CHOICE BASED CREDIT SYSTEM

B.Sc./B.A. Program with Computer Application

Table CMAG : Distribution of courses in different semesters for Undergraduate course in Computer Application

Semester			Total credit
I	CORE	CMAGCOR01T: Computer Fundamentals CMAGCOR01P: Computer Fundamentals	4 2
	AECC1	ENVS	2
II	CORE	CMAGCOR02T: Database Management Systems CMAGCOR02P: Database Management Systems	4 2
	AECC2	English	2
III	CORE	CMAGCOR03T: Computer Networks and Internet Technologies CMAGCOR03P: Computer Networks and Internet Technologies	4 2
	SEC1	CMSSSEC01M:Programming in Python	2
IV	CORE	CMAGCOR04T: Multimedia Systems and Applications CMAGCOR04P: Multimedia Systems and Applications	4 2
	SEC2	CMSSSEC02M:R Programming	2
V	DSE1 (Any one)	CMAGDSE01T: Programming with Python CMAGDSE02T: Visual Programming	6
VI	DSE2 (Any one)	CMAGDSE03T: Information Security and Cyber Laws CMAGDSE04T: Software Engineering	6
Total number of courses	10		120

Core Papers: Computer Applications (Credit: 06each) (DSC-1/2) (4 Theory + 4 Lab)

Core Paper I :Semester-I:
CMAGCOR01T   Computer Fundamentals

Introduction: Introduction to computer system (computer components, s/w, h/w 2, generations 2), uses(1), types (computer1). **6L**

Data Representation: Number systems(2,10,8,16 ,conversion,compliments,2 logic gates, BOOLEAN ALGEBRAIC LAWS ,SOP, POS,3)and character representation(UNICODE,ASCII CODE1L, BOOLEAN simplification by boolean algebra,k-map introduction 2),binary arithmetic(add, sub 2) **10L**

Human Computer Interface: Types of software(1), operating system as user interface (O.S TYPES 1, memory management 1, process 2), utility programs(1) **6L**

Devices: Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter **10L**

Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks **6L**

Computer Organisation and Architecture: (8085) C.P.U., registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors. **10L**

Overview of Emerging Technologies: Bluetooth (1), cloud computing (1), big data&data mining (3), mobile computing (2) and embedded systems (1). **8L**

Use of Computers in Education and Research: Data analysis, Heterogeneous storage, e-Library, Google Scholar, Domain specific packages such as SPSS, **4L**

Reference Books:
1. A. Goel, Computer Fundamentals, Pearson Education, 2010.
2. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006
3. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007

CMAGCOR01P:
The practical assignment must include connecting parts of a computer and assembling it to an extent, media formatting and installation of some software.
Practical exercises based on Open Office tools using document preparation and spreadsheet handling packages.

Text Editor (In Open source software like open office)

1.   Prepare **a grocery list** having four columns (Serial number, The name ofthe product, quantity and price) for the month of April, 06.

   • Font specifications for Title (Grocery List): 14-point Arial font in bold anditalics.
   • The headings of the columns should be in 12-point and bold.
   • The rest of the document should be in 10-point Times New Roman.

- Leave a gap of 12-points after the title.

2. Create a **telephone directory**.
   - The heading should be 16-point Arial Font in bold
   - The rest of the document should use 10-point font size
   - Other headings should use 10-point Courier New Font.
   - The footer should show the page number as well as the date last updated.

3. Design a **time-table form** for your college.
   - The first line should mention the name of the college in 16-point Arial Font and should be bold.
   - The second line should give the course name/teacher's name and the department in 14-point Arial.
   - Leave a gap of 12-points.
   - The rest of the document should use 10-point Times New Roman font.
   - The footer should contain your specifications as the designer and date of creation.

4. BPB Publications plans to release a new book designed as per your syllabus. Design the **first page of the book** as per the given specifications.
   - The title of the book should appear in bold using 20-point Arial font.
   - The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
   - At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
   - The details of the offices of the publisher (only location) should appear in the footer.

5. Create the following one page documents.

   a. Compose a note inviting friends to a get-together at your house, Including a list of things to bring with them.

   b. Design a certificate in landscape orientation with a border around the document.

   c. Design a Garage Sale sign.

   d. Make a sign outlining your rules for your bedroom at home, using a numbered list.

