MASTER OF COMPUTER APPLICATIONS (MCA)

MCA/ASSIGN/SEMESTER-V

ASSIGNMENTS

(July - 2016 & January - 2017)

MCS-051, MCS-052, MCS-053, MCSL-054,

MCSE-003, MCSE-004, MCSE-011

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UNIVERSITY

**SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
MAIDAN GARHI, NEW DELHI – 110 068**

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Important Notes

1. Submit your assignments to the Coordinator of your Study Centre on or before the due date.

2. Assignment submission before due dates is compulsory to become eligible for appearing in corresponding Term End Examinations. For further details, please refer to MCA Programme Guide.

3. To become eligible for appearing the Term End Practical Examination for the lab courses, it is essential to fulfill the minimum attendance requirements as well as submission of assignments (on or before the due date). For further details, please refer to the MCA Programme Guide.

4. The viva voce is compulsory for the assignments. For any course, if a student submitted the assignment and not attended the viva-voce, then the assignment is treated as not successfully completed and would be marked as ZERO.

Course Code	:	**MCS-051**
Course Title	:	**Advanced Internet Technologies**
Assignment Number	:	**MCA(5)/051/Assignment/16-17**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**15th October, 2016 (For July 2016 Session)**
		15th April, 2017 (For January 2017 Session)

There are eight questions in this assignment of 80 marks. Rest 20 marks are for viva-voce. Answer all the questions. You may use illustrations and diagrams to enhance the explanations. All programmes need to be run and results to be included while submitting the assignments.

1. (a) A business organization has a telephone directory that records details of every employee working in the organization in form of empid, empfirstname, designation, age and email address. Every employee is attached to a particular department which is the main organizing unit of the organization. The telephone directory is typically displayed in department order hierarchy and shows for each department the contact phone, fax number and email address. *(7 Marks)*

Create an XML file containing some directory data. Also give reasons for using XML. In what ways are XML DTD and Schema are similar to or different from each other.

[Note: Show at least two departments and five employees in each department in the XML file.]

(b) What do you mean by XML parsing ? *(3 Marks)*

2. (a) Make a very simple online banking application that collects a customer ID and inputs the first name, last name and bank account balance of the customer with that ID. It should give an error page for an unknown ID. Data is stored in Oracle database. Write the programe using Servlet and JDBC. *(7 Marks)*

(b) Write in brief how do you use JDBC to query and modify a database. *(3 Marks)*

3. (a) Make a course registration form using JSP that collects a first name, last name, contact no. email address, age and course name. *(15 Marks)*

(i) Validate it if the user name, and e-mail address are not blank. Display error message to user, if either of them is blank.

(ii) Validate if the user name already exists and display an error message to the user.

(iii)Create text boxes for first name, last name, contact number, email address, age and course name.

(iv) Use 3 check boxes for multiple selection.

(v) Send the registration information to a Servlet that stores data in Oracle database and displays it. (use HTTP post method)

(b) What is a customer tag in JSP ? Explain. *(3 Marks)*

4. Assume there is a course registration table with the following fields student_id, name, course name, email address. Add at least 10 records. Write and run a Java programe to make queries to the course registration table and modify it using JDBC APIs. *(7 Marks)*

5. What are the advantages of using Java's multiple layer security implementation ? Explain with the help of an example programe. *(8 Marks)*

6. (a) Describe the layer architecture of EJB and explain all its components briefly. *(7 Marks)*

(b) What is the advantage of using Entity bean over directly using JDBC API to do database operations. *(5 Marks)*

7. What do you mean by session tracking ? Also explain in brief different ways to handle session tracking ? *(5 Marks)*

8. Explain four basic mechanisms which a web client can authenticate a user to a web server during HTTP authentication. *(10 Marks)*

Course Code	:	MCS-052
Course Title	:	**Principles of Management and Information Systems**
Assignment Number	:	**MCA(5)/052/Assignment/16-17**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**15th October, 2016 (For July 2016 Session)**
		15th April, 2017 (For January 2017 Session)

This assignment has eight questions. Answer all questions. Each question is of 10 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Answer to each part of the question should be confined to about 300 words. Make suitable assumption is necessary.

