss the different set of operations and its functions.(L6)
- List some complex queries and views.(L1)

UNIT - IV

Database Design and E-R Model: Entity-Relationship Model, Constraints, Entity Relationship Diagrams, Entity-Relationship Design Issues, Weak Entity Sets, Extended E-R Features, Database Design for Banking Enterprise, Reduction to Relational Schemas, UML. (8)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the ER models with labeled diagrams by taking some examples.(L6)
- List the different ER features and its constraints.(L1)
- Outline the Database design.(L2)

UNIT - V

Relational Database Design: Features of Good Relational Design, Atomic Domains and normalization, 1NF, 2NF, 3NF, BCNF, Decomposition using Functional Dependencies, Functional

Dependency Theory, Decomposition Using Functional Dependencies, Decomposition Using Multi-Valued Dependencies, more Normal Form and Database Design Process & Modeling Temporal Data. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- List the different features of RDBMS.(L1)
- Analyze the different types of Normal Forms.(L4)
- Discuss the different functional dependencies using different techniques.(L6)

Text Books:

1. Database System Concepts by Henry F.Korth and S.Sundarshan, MC Graw Hill Higher Education, 5th edition, 2006.

Reference Books:

1. Database Management Systems by RaghuramaKrishnan and James Gerhke, MC Graw Hill Higher Education, 3rd edition.
2. Fundamentals of Database Systems by Elmasri Navathe, Sixth edition, Addison-Wesley, 2011.

Course Outcomes:

Upon completion of the course, the student is able to

- Explain the Fundamentals of Database Management Systems, Various applications of DBMS.(L2)
- Discuss the Entity-Relationship modeling, SQL, Data Normalization and Database design. (L6)
- Discuss the Database Architecture and design models.(L6)

BCA – IV SEMESTER
SCS 204: ELEMENTARY STATISTICS

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble:

Elementary statistics deals with the collection, analysis, interpretation, and presentation of data. Probability and Statistics for Computer Science treats the most common discrete and continuous distributions, showing how they find use in decision and estimation problems, and constructs computer algorithms for generating observations from the various distributions.

Course Objectives:

- To understand the difference between primary and secondary data
- To learn the basic concepts in applications of statistics and graphical presentation of data
- To understand the concept of measures of central tendency
- Ability to implement features of measures of dispersion.
- To understand the concept of correlation and regression.
- To understand the difference between discrete and continuous random variables and probability
- To evaluate problems on discrete and continuous probability distributions

UNIT - I

Introduction: Statistical Data and Methods, Applications of Statistics, Primary and Secondary data, Methods of collecting primary data, Tabulation of data, Diagrammatic and Graphic presentation of data. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- List the difference between primary and secondary data .(L1)
- Discuss the basic concepts of statistics.(L6)
- Choose appropriate data to represent graphically.(L6)
- Explain diagrammatic and graphic presentation of data for grouped and ungrouped data.(L5)

UNIT – II

Measures of Central Value & Dispersion: Arithmetic mean, Median, Mode, Range, Quartile deviation, Mean deviation, Standard deviation. (8)

Learning Outcomes:

By the end of this Unit, the student will be able to

- List the difference between arithmetic mean, median and mode .(L1)
- Discuss the basic concepts of measures of central tendency .(L6)
- Discuss the basic concepts of measures of dispersion(L6)
- Evaluate Mean deviation, standard deviation , and variance for ungrouped data .(L5)
- Evaluate Mean deviation, standard deviation , and variance for grouped data .(L5)

UNIT – III

Correlation and Regression : Types of correlation, Methods of studying Correlation, Karl pearson's coefficient of Correlation, Properties of the coefficient of correlation, Rank correlation coefficient, Uses of regression analysis, Difference between correlation and regression analysis, Regression lines, Regression equations. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Apply coefficient of correlation to ungrouped data.(L3)
- Explain the properties of the coefficient of correlation .(L5)
- Apply rank correlation coefficient to ungrouped data.(L3)
- Outline the different types of correlations.(L2)

- Explain regression analysis for the given data. (L5)

UNIT – IV

Probability : Definition of probability, Addition theorem on probability, Multiplication theorem on probability, Baye's theorem, Mathematical expectation. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Define probability with suitable examples .(L1)
- Explain the additional theorem on probability .(L5)
- Explain multiplication theorem on probability .(L5)
- Evaluate the problems on Baye's theorem.(L5)
- Evaluate the problems on Mathematical expectation .(L5)

UNIT – V

Probability Distributions : Random variable and probability distribution, Binomial distribution, fitting a Binomial distribution, Poisson distribution, Fitting a Poisson distribution, Normal distribution, Area under the normal curve. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Compare discrete random variable and continuous random variable .(L5)
- Construct probability distribution function .(L6)
- Compare Binomial and poisson distributions .(L5)
- Evaluate to fit a poission distribution .(L5)
- Explain normal distribution with examples .(L5)

Text Book :

1. Statistical Methods by S.P. Gupta, Sultan Chand & sons publication, 44th edition, 2017.

Reference Book :

1. Probability and Statistics for Engineers by G.S.S. Bhishma Rao, Sci-tech publishers,4th edition, 2010.

Course Outcomes:

Upon completion of the course, the student is able to

- Able to differentiate between primary and secondary data.
- Present the data in pictorial format.
- Learn different measures of central tendency.
- Able to apply of measures of dispersion, correlation and regression.
- Able to differentiate between discrete and continuous random variables.

BCA – IV SEMESTER

SCS 206: INTRODUCTION TO JAVA PROGRAMMING

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble:

Java is a popular general-purpose programming language and computing platform which fast, reliable, and secure. This course helps in developing classes, objects and also different packages in Java. It also helpful in creating a programmer's API for Java semantic web applications.

Course Objectives:

- To cover preliminaries and make the students learn how to program in basic concepts.
- To understand packages, Interfaces, threads. Exception Handling, String Handling, Applets in Java allows the students to implement effectively.

UNIT – I

The Primaries and Control Statements: Introduction to Java, Features of Java, Object Oriented Concepts, Lexical Issues, Data Types, Variables, Arrays, Operators, Control Statements. (8)

Learning Outcomes: By the end of this unit, the student will be able to

- List the java buzz words.(L4)
- Discuss the different types of data types and operators.(L6)
- Outline of the control statements.(L2)

UNIT – II

Classes and Objects: Classes, Objects, Constructors, Overloading methods, Overloading Constructors, Using Objects as Parameters, Understanding static, Introducing Inner Classes, Inheritance, Overriding methods, Dynamic Method Dispatch, Abstract class. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the constructors and destructors.(L6)
- Elaborate different types overloading methods and its parameters.(L6)
- Explain the concept of compile time polymorphism and Abstract class.(L2)

UNIT – III

Packages, Interfaces and Exception Handling: Packages, Access Protection, Importing Packages, Interfaces, Exception Handling, Throw and Throws finally. (8)

Learning Outcomes: By the end of this unit, the student will be able to

- Outline of packages and Interfaces.(L2)
- Discuss the import of packages.(L6)
- List the exception handling events.(L1)

UNIT – IV

Multithreaded Programming: The Java Thread Model , Main Thread, Creating Thread, Extending Thread, Creating Multiple Threads , Using is Alive() and join(), Thread Priorities. (9)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the Multithread concepts.(L6)
- List the creating and extending thread views.(L1)
- Explain the concepts of Thread methods like isAlive() and Join() .(L2)

UNIT – V

Applets: Applet Basics, Applet Architecture, Applet Skeleton, Simple Applet display methods, Requesting Repainting, Simple Banner Applet, HTML Applet Tag.