6. Create the following documents:

   (a) A newsletter with a headline and 2 columns in portrait orientation, including atleast one image surrounded by text.

   (b) Use a newsletter format to promote upcoming projects or events in your classroom or college.

7. Convert following text to a table, using comma as delimiter

   Type the following as shown (do not bold).
   Color, Style, Item
   Blue, A980, Van
   Red, X023, Car
   Green, YL724, Truck
   Name, Age, Sex
   Bob, 23, M
   Linda, 46, F

Tom, 29, M

9. Enter the following data into a table given on the next page.

Salesperson	Dolls	Trucks	Puzzles
Kennedy, Sally	1327	1423	1193
White, Pete	1421	3863	2934
Pillar, James	5214	3247	5467
York, George	2190	1278	1928
Banks, Jennifer	1201	2528	1203
Atwater, Kelly	4098	3079	2067

Add a column Region (values: S, N, N,S,S,S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:

In this exercise, you will add a new row to your table, place the word "Total" at the bottom of the Salesperson column, and sum the Dolls, Trucks, and Puzzles columns.

10.   Wrapping of text around the image.

11.   Create your resume by incorporating most of the options learned till now.

12.   Following features of menu option must be covered

FILE	Complete menu
EDIT	Complete menu
VIEW	Complete menu
INSERT	Complete menu
FORMAT	Complete menu
TABLE	Complete menu
WINDOW	Complete menu
HELP	Complete menu
TOOLS	All options except Online collaboration, Tools on Macro, Templates

Spreadsheet

1.   Enter the Following data in Excel Sheet

REGIONAL SALES PROJECTION

State	Qtr1	Qtr2	Qtr3	QTR4	Qtr Total	Rate	Amount
Delhi	2020	2400	2100	3000		15	
Punjab	1100	1300	1500	1400		20	
U.P.	3000	3200	2600	2800		17	
Harayana	1800	2000	2200	2700		15	
Rajasthan	2100	2000	1800	2200		20	

TOTAL
AVERAGE

(a) Apply Formatting as follow:

    I.Title in TIMES NEWROMAN

    ii.   Font Size - 14

    iii.   Remaining text - ARIAL, Font Size -10

    iv.   State names and Qtr. Heading Bold, Italic with Gray Fill Color.

    v.   Numbers in two decimal places.

    vi.   Qtr. Heading in center Alignment.

    vii.   Apply Border to whole data.

  (b) Calculate State and Qtr. Total

  (c) Calculate Average for each quarter

  (d) Calculate Amount = Rate * Total.

2. Given the following worksheet

	A	B	C	D
1	Roll No.	Name	Marks	Grade
2	1001	Sachin	99	
3	1002	Sehwag	65	
4	1003	Rahul	41	
5	1004	Sourav	89	
6	1005	Har Bhajan	56	

Calculate the grade of these students on the basis of following guidelines:

If Marks	Then Grade
>= 80	A+

>= 60 < 80		A	
>= 50 < 60		B	
< 50		F	

3. Given the following worksheet

	A	B	C	D	E	F	G
1	**Salesman**			**Sales in (Rs.)**			
2	No.	Qtr1	Qtr2	Qtr3	Qtr4	Total	Commission
3	S001	5000	8500	12000	9000		
4	S002	7000	4000	7500	11000		
5	S003	4000	9000	6500	8200		
6	S004	5500	6900	4500	10500		
7	S005	7400	8500	9200	8300		
8	S006	5300	7600	9800	6100		

Calculate the commission earned by the salesmen on the basis of following Candidates:

If Total Sales	Commission
< 20000	0% of sales
> 20000 and < 25000	4% of sales
> 25000 and < 30000	5.5% of sales
> 30000 and < 35000	8% of sales
>= 35000	11% of sales

The total sales is sum of sales of all the four quarters.