1. Explain in brief the basic principles that should be considered while designing an organization structure. What are the shortcomings in vertical organisational structure? Discuss. *(10 Marks)*

2. What is the concept of Enterprise Resource Planning? Discuss some of the basic features of ERP. Also, differentiate between Enterprise Resource Planning (ERP), and Supply Chain Management (SCM). *(10 Marks)*

3. (a) Explain the concept of database? List the advantages of DBMS over file processing system. *(5 Marks)*

    (b) Discuss why management needs information. Is it possible for the management of an organization to make effective decisions without the aid of an information system? *(5 Marks)*

4. (a) Why is it important to correctly identify the objects and their relationships early in the development process? *(5 Marks)*

    (b) What is data modelling? Differentiate between logical and physical models. Give any three reasons why logical models are superior for structuring business requirements. *(5 Marks)*

5. (a) Explain the role of a system analyst as an agent of change. Why are interpersonal and technical skills necessary in system development? *(5 Marks)*

    (b) Discuss the different tools used to automate the Portfolio Management Processes. *(5 Marks)*

6. List the main stages in the development of a system and briefly describe the work carried out by the system analyst at each stage. What is the difference between system analysis and system design? Can one begin to design without analysis? Explain. *(10 Marks)*

7. Discuss the role of intelligent systems in e-business. Also, explain different roles of business intelligence tools in different management levels. *(10 Marks)*

8. What are the drawbacks and challenges of IT (Information Technology) development in business and management? Suggest some solutions to avoid these drawbacks and misuse of information technology. *(10 Marks)*

Course Code   :   **MCS-053**
Course Title   :   **Computer Graphics and Multimedia**
Assignment Number   :   **MCA(5)/053/Assignment/16-17**
Maximum Marks   :   **100**
Weightage   :   **25%**
Last Dates for Submission :   **15th October, 2016 (For July 2016 Session)**
                                        15th April, 2017 (For January 2017 Session)

The assignment has fifteen questions in all and carries 80 marks. Answer all the questions. 20 Marks are for viva-voce. You may use illustrations and diagrams to enhance explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. <u>Not attending the viva leads to non evaluation of assignment.</u>

1. What is Computer Graphics ? Discuss the role of Computer Graphics in image processing, scientific visualization and simulations. *(5 Marks)*

2. Differentiate between, any two of the following *(5 Marks)*

    (i)   Random scan & Raster scan display devices
    (ii)   Drawing & Painting
    (iii)   Graphics & Animation

3. Write DDA Algorithm for lines with positive slopes. Modify it for negative sloped lines. Apply DDA Algorithm to draw line segment from (3, 5) to (9, 9). Verify the existence of staircase effect in the line, generated. *(5 Marks)*

4. Discuss the recursive approach for scan lane polygon filling. *(5 Marks)*

5. Find the transformation matrix for the reflection about line Y = X. *(5 Marks)*

6. Reflect the polygon ABCD with vertices A(-1, 0), B(0, -2), C(1, 0) and D(0, 2); about (i) y = 2 (ii) x = 2 (iii) y = x + 2 *(5 Marks)*

7. Obtain the transformation matrix for perspective projection of an object, projected on to x = 3 plane and viewed from (5, 0, 0). *(5 Marks)*

8. Apply Cyrus Beck Algorithm to clip a line segment, passing through Non-Convex window. Discuss all steps with suitable explanation. *(5 Marks)*

9. Write Bresenham Line generation algorithm. Use it to generate line segment between (15, 5) and (25, 13). *(5 Marks)*

10 Write Bresenham circle generation algorithm. Use it to generate a circle of radius 5 units, in the 1st Quadrent from x = 0 to x = y. *(5 Marks)*

11 Find the equation of the Berier curve, which passes through the points (0, 0) and (-2, 1), and is controlled through the points (7, 5) and (2, 0). *(5 Marks)*

12 Discuss how the depth value (Z) is calculated for the surface position (x, y) in the Z-buffer algorithm. *(5 Marks)*

13 Differentiate the following *(7.5 Marks)*

    (i)   Ray tracing & Ray casting
    (ii)   Gourand & Phong shading
    (iii) Specular & Diffused reflection

14 Discuss the mathematical formulation used to simulate all *(5 Marks)* categories of accelerations i.e., zero & non zero both, in any animation.