Event Handling: Two Event Handling Mechanisms, Event Classes, Event Listener Interfaces, Adapter Classes. (9)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the concept of Applet Architecture.(L6)
- List the different Applet methods.(L1)

- Discuss the Event handling mechanism.(L6)

Text Book:

1.The Complete Reference Java2 by Herbert Schildt, TMH, 5th edition, 2009.

Reference Books:

1. The Java Programming Language by K. Arnold and J. Gosling, Pearson Education, 3rd edition, 2005.
2. Java in a Nutshell: A Desktop Quick Reference for Java Programming by David Flanagan, Rammers, O'Reilly and Associates Inc. 1999.
3. Thinking in Java by Bruce Eckel, Prentice Hall, 2nd edition, 2002.

Course Outcomes:

Upon completion of the course, the student is able to

- To demonstrate data types and control statements (L2)
- To develop class and objects and constructors (L6)
- To explain packages and threading concepts (L2)
- To explain about applets and event handling (L2)

BCA – IV SEMESTER

SCS 208: MEAN STACK DEVELOPMENT

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble

MEAN is a combination of user-friendly JavaScript frameworks that are ideal for building dynamic applications and websites. which are some of the most exiting and innovative technologies emerging in the world of Web Development as set of tools It is an open source stack and free, designed to offer developers an organized and quick method of making quick prototypes Mean - based web apps. The main benefit of mean-stack is that one language -JavaScript, is used/runs at every level of the app, making it a modern and efficient approach to web development.

Course Objectives:

- Learn and understand the fundamental basics what is MEAN stack.
- Learn MongoDB-a schema-less (document-oriented) NoSQL database.
- KnowExpress.js: a server-side JavaScript framework running on top of Node.js.
- What is Angular: a browser-independent MVC JavaScript UI framework.
- Write Node.js: a server-side JavaScript run-time.

UNIT-I

Introducing the Node.js-to-Angular Stack: Understanding the Basic Web Development Framework, Understanding the Node.js-to-Angular Stack Components.

JavaScript Primer: Defining Variables, Understanding JavaScript Data Types, Using Operators, Implementing Looping, Creating Functions, Understanding Variable Scope, Using JavaScript Objects, Manipulating Strings, Working with Arrays, Adding Error Handling. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Understand the Basic Web Development Framework.(L2)
- Identify the Node.js-to-Angular Stack Components.(L1)
- List Javascript Data types and Demonstrate the use of operators in JavaScript.(L1)
- Illustrate the implementation of LOOPs.(L3)
- Brief understanding of working with Arrays, Strings, Functions, Error handling.(L2)

UNIT-II

Learning Node.js: Getting Started with Node.js, Understanding Node.js, Installing Node.js, Working with Node Packages, Creating a Node.js Application,

Using Events, Listeners, Timers, and Callbacks in Nodes.js: Understanding the Node.js Event Model, Adding Work to the Event Queue, Implementing Callbacks. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- What is Node.js and who uses .(L2)
- List the steps to Install Node.js.(L1)
- What are the Node Packaged modules.(L2)
- Create a simple Node.Js application.(L3)
- Understand the Node.js Event Model.(L3)
- How to implement Event Emitters and Listeners.(L3)

UNIT-III

Handling Data I/O in Node.js: Working with JSON, Using the Buffer Module to Buffer Data, Using the Stream Module to Stream Data, Compressing and Decompressing Data with Zlib

Understanding HTTP Services in Node.js: Processing URLs, Processing Query Strings and Form Parameters, Understanding Request, Response, and Server Objects. Implement HTTP Clients and Servers in Node.Js

Understanding Socket Services in Node.js: Understanding Network Sockets, Implementing TCP Socket Server and Socket Objects. Implementing TCP socket Servers and Clients. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Learn to work with JSON.(L2)
- Demonstrate the use of Buffer module to Buffer Data.(L2)
- Implement HTTP services in Node.js.(L3)
- Understand Network Sockets.(L2)
- Implement TCP socket servers and Socket Objects.(L3)

UNIT-IV

Understanding NoSQL and MongoDB: Why NoSQL? , Understanding MongoDB, MongoDB Data Types, Planning Your Data Model. **Getting Started with MongoDB:** Building the MongoDB Environment, Administering User Accounts, Configuring Access Control, Administering Databases, Managing Collections. **Getting Started with MongoDB and Node.js:** Adding MongoDB Driver to Node.js ,Connecting to MongoDB from Node.js, Understanding the Objects Used in the MongoDB Node.js Driver, Accessing and Manipulating Databases, Accessing and Manipulating Collections. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Understand why NoSQL.(L1)
- Explain MongoDB-collections and documents.(L3)
- List the data types used.(L1)
- Learn steps to Install MongoDB and build the environment.(L2)
- Connect to MongoDB from Node.js.(L3)
- Familiarize accessing and manipulating databases .(L3)

UNIT-V

Using Express: Implementing Express in Node.js.

Learning Angular: Jumping into TypeScript, Getting Started with Angular, Angular Components, Expressions, Data Binding, Built-in Directives. (8)

Learning outcomes:

By the end of the course, the student will be able to:

- Get started with Express.(L2)
- Brief understanding of implementing Express in Node.js.(L2)
- Learn what is Angular.(L1)
- Identity the benefits Angular provides.(L2)
- What are the Angular components, expressions.(L2)
- Understand Data Binding.(L2)

Text Book:

1. Node.js, MongoDB and Angular Web Development, Brad Dayley, Brendan Dayley, Caleb Dayley, Pearson Education Inc., 2nd Edition, 2018.

Reference Books:

1. Write Modern Web Apps with the MEAN Stack: Mongo, Express, AngularJS, and Node.js , Jeff Dickey, Peachpit Press, 2015.
2. Web Development with Node & Express By Ethan Brown, O'reily Media, 2014.

Course Outcomes:

Upon completion of the course, the student is able to

- Develop MongoDB-a schema-less (document-oriented) NoSQL database.(L6)
- Discuss Implement Express.js: a server-side JavaScript framework running on top of Node.js.(L6)
- Explain about the Angular: a browser-independent MVC JavaScript UI framework.(L2)
- Explain Node.js: a server-side JavaScript run-time .(L2)

Prepared By: Ms.B.SatyaSaiVani Verified By: Dr.M.Srivenkatesh

BCA – IV SEMESTER
GENERIC ELECTIVE – I
SCS 242: INTRODUCTION TO CRYPTOGRAPHY

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble: Due to rapid growth of digital communication and electronic data exchange information security has become a crucial issue in industry, business and administration. Modern cryptograph provides nessential techniques for securing information and protecting data.

Course Objectives:

- To enable the students to understand the importance of information security.
- To make them to understand attacks, cryptography, steganography.
- To know about the ciphers.
- To describe data encryption standards.