4. A company XYZ Ltd. pays a monthly salary to its employees which consists of basic salary, allowances & deductions. The details of allowances and deductions are as follows:

- HRA Dependent on Basic
    30% of Basic if Basic <=1000
    25% of Basic if Basic>1000 & Basic<=3000
    20% of Basic if Basic >3000
- DA Fixed for all employees, 30% of Basic
- Conveyance Allowance Rs. 50/- if Basic is <=1000Rs.
    75/- if Basic >1000 & Basic<=2000
    Rs. 100 if Basic >2000
- Entertainment Allowance NIL if Basic is<=1000
    Rs. 100/- if Basic > 1000

Deductions
- Provident Fund   6% of Basic
- Group Insurance Premium   Rs. 40/- if Basic is <=1500
    Rs. 60/- if Basic > 1500 & Basic<=3000
    Rs. 80/- if Basic >3000

Calculate the following:

Gross Salary   = Basic + HRA + DA + Conveyance + Entertainment

Total deduction   = Provident Fund + Group Insurance Premium =

Net Salary   Gross Salary – Total Deduction

5. Create Payment Table for a fixed Principal amount, variable rate of interests and time in the format below:

No. of Instalments	5%	6%	7%	8%	9%
3	XX	XX	XX	XX	XX
4	XX	XX	XX	XX	XX
5	XX	XX	XX	XX	XX
6	XX	XX	XX	XX	XX

6. Use an array formula to calculate Simple Interest for given principal amounts given the rate of Interest and time

Rate of Interest	8%
Time	5 Years

Principal	Simple Interest
1000	?
18000	?
5200	?

7. The following table gives year wise sale figure of five salesmen in Rs.

Salesman	2000	2001	2002	2003
S1	10000	12000	20000	50000
S2	15000	18000	50000	60000
S3	20000	22000	70000	70000
S4	30000	30000	100000	80000
S5	40000	45000	125000	90000

(a) Calculate total sale year wise.
(b) Calculate the net sale made by each salesman
(c) Calculate the maximum sale made by the salesman
(d) Calculate the commission for each salesman under the condition.
   (i) If total sales >4,00,000 give 5% commission on total sale made by the salesman.
   (ii) Otherwise give 2% commission.
(e) Draw a bar graph representing the sale made by each salesman.
(f) Draw a pie graph representing the sale made by salesman in 2000.

8. Enter the following data in Excel Sheet

PERSONAL BUDGET FOR FIRST QUARTER

Monthly Income (Net): 1,475

EXPENSES	JAN	FEB	MARCH	QUARTER TOTAL	QUARTER AVERAGE
Rent600.00	600.00	600.00			

Telephone	48.25	43.50	60.00
Utilities	67.27	110.00	70.00
Credit Card	200.00	110.00	70.00
Oil	100.00	150.00	90.00
AV to Insurance	150.00		
Cable TV	40.75	40.75	40.75
Monthly Total			

(a) Calculate Quarter total and Quarter average.

(b) Calculate Monthly total.

(c) Surplus = Monthly income - Monthly total.

(d) What would be total surplus if monthly income is 1500.

(e) How much does telephone expense for March differ from quarter average.

(f) Create a 3D column graph for telephone and utilities.

(g) Create a pie chart for monthly expenses.

9. Enter the following data in Excel Sheet

TOTAL REVENUE EARNED FOR SAM'S BOOKSTALL

Publisher name	1997	1998	1999	2000	total
A	Rs. 1,000.00	Rs. 1100.00	Rs. 1,300.00	Rs. 800.00	
B	Rs. 1,500.00	Rs. 700.00	Rs. 1,000.00	Rs. 2,000.00	
C	Rs. 700.00	Rs. 900.00	Rs. 1,500.00	Rs. 600.00	
D	Rs. 1,200.00	Rs. 500.00	Rs. 200.00	Rs. 1,100.00	
E	Rs 800.00	Rs. 1,000.00	Rs. 3,000.00	Rs. 560.00	

(a) Compute the total revenue earned.

(b) Plot the line chart to compare the revenue of all publisher for 4 years.

(b) Chart Title should be 'Total Revenue of sam's Bookstall (1997-2000)'

(c) Give appropriate categories and value axis title.