15 Write short notes on *(7.5 Marks)*

    (i)   Authoring tools & its types
    (ii)   Multimedia tools & its types
    (iii) Video file formats

Course Code	:	MCSL-054
Course Title	:	Lab (based on MCS-051 & 053)
Assignment Number	:	MCA(5)/L-054/Assignment/16-17
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	31st October, 2016 (For July 2016 Session)
		30th April, 2017 (For January 2017 Session)

This assignment has two parts A and B (Advanced Internet Technologies and Computer Graphics & Multimedia) and each part is for 20 marks. Answer all the questions. Lab record for all the respective sessions (given in the MCSL-054 Lab Manual) for each course carries 20 Marks each. Rest 20 marks are for viva voce. Please go through the guidelines regarding assignments given in the MCA Programme Guide for the format of presentation. If any assumptions made, please state them.

PART-I: MCS-051 (Advanced Internet Technologies)

1.   Develop a web page using servlet to display the details of teachers who are teaching the 5th semester courses of MCA programme.   *(4 Marks)*

2.   Write a JSP program for an NGO, which displays a web page with NGO basic information and containing two web links one for organization details such as objectives, people associated with NGO, current date and time and some activities photographs etc. Other link show the schedules of future activities and details of work plan and peoples association for these activities. On clicking these web links web page open with necessary details. Make necessary assumptions require.   *(7 Marks)*

3.   Create a web page for registration of participants in a J2EE Programming Quiz completion organised by an Institution.   *(5 Marks)*

4.   Create an XML document for Reservation of Tickets of Indianan Railways.   *(4 Marks)*

PART-II: MCS-053 (Computer Graphics and Multimedia)

1.   Write a program in C/C++ using OpenGL to draw a circle of orange colour and inside that draw a triangle of green colour.   *(4 Marks)*

2.   Write a program in C/C++ using OpenGL to show a ball rolling.   *(4 Marks)*

3.   Write a program in C or C++ to implement Bresenham's circle generation algorithm.   *(4 Marks)*

4.   Write a program in C/C++ to implement Following Algorithms: *(8 Marks)*

   1. DDA line drawing algorithm.
   2. Cohen-Sutherland line clipping algorithm.

Course Code	:	MCSE-003
Course Title	:	**Artificial Intelligence and Knowledge Management**
Assignment Number	:	**MCA(5)/E-003/Assignment/16-17**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**31ˢᵗ October, 2016 (For July 2016 Session)**
		30ᵗʰ April, 2017 (For January 2017 Session)

This assignment has eight questions and each carries 10 marks. The rest of the 20 marks are for viva-voce. Answer all the questions. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Make suitable assumption is necessary.

1. How does the use of heuristics reduce the search space? Suggest a heuristic function for travelling salesman problem. *(10 Marks)*

2. Explain the following knowledge representation techniques with suitable example. *(10 Marks)*

    (i) Semantic Net
    (ii) Rule-Based Representation

3. (a) Differentiate between an expert system and a conventional system. *(2.5 Marks)*

    (b) Discuss state space representation for the following: *(7.5 Marks)*

        (i) Traveling Salesman Problem
        (ii) Water-Jug Problem,
        (iii) Human Cannibal River-Crossing Problem.