UNIT - I

Introduction: Security goals, Confidentiality, Integrity, Availability, Attacks, Attacks threatening Confidentiality, Attacks Threatening Integrity, Attacks Threatening Availability, Passive versus Active Attacks, Services and Mechanism, Security Services, Security Mechanisms, Relation Between Services and Mechanisms, Techniques, Cryptography, Steganography. (10)

Learning Outcomes:

By the end of the unit the student will be able to

- Explain different security goals. (L2)
- Differentiate between Passive and Active Attacks.(L3)
- Identify relationship between Services and Mechanisms. (L3)

UNIT - II

Traditional Symmetric Key Ciphers: Introduction, Kerckhoff's Principle, Cryptanalysis, Categories of Traditional ciphers, Substitution Ciphers, Mono alphabetic ciphers, Poly alphabetic Ciphers, Transposition Ciphers, Keyless Transposition Ciphers, Keyed Transposition Ciphers, Combining two approaches. (13)

Learning Outcomes:

By the end of the unit the student will be able to

- Understand Kerckhoff's Principle. (L3)
- Know about categories of Traditional ciphers. (L2)
- Know Keyless Transposition Ciphers, Keyed Transposition Ciphers. (L2)

UNIT - III

Stream and Block Ciphers: Stream ciphers, Block Ciphers, Combination, Introduction to Modern Symmetric Key cipher, Modern Block Ciphers-Substitution or Transposition, Block Ciphers as Permutation Groups, Components of Modern Block Cipher, S-Boxes. (10)

Learning Outcomes:

By the end of the unit the student will be able to

- Develop substitution and transposition ciphers. (L3)
- Describe concepts of symmetric key ciphers. (L2)
- Explain concepts of modern block ciphers. (L2)
- Extend the concept of modern stream ciphers. (L2)

UNIT - IV

Product Ciphers: Introduction, two Classes of Product Ciphers, Feistel Ciphers, Non-Feistel Ciphers, Attacks on Blocks Ciphers, Modern Stream Ciphers. (8)

Learning Outcomes:

By the end of the unit the student will be able to

- Describe Feistel Ciphers, Non-Feistel Ciphers. (L3)
- Demonstrate Attacks on Blocks Ciphers. (L4)
- Explain Modern Stream Ciphers. (L3)

UNIT - V

Data Encryption Standard (DES): Introduction, DES Structure, Multiple DES.

Asymmetric-Key Cryptography: Introduction, RSA Cryptosystem. (10)

Learning Outcomes:

By the end of the unit the student will be able to

Outline the structure of DES. (L2)

Illustrate the analysis of DES. (L3)

Explain the concept of Asymmetric-Key Cryptography. (L2)

Text Book:

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

Reference Books:

1. Cryptography and Network Security by William Stallings, Pearson Education, 2011.
2. Cryptography and Network Security by Atul Kahate, Tata McGraw-Hill Publishing Company Limited, 2003.

Course Outcomes:

Upon completion of the course the student will be able to

- Understand the importance of computer security. (L2)
- Identify the differences between different types of ciphers. (L4)
- List the concepts of block ciphers and stream ciphers. (L4)
- Able to outline structure of DES. (L3)
- List the concepts of asymmetric key cryptography. (L4)

Prepared By: Dr.M.Srivenkatesh Verified By: Dr.M.Srivenkatesh

BCA – IV SEMESTER
GENERIC ELECTIVE – I
SCS 244: FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble:

Intelligent machines has replaced human capabilities in many areas. Artificial intelligence is the intelligence exhibited by machines or software. It is the branch of computer science that emphasizes on creating intelligent machines that work and react like humans. Artificial Intelligence spans a wide variety of topics in computer science research, including machine learning, deep learning, reinforcement learning, natural language processing, reasoning, perception etc.

Course Objectives:

- The basic fundamental concepts of Artificial Intelligence and the participants will get to learn in the future about Machine learning, Deep Learning, explore the Platforms for AI, implement methods to solve problems using Artificial Intelligence and Natural Language Processing, etc.
- To make the students to understand about the building blocks of AI such as Search, Knowledge representation, inference, logic, and learning and the concepts of Natural Language Processing.

UNIT-I

Introduction: Introduction to Artificial Intelligence, Historical Backdrop, What is Intelligence, The bottom line.

State Space Search: Generate the test, Simple search, Depth First Search (DFS), Breadth First Search (BFS), Comparison of BFS and DFS, Quality of solution, Depth Bounded DFS(DBDFS), Depth First Iterative Deepening(DFID). (12)

Learning Outcomes:

At the end of the unit, the student will be able to:

- list the contributions and application of AI.
- Characterize the goals of AI, approaches to and progress toward those goals.
- Describe logic programming and basic constructs used in AI programming.
- Explain the problem solving by Searching State Space (L4)
- Describe DFS & BFS algorithm.
- Compare BFS and DFS.
- Discuss the quality measure as the length of solution.

UNIT – II

Heuristic Search: Heuristic Functions, Best First Search, Hill Climbing, Local Maxima, SolutionSpace Search, Variable Neighbourhood Descent, Beam Search, Tabu Search, Peak to Peak Methods. (10)

Learning Outcomes:

At the end of the unit, the student will be able to:

- What is the idea of using heuristic function.(L1)
- Illustrate the idea of heuristic functions with a problem.(L3)
- Explain heuristic functions and heuristic search.(L3)
- Describe greedy search methods. (L3)
- Explain Hill Climbing algorithm.(L2)
- Compare constructive search problems and perturbation search.(L2)
- Define Neighborhood functions.(L1)

UNIT – III

Finding Optimal Paths: Brute Force, Branch and Bound, Refinement Search, Dijkstra's Algorithm, Algorithm A*, Admissibility of A*, Iterative Depending A* (IDA*), Recursive Best First Search (RBFS), Pruning the CLOSED list, Pruning the OPEN list, Divide and Conquer Beam Stack Search. (12)

Learning Outcomes:

At the end of the unit, the student will be able to:

- List the methods for optimization to find good solutions in a least cost.(L1)
- Discuss optimization techniques.(L3)
- Explain the refinement search method.(L2)
- Explain the well known shortest path algorithm.(L3)

UNIT – IV

Concepts & Language: The Conceptual Domain: The Ontologies base, Reification, RDF and Semantic Web, Properties, Event Calculus, Conceptual Dependency Theory, Conceptual Analysis. (10)

Learning Outcomes:

At the end of the unit, the student will be able to:

- What is the concept of AI.(L1)
- Explain the concept of Ontology. (L3)
- Discuss the ontology infrastructure for the semantic web. .(L2)
- Understand the conceptual dependency in AI. (L2)

UNIT – V

Natural Language Processing: Classic problems in NLP and schools of thought, Basic NLP Techniques, Applications, Natural Language Generation. (8)

Learning Outcomes:

At the end of the unit, the student will be able to:

- What is NLP.(L1)
- Explain the classic problems in NLP.(L2)
- Illustrate the applications on NLP.(L2)
- What the basic NLP techniques.(L3)

Text Book:

1. A first course in Artificial Intelligence by Deepak Khemani, TMH, 2013.

Reference books:

1. Artificial Intelligence by Elaine Rich, Kevin Knight, Shivashankar B Nair TMH, 3rd edition.
2. Artificial Intelligence simplified understanding the basic concepts by Binto George, Gail Carmichael, CST, 2016.