10. Generate 25 random numbers between 0 & 100 and find their sum, average and count. How many no. are in range 50-60

Core Paper II :Semester – II:
CMAGCOR02T   Database Management System

Database: Introduction to database (4), relational data model (1), DBMS architecture (centralized vs distributed introduction to tier arch 3), data independence(2), DBA, database users, end users,(3) front end tools (1)**14L**

E-R Modeling: Entity types, entity set, attribute and key(5), relationships, relation types(4), E- R diagrams(1), database design using ER diagrams (4)**14L**

Relational Data Model: Relational model concepts, relational constraints(4), primary and foreign key(2), normalization: 1NF, 2NF, 3NF(8) **14L**

Structured Query Language: SQL queries(1), create a database table(1), create relationships between database tables(3), modify and manage tables(2), queries(3), forms(2), reports(2), modify(1), filter and view data(3). **18L**

Reference Books :
1. P. Rob, C. Coronel, Database System Concepts by, Cengage Learning India, 2008
2. R. Elmsasri,S. Navathe Fundamentals of Database Systems, Pearson Education, Fifth Edition, 2007
3. MySQL : Reference Manual

CMAGCOR02P:

Practical List

1) Create a database having two tables with the specified fields, to computerize a library system of a Delhi University College.

   LibraryBooks (Accession number, Title, Author, Department, Purchase Date, Price)
   IssuedBooks (Accession number, Borrower)
   a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
   b) Delete the record of book titled "Database System Concepts".
   c) Change the Department of the book titled "Discrete Maths" to "CS".
   d) List all books that belong to "CS" department.
   e) List all books that belong to "CS" department and are written by author "Navathe".
   f) List all computer (Department="CS") that have been issued.
   g) List all books which have a price less than 500 or purchased between "01/01/1999" and "01/01/2004".

2) Create a database having three tables to store the details of students of Computer Department in your college.

   Personal information about Student (College roll number, Name of student, Date of birth, Address, Marks(rounded off to whole number) in percentage at 10 + 2, Phone number)
   Paper Details (Paper code, Name of the Paper)
   Student's Academic and Attendance details (College roll number, Paper code, Attendance, Marks in home examination).
   a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
   b) Design a query that will return the records (from the second table) along with the name of student from the first table, related to students who have more than 75% attendance and more than 60% marks in paper 2.
   c) List all students who live in "Delhi" and have marks greater than 60 in paper 1.
   d) Find the total attendance and total marks obtained by each student.
   e) List the name of student who has got the highest marks in paper 2.

3) Create the following tables and answer the queries given below:

   Customer (CustID, email, Name, Phone, ReferrerID) Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo)
   BicycleModel (ModelNo, Manufacturer, Style)
   Service (StartDate, BicycleID, EndDate)

a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
b) List all the customers who have the bicycles manufactured by manufacturer "Honda".
c) List the bicycles purchased by the customers who have been referred by customer "C1".
d) List the manufacturer of red colored bicycles.
e) List the models of the bicycles given for service.

4) Create the following tables, enter at least 5 records in each table and answer the queries given below.
EMPLOYEE (Person_Name, Street, City) WORKS
(Person_Name, Company_Name, Salary)
COMPANY (Company_Name, City)
MANAGES (Person_Name, Manager_Name)
a) Identify primary and foreign keys.
b) Alter table employee, add a column "email" of type varchar(20).
c) Find the name of all managers who work for both Samba Bank and NCB Bank.
d) Find the names, street address and cities of residence and salary of all employees who work for "Samba Bank" and earn more than $10,000.
e) Find the names of all employees who live in the same city as the company for which they work.
f) Find the highest salary, lowest salary and average salary paid by each company.
g) Find the sum of salary and number of employees in each company.
h) Find the name of the company that pays highest salary.

5) Create the following tables, enter at least 5 records in each table and answer the queries given below.
Suppliers (SNo, Sname, Status, SCity)
Parts (PNo, Pname, Colour, Weight, City)
Project (JNo, Jname, Jcity)
Shipment (Sno, Pno, Jno, Qunatity)
a) Identify primary and foreign keys.
b) Get supplier numbers for suppliers in Paris with status>20.
c) Get suppliers details for suppliers who supply part P2. Display the supplier list in increasing order of supplier numbers.
d) Get suppliers names for suppliers who do not supply part P2.
e) For each shipment get full shipment details, including total shipment weights.
f) Get all the shipments where the quantity is in the range 300 to 750 inclusive.
g) Get part nos. for parts that either weigh more than 16 pounds or are supplied by suppliers S2, or both.
h) Get the names of cities that store more than five red parts.
i) Get full details of parts supplied by a supplier in Delhi.
j) Get part numbers for part supplied by a supplier in Allahabad to a project in Chennai.
k) Get the total number of project supplied by a supplier (say, S1).
l) Get the total quantity of a part (say, P1) supplied by a supplier (say, S1).

Core Paper III: Semester III:
CMAGCOR03T   Computer Networks and Internet Technologies

Computer Networks: Introduction to computer network, data communication, components of data communication, data transmission mode, data communication measurement, LAN, MAN, WAN, wireless LAN, Internet, Intra-net, extra-net. **6L**

Network Models: Client/ server network and Peer-to-peer network, OSI, TCP/IP, layers and functionalities. **8L**

Transmission Media: Introduction, Guided Media: Twisted pair, Coaxial cable, Optical fiber. Unguided media: Microwave, Radio frequency propagation, Satellite. **4L**

LAN Topologies: Ring, bus, star, mesh and tree topologies. **2L**

Network Devices: NIC, repeaters, hub, bridge, switch, gateway and router. **2L**

Internet Terms: Web page, Home page, website, Internet browsers, URL, Hypertext, ISP, Web server, download and upload, on-line and off-line . **2L**

Internet Applications: www, telnet, ftp, e-mail, social networks (Intro to various attacks), search engines, Video Conferencing, e-Commerce, m-Commerce, VOIP, blogs. **6L**

Introduction to Web Design: Introduction to hypertext markup language (html) (1) Document type definition (1), creating web pages (1), lists, hyperlinks (2), tables (2), web forms, inserting images (2), frames, hosting options and domain name registration (3). Customized Features: Cascading style sheet (css) for text formatting and other manipulations (4). **16L**

JavaScript Fundamentals: Data types and variables (2), functions, methods and events (4), controlling program flow (3), JavaScript object model (2), built-in objects and operators (3). **14L**

Reference Books:
1. Andrew S. Tanenbaum, David J. Wetherall Computer Networks (5th Edition),PHI, 2010
2. B. A. Forouzan, Data Communication and Networking , TMH, 2003.
3. D.R. Brooks, An Introduction to HTML and Javascript for Scientists and Engineers,Springer
4. HTML A Beginner's Guide, Tata McGraw-Hill Education,2009.
5. J. A. Ramalho, Learn Advanced HTML 4.0 with DHTML, BPB Publications,2007

CMAGCOR03P:
Networking exercises in a trial lab, where effects of different connectors, topologies in practical could be demonstrated.

Before moving to JavaScript practicals, students must get an idea about fundamental programing using Scratch (https://scratch.mit.edu). Students should be encouraged to learn Scratch on their own and work on assignments available online such as https://sites.google.com/site/christopherscfahs/scratch-programming/scratch-assignments or http://scratched.gse.harvard.edu/resources/uw-catapult-project .
Alternatively, students may use Alice (http://www.alice.org/index.php) and learn basic programming. A lot of online assignments and spoken tutorials on YouTube would be helpful.

Practical exercises based on concepts listed in theory using HTML.

1. Create HTML document with following formatting – Bold, Italics, Un erline, Colors, Headings, Title , Font and Font Width, Background, Paragraph, Line B akes, Horizontal Line, Blinking text as well as marquee text.

2. Create HTML document with Ordered and Unordered lists, Inserting Images, Internal and External linking

3. Create HTML document with Table:

				Some image here

4. Create Form with Input Type, Select and Text Area in HTML.

5. Create an HTML containing Roll No., student's name and Grades in a tabular form.

6. Create an HTML document (having two frames) which will appear as follows:

About Department 1 Department 2 Department 3	This frame would show thecontents according to the link clicked by the user on the left frame.

7. Create an HTML document containing horizontal frames as

follows: Department Names (could be along with Logos)
Contents according to the Link clicked

8. Create a website of 6 – 7 pages with different effects as mentioned in above problems.

9. Create HTML documents (having multiple frames) in the following three formats:

Frame1
_____
Frame2

Frame1	
Frame2	Frame3

10. Create a form using HTML which has the following types of controls:

I. Text Box

II. Option/radio buttons

III. Check boxes

IV. Reset and Submit buttons

List of Practicals using Javascript :

Create event driven program for following:

1. Print a table of numbers from 5 to 15 and their squares and cubes using alert.
2. Print the largest of three numbers.
3. Find the factorial of a number n.
4. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.
5. A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.
6. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.