Course Outcomes:

Upon completion of the course, the student is able to

- Discuss the basic fundamental concepts of Artificial Intelligence.(L6)
- What is the future of AI.(L1)
- Explain different AI techniques used.(L5)
- Develop Applications of AI.(L3)

Prepared By: Ms.B.SatyaSaiVani Verified By: Dr.M.Srivenkatesh

BCA – IV SEMESTER

SCS 222: DATABASE MANAGEMENT SYSTEMS LAB

Hours per week: 4 Examination: 100 Marks

Credits: 2

Objectives: To give a formal foundation on the relational model of data and to give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

1. To implement Data Definition language commands using Create, Alter, Drop, Truncate
2. To implement DML, TCL and DRL commands
   (a) Insert (b) Select (c) Update (d) Delete
   (e) Commit (f) Rollback (g) Save point (h) Like'%'
3. To implement Constraints.
   (a) Primary key (b) Foreign Key (c) Check (d) Unique (e) Null
   (f) NotNull (g) Drop Constraints
4. To implement Nested Queries & Join Queries
5. PL/SQL programs to implement
   (a) Addition of Two Numbers (b) IF Condition
   (c) Greatest of three numbers using IF AND ELSEIF
   (d) Summation of odd numbers using for LOOP (e) GCD Numbers
6. Implementation of Implicit and Explicit Cursors
7. Demonstration of triggers

Reference Books:

1. Introduction to Relational Databases and SQL Programming by Christopher Allen, Simon Chatwin, Catherine A. Vreary, Tata McGraw-Hill.
2. Databse Management System a Practical Approach by Rajiv Chopra, S.Chand, Fourth revised edition, 2010.

Course Outcomes:

Upon completion of the course, the student is able to

- To implement Create, insert, select commands on the database. (L2)
- Demonstrate the working of different concepts of DBMS (L3)
- Implement, analyze and evaluate the project developed for an application. (L3)
- Design and implement database scheme for a given problem –domain.(L4)
- Normalize a database (L4)

Prepared By: Ms.K.Yasudha Verified By: Dr.M.Srivenkatesh

BCA – IV SEMESTER
SCS 224: JAVA PROGRAMMING LAB

Hours per week: 4 Examination: 100 Marks
Credits: 2

Objectives: To make the student to understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. and to enable the student to define classes, invoke methods and using class libraries, etc.

1. Implement a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java. util)
2. Write a Java program to illustrate the concept of class with method overloading.
3. Demonstrate a Java program and apply the concept of Single level and Multi level Inheritance.
4. Write a Java program to illustrate the concept of Dynamic Polymorphism.
5. Demonstrate a Java program to execute Interfaces & Abstract Classes.
6. Write a Java program to implement the concept of exception handling.
7. Illustrate the concept of threading using Thread Class and runnable Interface.
8. Demonstrate the concept of multi-threading that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
9. Implement the serialization concept
10. Write a Java program to illustrate the concept of Thread synchronization.

Reference Books:

1. The Complete Reference Java2 by Herbert Schildt, TMH 5th edition, 2009.
2. Java How to program by Paul Deitel, Harvey Deitel, Pearson, 10th edition, 2016.

Course Outcomes:

Upon completion of the course, the student is able to

- An ability to analyze a problem and identify and define the computing requirements appropriate for its solution under given constraints.(L2)
- Describe the Multithreading programming concepts. (L2)
- An ability to perform experiments to analyze and interpret data for different applications of exception handling. (L2)
- Understand OOP concepts and basics of Java programming. (L1)
- Create Java programs using inheritance and polymorphism and Implement error-handling techniques using exception handling and multithreading. (L3)
- To differentiate various collections, build files and establish database connection. To develop GUI using Swing components. (L3)

Prepared By: Ms.K.Yasudha Verified By: Dr.M.Srivenkatesh

BCA – IV SEMESTER

SFC: 222 PROFESSIONAL COMMUNICATION SKILLS Lab

Hours per week: 4 Examination: 100 Marks

Credits: 2

Objectives: To enhance Pronunciation skills , to help them avoid the mother tongue influence in their speech, to help them use paralinguistic features in their language, to develop vocabulary for competitive examinations, to enable the students to acquire LSRW skills, to instill confidence and speak effectively

- Phonetics, vowels, consonants & Diphthongs, Phonetic Transcription
- Stress/ Accent
- Intonation
- Describing objects/situations/people
- Role Play
- Short extemporaneous presentation
- Group Discussion
- Listening and Reporting
- Just a Minute Sessions
- Interview Skills

Reference Books:

1. Developing Communication Skills by Krishna Mohan and Meera Benarji , Macmillan Press.
2. Better English Pronunciation by JDO Connor Cubs , Cambridge University Press.
3. Oxford Grammar with answers by John Eastwood, Oxford University Press.
4. Hand Book if English Grammar and Usage by Mark Leaster and Larry Beason, Tata Mc GrawHill Company.
5. A Text book of English Phonetics for Indian Students by T.BalaSubramanian, Macmillan Press.

Course Outcomes:

Upon completion of the course, the student is able to

- Discuss the structure of speech organs and their function in varying the speech signal, including the voice, and be aware of basic methods of articulation.(L6)
- Demonstrate the most important categories of vowels and consonants, and know the signs, and definitions of the most important vowels, consonants and prosodic phenomena.(L2)
- Develop their Presentation skills through JAM Sessions and Role Play.(L6)
- Demonstrate to speak effectively and try to avoid the influence of their mother tongue. (L2)
- Develop to narrate short stories through Short extemporaneous presentation.(L6)
- Elaborate required skills to face interviews confidently.(L6)
- Improve face to face interaction between two or more individuals with a motive or a purpose.(L6)

Prepared By: Dr.S.Sushma Raj Verified By: Dr.M.Srivenkatesh

BCA – V SEMESTER

SCS 301: OBJECT ORIENTED ANALYSIS AND DESIGN

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals:40 Marks

Preamble :

Object oriented analysis and design is one is a popular technical approach for analyzing and designing an application, system, or business by applying object-oriented programming, as well as using visual modeling throughout the development life cycles to foster better stakeholder communication and product quality. This course also helps in developing is to improve the quality and productivity of system analysis and design by making it more usable. In analysis phase, OO models are used to fill the gap between problem and solution.