Core Paper IV :Semester IV:
CMAGCOR04T   Multimedia Systems and Applications

Multimedia: Introduction to multimedia, components, uses of multimedia, **6L** multimedia applications, virtual reality.

Text: Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, **4L** Hypermedia & Hypertext.

Images: Still Images – bitmaps, vector drawing, 3D drawing & rendering, natural light **6L** & colors, computerized colors, color palettes, image file formats.

Sound: Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats. **6L**

Video: How video works, analog video, digital video, video file formats, video shooting and editing.   **8L**

Animation: Principle of animations, animation techniques, animation file formats.   **10L**

Internet and Multimedia: www and HTML, multimedia on the web – web servers, web browsers, web page makers and site builders.   **6L**

Making Multimedia: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools.   **14L**

References:
1. Tay Vaughan, "Multimedia: Making it work", TMH, Eighth edition.
2. Ralf Steinmetz and Klara Naharstedt, "Multimedia: Computing,Communications Applications", Pearson.
3. Keyes, "Multimedia Handbook", TMH.
4. K. Andleigh and K. Thakkar, "Multimedia System Design", PHI.

CMAGCOR04P:
Practical exercises based on concepts listed in theory using Presentation tools in office automation tool/ GIMP/Blender / Audacity/ Animation Tools/ Image Editors/ Video Editors.

Implement the followings using Blender -
1. Create an animation using the tools panel and the properties panel to draw the following – Line, pe , oval, circle, rectangle , square, pencil , brush , lasso tool
2. Create an animation using text tool to set the font , size , color etc.

3. Create an animation using **Free transform tool** that shoulduse
   followings-Move Objects
   Skew Objects
   Stretch Objects
   Rotate Objects
   Stretch Objects while maintaining proportion
   Rotate Objects after relocating the center dot
4. Create an animation using layers having following
   features-Insert layer, Delete layer, guide layer, Mask layer.
5. Modify the document (changing background color etc.)using the following tools
   Eraser tool
   Hand tool Ink
   bottle tool Zoom
   tool Paint
   Bucket tool
   Eyedropper tool
6. Create an animation for bus car race in which both starts from the same point andcar wins the race.
7. Create an animation in which text Hello gets converted into GoodBye (usingmotion/shape tweening).
8. Create an animation having five images having fade-in fade-out effect.
9. Create an scene to show the sunrise (using multiple layers and motion tweening)
10. Create an animation to show the ripple effect.
11. Create an animation (using Shape tweening and shape hints) for transforming oneshape into another.

12. Create an animation for bouncing ball (you may use motion guide layer).

Project :

Design a minimum 10 page interactive website using Joomla or WordPress.

Semester V and VI : Any two papers from following Discipline Specific Electives – (Credits : 06 each) - DSE – (4 Theory + 4 Lab)

Discipline Specific Elective 1 :
CMAGDSE01T: Programming with Python

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.   **4L**

Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming   **6L**

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Overview of Programming : Structure of a Python Program, Elements of Python   **4L**

Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator)   **6L**

Creating Python Programs : Input and Output Statements, Control **8L** statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass), Defining Functions, default arguments, Errors and Exceptions.

Iteration and Recursion: Conditional execution, Alternative execution, Nested **8L** conditionals, The return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, The while statement, Tables, Two-dimensional tables

Strings and Lists: String as a compound data type, Length, Traversal and the for loop, **8L** String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists

Object Oriented Programming: Introduction to Classes, Objects and Methods, **4L** Standard Libraries.

Data Structures: Arrays, list, set, stacks and queues. **4L**

Searching and Sorting: Linear and Binary Search, Bubble, Selection and Insertion **6L** sorting.

References :

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. How to think like a computer scientist : learning with Python / Allen Downey, Jeffrey Elkner, Chris Meyers. 1st Edition – Freely available online.
1. http://docs.python.org/3/tutorial/index.html
2. http://interactivepython.org/courselib/static/pythonds

Discipline Specific Elective 2:

CMAGDSE02T   Visual Programming

Use any open source alternative such as Tkinter with Python /SharpDevelop/GAMBAS/OPENXAVA with JAVA

GUI Environment: Introduction to graphical user interface (GUI), programming **4L** language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs.