Course Objectives:

- To create a requirements model using UML class notations and use-cases based on statements of user requirements, and to analyze requirements models given to them for correctness and quality.
- To construct the OO design of a system from the requirements model in terms of a high-level architecture description, and low-level models of structural organization and dynamic behavior using UML class, object, and sequence diagrams.
- To build the nature of design patterns by understanding a small number of examples from different pattern categories, and to be able to apply these patterns in creating an OO design.
- To analyze OO design heuristics, patterns or published guidance, evaluate a design for applicability, reasonableness, and relation to other design criteria

UNIT - I

System Development: Object Basics, Development Life Cycle, Methodologies, Patterns, Frameworks, Unified Approach, UML. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the basic concepts of objects. (L2)
- Explain the need of Development Life Cycle.(L2)
- Describe the various methodologies. (L2)
- Explain the need of various Patterns, Frame works. (L2)
- Outline the Unified Approach ,UML. (L2)

UNIT - II

Use-Case Models: Object Analysis, Object relations, Attributes, Methods, Class and Object responsibilities, Case Studies. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the objects Analysis. (L2)
- Illustrate the varies object relations ,Attributes. (L3)
- Explain the concept of methods and development of classes.(L2)
- Describe the various object responsibilities. (L2)
- Illustrate with case studies. (L3)

UNIT - III

Design Processes: Design Axioms, Class Design, Object Storage, Object Interoperability, Case Studies. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the design axioms. (L2)
- Demonstrate the design of classes. (L3)

- Explain the concept of object storage. (L2)
- Describe the object interoperability. (L2)
- Illustrate with case studies. (L3)

UNIT - IV

User Interface Design: View layer Classes, Micro-Level Processes, View Layer Interface, Case Studies. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the view layer classes. (L2)
- Explain the micro level process. (L2)
- Demonstrate the view level interface. (L3)
- Illustrate with case studies. (L3)

UNIT – V

Quality Assurance Tests: Testing Strategies, Object orientation on testing, Test Case, Test Plans, Continuous testing, Debugging Principles, System Usability, Measuring User Satisfaction, Case Studies. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe varies testing strategies. (L2)
- Explain the concepts of object oriented testing. (L2)
- Illustrate testing with varies test cases. (L3)
- Build test plans debugging principles. (L2)
- Describe the measurement of user satisfactions. (L2)
- Illustrate with case studies. (L3)

Text Book:

1. Object Oriented Systems Development by Ali Bahrami, McGraw Hill International Edition , 2017.

Reference Book:

1. Object Oriented Analysis and design by Grady Booch, Addison Wesley publications,3rd Edition, 2007.

Course Outcomes:

Upon completion of the course, the student is able to

- To adapt different process models using UML.(L6)
- Able to identify and understand the requirements and develop the analysis models using UML concepts.(L6)
- Develop object design using UML models.(L6)
- Develop user interface design using UML models.(L6)
- Examine the various testing strategies ,debugging principles and case studies.(L4)

BCA – V SEMESTER

SCS 303: INTRODUCTION TO R PROGRAMMING

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals:40 Marks

Preamble :

The course is designed to enable the student to write programs for problem solving. After an introduction to R, R Studio, Exploratory Data Analysis, Using R for Data Visualization and Graphics for Communication are designed to work together to make data science fast, fluent. This course lays for developing program logic & for writing programs in R according to developed logic.

Course Objectives:

- Write functions and use R in an efficient way,
- Use R for computation, graphics, and modeling,
- Use R in their own research,
- Be able to expand their knowledge of R on their own.

UNIT – I

History and Overview of R: What is R? What is S? The S Philosophy, Back to R, Basic Features of R, Free Software, Design of the R System, Limitations of R, R Resources

Getting Started with R: Installation, Getting started with the R interface, R Nuts and Bolts Entering Input, Evaluation, R Objects, Numbers, Attributes, Creating Vectors, Mixing Objects, Explicit Coercion, Matrices, Lists, Factors, Missing Values, Data Frames, Names, Summary. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain the R,S programming concepts and features of R programming. (L2)
- Describe the design R system and its limitations and resources. (L2)
- Explain basic concepts of R programming. (L2)
- Discuss about vectors ,missing objects matrices, Lists.(L6)

UNIT-II

Getting Data In and Out of R: Reading and Writing Data, Reading Data Files with read.table(), Reading in Larger Datasets with read. table, Calculating Memory Requirements for R Objects, Using the readr Package, Using Textual and Binary Formats for Storing Data , Using dput() and dump(), Binary Formats, Interfaces to the Outside World File Connections, Reading Lines of a Text File, Reading From a URL Connection Sub setting R Objects, Sub setting a Vector, Sub setting a Matrix, Sub setting List, Sub setting Nested Elements of a List, Extracting Multiple Elements of a List, Partial Matching, Removing NA Values. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain about reading and writing data and its related packages. (L2)
- Describe textual and binary format for storing data. (L2)
- Explain basic concepts of R programming. (L2)
- Demonstrate about vectors, matrices, Lists.(L2)

UNIT -III

Vectorized Operations, Vectorized Matrix Operations Dates and Times, Dates in R, Times in R , Operations on Dates and Times. Managing Data Frames Data Frames, The dplyr Package, dplyr Grammar ,Installing the dplyr package ,select().filter()arrange, rename, mutate, group_by(), Control Structures If-else, for Loops, Nested for loops ,while Loops, repeat Loops, next, break. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain about reading and writing data and its related packages. (L2)
- Describe vectorized operations, dates, times and related packages. (L2)

- Explain basic concepts of R programming. (L2)
- Demonstrate about vectors, matrices, Lists.(L2)
- Construct R programs using various conditional statements. (L2)
- Develop R programs using loops and nested loops. (L2)

UNIT – IV

Functions: Functions in R, Your First Function, Argument Matching, Lazy Evaluation, The Argument, Arguments Coming after the argument. Scoping Rules of R, A Diversion on Binding Values to Symbol, Scoping, Lexical Scoping: Why Does It Matter, Lexical vs. Dynamic Scoping, Application, Plotting the Likelihood, Summary.

Coding Standards for R ,Loop Functions ,Looping on the Command, lapply, sapply, split Splitting a Data Frame, tapply, apply(), Col/Row Sums and Means, Other Ways to Apply , apply(). (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss the functions and its arguments in R programming (L6)
- Explain lexical scoping (L2)
- Compare lexical scoping with dynamic scoping (L2)
- Demonstrate various coding standards on looping (L2)
- Explain splitting a data frame and related commands (L2)

UNIT - V

Debugging: Figuring Out What's Wrong, Debugging Tools in R Using traceback(). Using debug(), Using recover(), Summary.

Profiling R Code, Using system.time(), Timing Longer Expressions, The R Profiler, Using summary Rprof()Summary, Simulation, Generating Random Numbers, Setting the random number seed, Simulating a Linear Model Random Sampling Summary.

Data Analysis Case Study: Changes in Fine Particle Air Pollution in the U.S Loading and Processing the Raw Data, Results. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain about debugging and related functions (L2)
- Describe time and its expression (L2)
- Describe random numbers and related functions (L2)
- Illustrate data analysis with case study (L2)

Test Book:

1. R programming for Data Science by Roger D.Peng, 2014.

Reference Books:

1. An Introduction to R, by Venables William N, Network Theory Limited.
2. R: Easy R Programming for Beginners by Your Step-By-Step Guide to Learning R Programming (R Programming Series) by Feliz Alvaro, CreateSpace Independent Publishing Platform.

Course Outcomes:

Upon completion of the course, the student is able to

At the end of this course, students will be able to

- List motivation for learning a programming language (L1)
- To transform your datasets into a form convenient for analysis (L3)
- To learn powerful R tools for solving data problems with greater clarity and ease (L2)
- To examine your data, generate hypotheses, and quickly test them (L4)
- To learn R Markdown for integrating prose, code, and results (L5)

Prepared By: Dr.M.Srivenkatesh Verified By: Dr.M.Srivenkatesh

BCA – V SEMESTER

SCS 305: INTRODUCTION TO CLOUD COMPUTING

Hours per week: 4 End Examination: 60 Marks

Credits: 4 Sessionals: 40 Marks

Preamble:

This course will help the students to get familiar with Cloud Computing Fundamental concepts, technologies, architecture and state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations.

Course Objectives:

- To understand basic concepts related to cloud computing technologies and concepts of cloud delivery models IaaS, PaaS and Saas
- To evaluate the underlying principle of Data Center, cloud virtualization, cloud multitenant and service technologies.
- To implement different infrastructure and specialized mechanisms related to cloud storage and usage monitor.
- Fundamentals of cloud computing architectures based on current standards, protocols, and best practices.

UNIT - I

Define: What is a cloud? Hype cycle, Implantation gap, Common Definition Metaphorical Interpretation, Attributes.

Cloud Architecture: Stack Management Layers, Standards and Interoperability, Private Cloud, Community Cloud, Hybrid Cloud, Cloud Maturity. (8)

Learning Outcomes

By the end of this Unit, the student will be able to

- Define cloud and common definitions. (L1)
- Describe cloud architecture and varies types of clouds. (L2)

UNIT - II

Infrastructure as a Service: Infrastructure Stack, Servers, Storage, Network, Integration, Management, Payment and Billing, Iaas Landscape.

Platform as a Service: Web Application Frameworks, Web Hosting Services, Google App Engine, Microsoft Windows Azure, Force.com, Additional Platforms.

Software as a service: Customer Relationship Management, Human Resources, Financial, Collaboration, Backup and Recovery, Industry Solutions. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Explain the cloud as infrastructure as service and its related concepts. (L2)
- Describe the cloud as platform as service and its related concepts. (L2)
- Demonstrate the cloud as software as service and its related concepts. (L2)

UNIT - III

Benefits and Challenges: Benefits, Challenges, Recommendations.

Strategic Impact: What is Strategy? Strategic Analysis, External Analysis, Internal Analysis, Strategic Realignment.

Risk Impact: Notion of Risk, Risk Management, Cloud Impact, Enterprise Wide Risk Management.

Financial Impact: Resource Costs, Return on Investment, Cash Flow, Financial Visibility, Return on Assets. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Discuss various benefits and challenges of cloud. (L6)

- Explain strategic impact and its related concepts of cloud.(L2)
- Discuss risk impact and its related concepts of cloud. (L6)
- Elaborate financial impact and its related concepts of cloud. (L6)

UNIT - IV

Requirements Analysis: Strategic Alignment, Architecture Development Cycle.
Draft Architecture: Business Process Modeling, Architecture Modeling, Preliminary Design.
Application Inventory: Options, Stakeholders, Business criteria, Technical criteria, Cloud Opportunities, Analysis, Net Benefit and Risk, New Opportunities.
Service Components: Service Delivery Model, Potential Providers, Evaluation Criteria and Weight. (12)

Learning Outcomes

By the end of this Unit, the student will be able to

- Discuss requirement analysis and its related concepts.(L6)
- Explain draft architecture and it related concepts.(L2)
- Discuss application inventory and its related concepts. (L6)
- Explain service components and its related concepts.(L2)

UNIT – V

User Profiles: Options, Segmentation Criteria, Profile Classification, Application Map, Identity Management, Compliance.
End-to-end Design: Technical Design, Devices, Connectivity, Physical Infrastructure, Management, Metering and Billing, Hybrid Cloud Design.
Connectivity: Network Connectivity, Content Delivery Networks, Application Connectivity, Information Connectivity. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Discuss user profiles and its related concepts.(L6)
- Explain end to end user design and managing cloud issues. (L2)
- Discuss network connectivity and its related concepts of cloud. (L6)

Text Book:

1. Cloud Computing Explained by John Rhoton, Recursive Press, 2013.

Reference Books:

1. Cloud Computing, Principles, Systems and Applications by Nick Antonopoulos and Lee Gilliam Springer International Edition, 2015.
2. Cloud Computing Principles and Paradigms by Raj Kumar Buyya, James Broberg and Anderzej Goscinscinki, Wiley Publications, 2011

Course Outcomes:

Upon completion of the course, the student is able to

- Define the basic concepts, terminology and the fundamental models.(L-1)
- Demonstrate the set of primary technology components and characteristics
- associated with cloud computing. (L-2)
- Discuss various benefits and challenges and various types of impact on cloud.(L-3)
- Elaborate requirements analysis ,draft architecture ,application inventory and service components of cloud.(L4)
- Define user profile, end to end design and connectivity issues of cloud. (L6)

BCA – V SEMESTER
SCS 307: BUSINESS INTELLIGENCE

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals:40 Marks

Preamble:

Business Intelligence (BI) describes the ability to jointly analyze all of a company's data, distilling relevant information to be used to foster better business decisions. The foundation of any BI solution is the careful preprocessing of existing data, for example, in a data warehouse and data mining .This course also helps in developing decision support system and study of business intelligence applications.

Course Objectives:

- To understand the business intelligence concepts and its architecture
- To learn decision support systems and data warehousing concepts
- To understand mathematical modeling for decision making and data mining concepts
- To learn time serious data and it s related concepts
- To discuss about business intelligence applications and its related concepts

UNIT - I

Introduction to Business intelligence : Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Cycle of a business intelligence analysis, Enabling factors in business intelligence projects, Development of a business intelligence system, Ethics and business intelligence. (8)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe basic concepts of data, Information and knowledge. (L3)
- Discuss business intelligence architecture. (L6)
- Discuss cycle of business intelligence analysis.(L6)
- Explain business intelligence projects & develop a business intelligence systems. (L2)

UNIT - II

Decision support systems: Definition of system, Representation of the decision-making process, Rationality and problem solving, the decision-making process, Types of decisions, Approaches to the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system

Data warehousing: Definition of data warehouse, Data warehouse architecture, ETL tools, Metadata, Cubes and multidimensional analysis, Hierarchies of concepts and OLAP operations, Materialization of cubes of data. (8)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss decision support systems and related concepts (L6)
- Describe types of decisions and it approaches (L3)
- Explain about development of decision systems (l2)
- Outline various data warehousing and its related concepts (L2)

UNIT - III

Mathematical models for decision making: Structure of mathematical models, Development of a model, Classes of models.

Data Mining: Definition of Data Mining, Representation of input data, Data Mining Process, Analysis Methodologies.