Controls : Introduction to controls textboxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with **8L** multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.

Operations: Data types, constants, named & intrinsic, declaring variables, scope of variables, val function, arithmetic operations, formatting data.

Decision Making : If statement, comparing strings, compound conditions (and, or, **4L** not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

Modular programming: Menus, sub-procedures and sub-functions defining / **8L** creating and modifying a menu, using common dialog box, creating a new sub-procedure, passing variables to procedures, passing argument by value or by reference, writing a function/ procedure.

Forms Handling : Multiple forms creating, adding, removing forms in project, hide, **6L** show method, load, unload statement, me keyword, referring to objects on a different forms

Iteration Handling: Do/loops, for/next loops, using msgbox function, using string function

Arrays and Grouped Data Control: Arrays - 1-dimension arrays, initializing an array using for each, user-defined data types, accessing information with user-defined data types, using list boxes with array, two dimensional arrays. lists, loops and printing list boxes & combo boxes, filling the list using property window / additem method, clear method, list box properties, removing an item from a list, list box/ combo box operations. **6L**

4L

Database Connectivity: Database connectivity of forms with back end tool like mysql, populating the data in text boxes, list boxes etc. searching of data in database using forms. Updating/ editing of data based on a criterion. **10L**

Reference Books:
1. Reference: Programming in Visual Basic 6.0 by Julia Case Bradley, Anita C. Millispangh(Tata Mcgraw Hill Edition 2000 (Fourteenth Reprint 2004))

Discipline Specific Elective 3 :
CMAGDSE03T   Information Security and Cyber Laws

Course Introduction: Computer network as a threat, hardware vulnerability, software vulnerability, importance of data security.	**8L**

Digital Crime: Overview of digital crime, criminology of computer crime.	**4L**

Information Gathering Techniques: Tools of the attacker, information and cyber warfare, scanning and spoofing, password cracking, malicious software, session hijacking.	**8L**

Risk Analysis and Threat: Risk analysis, process, key principles of conventional computer security, security policies, authentication, data protection, access control, internal vs external threat, security assurance, passwords, authentication, and access control, computer forensics and incident response	**10L**

Introduction to Cryptography and Applications : Important terms, Threat, Flaw, Vulnerability, Exploit, Attack, Ciphers, Codes, Substitution Cipher (Caeser), Transposition Cipher (Rail-Fence), Public key cryptography (Definitions only), Private key cryptography (Definition and Example), Cyber forensics, Steganography	**10L**

10L

Safety Tools and Issues : Firewalls, logging and intrusion detection systems, Windows and windows XP / NT security, Unix/Linux security, ethics of hacking and cracking

Cyber laws to be covered as per IT 2008:	**10L**

- Chapter 1: Definitions
- Chapter 2: Digital Signature And Electronic Signature
- [Section 43] Penalty and Compensation for damage to computer, computer system, etc.
- [Section 65] Tampering with Computer Source Documents
- [Section 66 A] Punishment for sending offensive messages through communication service, etc.
- [Section 66 B] Punishments for dishonestly receiving stolen computer resource or communication device
- [Section 66C] Punishment for identity theft
- [Section 66D] Punishment for cheating by personation by using computer resource
- [Section 66E] Punishment for violation of privacy
- [Section 66F] Punishment for cyber terrorism
- [Section 67] Punishment for publishing or transmitting obscene material in electronic form
- [Section 67A] Punishment for publishing or transmitting of material

containing sexually explicit act, etc. in electronic form[Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form
- [Section 72] Breach of confidentiality and privacy

Reference Books:

1. M. Merkow, J. Breithaupt, Information Security Principles and Practices, Pearson Education.
2. G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning, 2010
3. A. Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India, 2008
4. Anderson, Ross. Security engineering. John Wiley & Sons, 2008. (Freely available online)

Discipline Specific Elective 4 :
CMAGDSE04T   Software Engineering

Introduction to Software Engineering: Challenges -Scale-Quality and Productivity- **12L** Consistency and Repeatability-Change, Software Engineering approach-Phased Development Process-Managing the Process

Software Process: Desired characteristics-Predictability-Maintainability-Change supportive-Early Defect Removal, Software Process models: Waterfall model- **12L** Prototyping-Iterative-Timebox, Comparison of the models.