Data Preparation: Data Validation, Data Transformation, Data Reduction. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain mathematical models for decision making (L2)
- Discuss data mining concepts(L6)
- Demonstrate about data preprocessing tasks (L2)

UNIT - IV

Time series Data in BI : Definition of time series, Index numbers, Evaluating time series models, Distortion measures, Dispersion measures, Tracking signal, Analysis of the components of time series, Moving average, Decomposition of a time series, Exponential smoothing models, Simple exponential smoothing, Exponential smoothing with trend adjustment, Exponential smoothing with trend and seasonality, Simple adaptive exponential smoothing, Exponential smoothing with damped trend, Initial values for exponential smoothing models, Removal of trend and seasonality, Autoregressive models, Moving average models, Autoregressive moving average models, Autoregressive integrated moving average models, Identification of autoregressive models, Combination of predictive models, the forecasting process, Characteristics of the forecasting process, Selection of a forecasting method. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss time serious and its related concepts(L6)
- Describe exponential smoothing and its related concepts (L3)
- Explain autoregressive models and its related concepts (L2)
- Demonstrate forecasting and its related concepts(L2)

UNIT - V

Business intelligence applications: Marketing models -Relational marketing, Motivations and objectives, An environment for relational marketing analysis, Lifetime value, The effect of latency in predictive models, Acquisition, Retention, Cross-selling and up-selling, Market basket analysis, Web mining, Business case studies, Retention in telecommunications, Acquisition in the automotive industry, Cross-selling in the retail industry. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain business intelligence applications and its related concepts (L2)
- Describe about market and basket analysis (L3)
- Discuss web mining and its related applications (L6)
- Illustrate different case studies (L2)

Text Book:

1. Business Intelligence: Data Mining and Optimization for Decision Making by Carlo Vercellis, Wiley Publisher, 2009.

Reference Books:

1.Decision Support Systems for Business Intelligence by Vicki L. Sauter, Wiley Publisher, 2nd edition, 2010.

2. Business Intelligence by Rajiv Sabherwal, Irma Becerra-Fernandez, Wiley, 2010.

Course Outcomes:

Upon completion of the course, the student is able to

- Build design business intelligence solutions (L6)
- Construct data intensive projects using data mining and data warehousing concepts (L6)
- Designing applications using time serious data and its related concepts (L6)
- Developing applications using market basket analysis (L6)
- Demonstrate varies case studies (L2)

BCA – V SEMESTER
GENERIC ELECTIVE - II
SCS 341: INTRODUCTION TO DATA MINING

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals:40 Marks

Preamble

Data warehousing and data mining is one of the most advanced fields of computer science which involves use of Mathematics, Statistics, Information Technology and information Sciences in discovering new information and knowledge from large databases It is a new emerging interdisciplinary area of research and development which has created interest among scientists of various disciplines like computer science, mathematics, statistics, information technology.

Course Objectives:

- To learn the basic concepts and techniques of data mining,
- To study about Frequent Item sets and Related Algorithms and Classification,
- To learn about Clustering Concepts.

UNIT - I

Introduction: What motivated data mining? why is it important? What is data mining? data mining-on what kind of data? data mining functionalities, what kinds of patterns can be mined? Are all of the patterns interesting? Classification of data mining systems, Data mining task primitives, Integration of a data mining system with a database or data warehouse system. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss about data mining and its importance (L6)
- Demonstrate data mining functionalities (L2)
- List the kind of patterns that can be mined(L1)
- Explain classification of data mining systems (L2)
- Discuss data mining task primitives (L6)
- Explain integration of data mining with other technologies (L2)

UNIT - II

Data pre-processing: Types of data sets and attribute values, basic statistical descriptions of data, data visualization, measuring data similarity, data quality, major tasks in data preprocessing, data reduction, Data transformation and data discretization, data cleaning and data integration. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss data objects and attribute types.(L6)
- Solve the Statistical problems including data similarity and dissimilarity.(L6)
- Interpret the various preprocessing techniques.(L5)

UNIT - III

Mining frequent patterns, associations and correlations: Basic concepts, applications of frequent pattern and associations, frequent pattern and association mining, mining various kinds of association rules, apriori algorithm, FP growth algorithm. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Define the terminology related to Association mining
- Demonstrate the working of Apriori and FP Growth algorithms.(L2)
- Develop Association rules from frequent itemsets.(L6)
- Interpret pattern evaluation methods.(L5)

UNIT - IV

Classification Analysis: Classification: Basic concepts, decision tree induction, Bayes classification methods, rule-based classification, model evaluation and selection, classification by neural networks, techniques to improve classification accuracy (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss the basic concepts of Classification.(L6)
- Discuss various classification techniques.(L6)
- Explain various classification techniques.(L5)
- Identify techniques to improve classification accuracy.(L3)

UNIT - V

Cluster Analysis: Basic concepts and methods, clustering structures, major clustering approaches, partitioning methods, hierarchical methods, density based methods, model-based clustering: the expectation-maximization method. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Define cluster analysis. (L6)
- Explain various types of clustering methods.(L5)
- Evaluate measures of clustering tendency.(L5)

Text Books:

1. Data Mining: Concepts and Techniques by Jiawei Han, Micheline Kamber, JianPei , Morgan Kaufmann publishers, 3rd edition, 2011.

Reference Books:

1. Introduction to Data Mining by Michael Steinbach, Vipin Kumar, Pang-Ning Tan, Addison Wesley, 1/e , 2006.
2. Data Mining: Introductory and Advanced Topics by Margaret H. Dunham, Data, 1/e Pearson Publishers, 2006.

Course Outcomes:

Upon completion of the course, the student is able to

- Discuss and define data warehousing and data mining.(L6)
- Interpret data and apply preprocessing techniques.(L5)
- Explain association rule mining algorithms and evaluate patterns.(L5)
- Explain various classification techniques and find accuracy.(L5)
- Elaborate various clustering methods and evaluate them(L6)

BCA – V SEMESTER
GENERIC ELECTIVE – II
SCS 343: FUNDATIONS OF DATA SCIENCE

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Preamble:

This course covers foundational techniques and tools required for data science. The course focuses on concepts, principles, and techniques applicable to any technology environment and industry and establishes a baseline that can be enhanced by further formal training and additional real-world experience.

Course Objectives:

- To discuss basics of python programming and its related concepts.
- To demonstrate data in various visual representation and learn about mathematical concepts of linear algebra and statistics.
- To learn machine learning concepts and its various algorithms.
- To discuss various regression and decision tree concepts.
- To learn neural networks, clustering, natural language processing.

UNIT-I

A crash course in Python : The basics, Getting Python, The Zen of Python, Whitespace Formatting, Modules, Arithmetic, Functions, Strings, Exceptions, Lists, Tuples, Dictionaries, Sets, Control flow, Sorting, Generators and Iterators, Randomness, Regular Expressions, Object-Oriented Programming, Functional Tools, enumerate. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss the python fundamental concepts. (L6)
- Explain various arithmetic operators, functions, strings, control structures. (L2)
- Describe object oriented programming concepts. (L2)

UNIT-II

Visualizing Data: Matplotlib, Bar charts, Line Charts, Scatter plots.
Linear Algebra: Vectors, Matrices.
Statistics: Describing a single set of data, Central Tendencies, Dispersion, Correlation, Simpson's Paradox, Correlation and Causation. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- To demonstrate data in various visual (L6)
- Explain linear algebra concepts (L2)
- Describe basic fundamental concepts of statistics. (L2)

UNIT-III

Machine Learning: Modeling, What Is Machine Learning, Over fitting and Under fitting , Correctness , The Bias-Variance Trade-off , Feature Extraction and Selection
K-Nearest Neighbors: The Model, The Curse of Dimensionality
Naive Bayes: A Really Dumb Spam Filter, A More Sophisticated Spam Filter, Implementation, Testing Our Model
Simple Linear Regression: The Model , Using Gradient Descent , Maximum Likelihood Estimation. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss various machine learning algorithms (L6)
- Explain Naïve Bayes concepts (L2)

- Describe linear regression and its related concepts (L2)

UNIT-IV

Multiple Regressions: The Model, Further Assumptions of the Least Squares Model, Fitting the Model, Interpreting the Model, Goodness of Fit

Logistic Regression: The Problem, The Logistic Function, Applying the Model, Goodness of Fit, Support Vector Machines

Decision Trees: What Is a Decision Tree? , Entropy, The Entropy of a Partition, Creating a Decision Tree, Putting It All Together, Random Forests. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss the multiple regression and its related concepts (L6)
- Explain logistic regression and its related concepts (L2)
- Describe decision tree and its related concepts (L2)

UNIT-V

Neural Networks: Perceptions , Feed-Forward Neural Networks, Back propagation

Clustering: The Model ,Example: Meetups , Choosing k , Example: Clustering Colors, Bottom-up Hierarchical Clustering.

Natural Language Processing: Word Clouds, n-gram Models, Grammars (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain about Neural Networks and its related Concepts. (L2)
- Describe clustering and various types of clustering. (L2)
- Describe natural language processing. (L2)

Textbook:

1. Data Science from Scratch First Principles with python by Joel Grus, O'Reilly Media, 2015.

Reference Books:

1. Data Analytics Made Access by Anil Maheshwari, 2019.
2. Python for Data Analysis step-by-step tutorial for Beginners by Samuel Burns, Global Tech and Amazon KDP, 2019.

Course Outcomes:

Upon completion of the course, the student is able to

At the end of this course, students will be able to

- List motivation for learning a programming language. (L1)
- To transform data in visualized fashion.(L3)
- To learn linear algebra, various statistical Techniques. (L5)
- To examine Multiple Regressions**,** Logistic Regression, Decision Trees. (L4)
- To learn Neural Networks, Clustering, Natural Language Processing (L5)

Prepared By: Ms.B.SatyaSaiVani Verified By: Dr.M.Srivenkatesh

BCA – V SEMESTER
SCS 321: R PROGRAMMING LAB

Hours per week: 4 Examination: 100 Marks
Credits: 2

Objective: To make the students to learn how to program in *R* and how to use *R* for effective data analysis.

1. What is R? and Data Types
    a. Download, Install, Configure
    b. Learn to use help() function
    c. Understand data types in R (logical,numeric,etc)
    d. Convert data types
2. Getting Data In and Out of R
    a. Create, find, and remove data(vector, matrix, data frame) in R
    b. Read external data into R(.txt, .csv)
    c. Write R data into external files(.txt, .csv)
3. Manipulating on Strings
    a. Understand and manipulate strings(e.g. substr(), scan())
    b. Understand indexing of data in vectors, matrices, and data frames
    c. Graphing techniques to visualize data selection
4. Operators, Vectors ,Matrices, Array, Lists, Data Frames and math functions
    a. Learn about operators(mathematics, logical, miscellaneous)
    b. Learn about basic math functions(e.g. sum())
    c. Use operators and math functions on variables
5. Plotting Data
    a. Dot Plots
    b. Histograms
    c. Box Plots
6. Using Control Structures
    a. Understand if else statement
    b. Use if else statement for data manipulation
    c. Compare if else statement with ifelse() function
    d. Learn about ifelse() function
    e. Use ifelse() function on vectors and matrices
    f. Use graphs to show the results
7. Working with Loops
    a. Understand how loops work in R
    b. Create your own loop for vectors
    c. Create a series of graphs with loop functions
    d. Learn to use break and next statements in loops
    e. Use loops to create and change data in vectors, matrices, and arrays
    f. Use loops to create data as a list
    g. Learn about double loops
    h. Create your own double loops for matrix
    i. Use operators and functions in single and double loops

8. Using control structure, math function in loops
    a. Use ifelse() function in loops
    b. Combine loops and if else statement
    c. Represent your results with graphs
    d. Use math functions in loops
    e. Use math functions in if else statement
    f. Show your results with graphs
9. Understand advanced functions such as apply() and by()
10. Use apply() and by() to calculate descriptive statistics
11. Create graphs for the calculated descriptive statistics

Reference Books:

1. R Cook Book by Paul Teetor, Orielly Publications, 2011.
2. Efficient R Programming : A Practical Guide to Smarter Programming by Colin Gillespie & Robin Lovealce, O'Reilly, 2017

Course Outcomes:

Upon completion of the course, the student is able to

- To discuss data in and out of R ,Strings, operators, vectors list motivation for learning a programming language (L1)
- To transform your datasets into a form convenient for analysis (L3)
- To demonstrate plotting of data with various techniques (L5)
- To examine control structures and working with loops (L4)
- To learn advanced functions and create graphs for statistics(L5)

Prepared By: Ms.B.SatyaSaiVani Verified By: Dr.M.Srivenkatesh

BCA – V SEMESTER
SCS 323: BUSINESS INTELLIGENCE LAB USING TABLEAU

Hours per week: 4 Examination: 100 Marks
Credits: 2

Objective: To make students aware of the basics of the fast growing data visualization tool this is currently being used in the BI Industry.

1. Program to Demonstrate the Data Sources, Custom Data View, Extracting Data.
2. Program to Demonstrate the Fields Operations, Editing Metadata.
3. Program to Demonstrate the Data Joining, Data Blending.
4. Program to Demonstrate the Worksheets.
5. Program to Demonstrate the Add Worksheets, Rename Worksheet, Save & Delete Worksheet, Reorder Worksheet, Paged Workbook.
6. Program to Demonstrate the Calculations.
7. Program to Demonstrate the Operators.
8. Program to Demonstrate the Functions.
9. Program to Demonstrate the Numeric Calculations, String Calculations.
10. Program to Demonstrate the Date Calculations, Table Calculations, LOD Expressions.
11. Program to Demonstrate the Sort & Filters, Basic Sorting, Basic Filters.
12. Program to Demonstrate the Quick Filters, Context Filters, Condition Filters, Top Filters
13. Program to Demonstrate the Charts, Bar Chart, Line Chart, Pie Chart, Crosstab, Scatter Plot.
14. Program to Demonstrate the Bubble Chart, Bullet Graph, Box Plot, Tree Map, Bump Char, Gantt Chart.
15. Program to Demonstrate the Histogram, Motion Charts, Waterfall Charts.

Text Book:

1. Tableau your data: Fast and Easy Visual Analysis with Tableau Software by Murray, Daniel G.: Wiley India, 2014.

Reference Books:

1. Learning Tableau by Milligan, N., PACKT / Shroff Publishers, 2015.
2. Communicating Data with Tableau by Jones, B, PACKT Shroff Publishers, 2014.
3. Power Pivot and Power BI Collie by Rob., Singh, Avichal, Holy Macro Books, 2016.

Course Outcomes:

Upon completion of the course, the student is able to

- To demonstrate various programs which includes data ,field operations, date operations. (L6)
- To discuss worksheets and various operations on worksheets .(L6)
- To demonstrate calculations, operations, Designing applications using time serious data and its related concepts. (L6)
- To demonstrate various filters.(L6)
- To demonstrate various charts.(L6)

Prepared By: Ms.B.SatyaSaiVani Verified By: Dr.M.Srivenkatesh

BCA – VI SEMESTER
SCS 392: PROJECT WORK

Hours per week: 4 End examination: 50 Marks
Credits: 2 Sessionals : 150 Marks