More Software Processes: Project Management Process-Inspection Process- **8L** Configuration.

Management Process: Requirements change management process-Process management process.

Software Requirement Specification (SRS): Need for SRS-Requirement process, Problem Analysis using UML (Unified Modelling Language) and Data dictionary, Characteristics of SRS, Components of an SRS.

Testing: Psychology of testing -Error, Fault and Failure-Black box testing-Boundary value analysis, Testing Process-Levels of Testing.

Reference Books

1. Pankaj Jalote,An Integrated approach to software engineering (third edition), Narosa, 2003
2. Roger S. Pressman ,Software Engineering (Sixth edition) , Tata McGraw Hill,2009

3. Organized Retail Shopping Management Software

5. Online Hotel Reservation Service System

6. Examination and Result computation system

7. Automatic Internal Assessment System

8. Parking Allocation System

9. Wholesale Management System

Skill Enhancement Courses (any two) (Credit: 02 each) – SEC1 to SEC2 Theory: 01, Labs: 02

CMSSSEC001: Programming in Python   **Theory:15 Lectures**

1. Planning the Computer Program: **(2 Lectures)**
Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

2. Techniques of Problem Solving   **(2 Lectures)**
Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

3. Overview of Programming   **(3 Lectures)**
Structure of a Python Program, Elements of Python

4. Introduction to Python   **(4 Lectures)**
 Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators(Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).

5. Creating Python Programs   **(4 Lectures)**

Input and Output Statements, Control statements(Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments.

Recommended Books:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation www.python.or 2015
3. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python, Freely available online.2012
4. http://docs.python.org/3/tutorial/index.html
5. http://interactivepython.org/courselib/static/pythonds
6. http://www.ibiblio.org/g2swap/byteofpython/read/

Software Lab Based on Python:

Section: A (Simple programs)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon users choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :
Grade A: Percentage >=80
Grade B: Percentage>=70 and
<80 Grade C: Percentage>=60
and   <70   Grade   D:
Percentage>=40 and <60 Grade
E: Percentage<40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input paramters from user.
4. WAP to display the first n terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to find sum of the following series for n terms: $1 – 2/2! + 3/3!$--------- n/n!
7. WAP to calculate the sum and product of two compatible matrices.

Section: B (Visual Python):

All the programs should be written using user defined functions, wherever possible.
1. Write a menu-driven program to create mathematical 3D objects I. curve
II. sphere
III. cone IV. arrow
V. ring
VI.   cylinder.
2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.

4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula m=60/ (t+2), where t is the time in hours. Sketch a graph for t vs. m, where t>=0.
6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:
P(t) = (15000(1+t))/(15+ e)
where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.

7. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
I. velocity wrt time (v=u+at)
II. distance wrt time (s=u*t+0.5*a*t*t)

III. distance wrt velocity (s=(v*v-u*u)/2*a)
8. WAP to show a ball bouncing between 2 walls. (Optional)

CMSSSEC002: R-Programming (1+2 Labs)   **Theory:15 Lectures**

(5 Lectures)
Overview and History of R, Getting Help, Data Types, Subsetting,
Vectorized Operations, Reading and Writing Data.

Control Structures, Functions, lapply, tapply, split, mapply, apply, Coding Standards.   **(5 Lectures)**

Scoping Rules, Debugging Tools, Simulation, R Profiler   **(5 Lectures)**

Recommended Books:

1.   William N. Venables and David M. Smith, An Introduction to R. 2nd Edition. Network Theory Limited.2009
2.   Norman Matloff, The Art of R Programming - A Tour of Statistical Software Design, No Starch Press.2011

Software Lab Based on R Programming

1. Write a program that prints ‗Hello World' to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n
3. Write a program that prints a multiplication table for numbers up to 12.
4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list.
6. Write a function that tests whether a string is a palindrome.
7. Implement the following sorting algorithms: Selection sort, Insertion sort, Bubble Sort
8. Implement linear search.
9. Implement binary search.
10. Implement matrices addition, subtraction and Multiplication