4. (a) Write a recursive function in LISP named partial-factorial that takes two natural numbers m and n as arguments, and then computes the product of all natural numbers between m and n (including m both m and n). It is not necessary that m is less than n. *(5 Marks)*

    (b) Write a PROLOG programme that answers questions about family members and relationships. Include predicates and rules which define sister, brother, father, mother, grandfather, grandchild and uncle. The programme should be able to answer queries such as the following: *(5 Marks)*
        ? – grandfather (X, mohan)
        ? – grandchild (X, Y)
        ? – uncle (phillips, mary)
        ? – mother (ruksana, X)

5. What are Agents ? Discuss various types of agents with reference to their relevance and significance in expert systems. *(10 Marks)*

6. (a) Give Frame-Based Representation for the following facts: *(5 Marks)*

Ramesh is a 35-year-old Professor of Hindi in Delhi University. The name of his wife, son and daughter are respectively Kavita, Ravi and Sameera.

(b) Give Semantic Net representation (instead of Frame-based representation) of the facts given in part (a) of this question. *(5 Marks)*

7. (a) Compare backward reasoning and forward reasoning strategies in Artificial Intelligence. *(5 Marks)*

(b) Explain each of the following w.r.t. the discipline of Artificial Intelligence : *(5 Marks)*

  (i)   Learning
 (ii) Understanding
(iii) The Turing Test
(iv) Uncertainty
 (v) A.I. problem

8. Write A* algorithm. How is A* algorithm different from AO*? Out of the two which one is better and why? Justify with suitable arguments. *(10 Marks)*

Course Code	:	**MCSE-004**
Course Title	:	**Numerical and Statistical Computing**
Assignment Number	:	**MCA(5)/E-004/Assignment/16-17**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**31st October, 2016 (For July 2016 Session)**
		30th April, 2017 (For January 2017 Session)

This assignment has five questions in all and carries 80 marks. The rest of the 20 marks are for viva-voice. Answer all the questions. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. <u>Not attending the viva leads to non evaluation of assignment.</u>

Note : You are advised to use Non Scientific Calculator, Log tables, Trigonometric tables, along with tables given in your blocks; to solve the questions.

1. (a) If 0.333 is the approximate value of 1/3, then find absolute, relative and percentage errors. *(6 Marks)*

    (b) For x = 0.4845 and y = 0.4800, calculate the value of $(x^2 - y^2)/(x + y)$ using normalized floating point arithmetic compare value with the value of (x − y). *(4 Marks)*

2. (a) Find the real root of equation $f(x) = x^3 - x - 1 = 0$ using Bisection method. *(5 Marks)*

    (b) How many iterations of Bisection method are required to be performed, to obtain smallest positive root of $x^3 - 2x - 5 = 0$, correct upto 2 decimal places. *(3 Marks)*

    (c) Use Newton's method to find root of the equation *(5 Marks)*

$$x^3 - 2x - 5 = 0$$

3. (a) Use Gauss Elimination to solve *(6 Marks)*

$10x_1 - 7x_2 = 7;$
$-3x_1 + 2.099x_2 + 6x_3 = 3.901;$
$5x_1 - x_2 + 5x_3 = 6.$

Correct to six decimal places of significant digit.

    (b) Solve Ax = B, where $A = \begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & -1 \\ 3 & 5 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 1 \\ 6 \\ 4 \end{bmatrix}$ *(6 Marks)*

LU decomposition method.

(c) Solve the following system of equations using *(10 Marks)*

    (i) Jacobi Method   (ii) Gauss – seidel method

$$x + y - z = 0;$$
$$-x + 3y = Z,$$
$$x - 2z = 3,$$

assume the initial solution vector as $[0.8 \quad 0.8 \quad 2.1]^T$

4. (a) For the given discrete data find the interpolating polynomial using *(8 Marks)*

    (i) Lagrange's interpolation

    (ii) Newton Divided difference interfdation

xi	0	1	3
Fi	1	3	55

(b) Evaluate $\int_0^6 \frac{dx}{1+x2}$ by using *(9 Marks)*

    (i) Simpson's 1/3 rule (ii) Simpson's 3/8 rule (iii) Weddle's rule

(c) Solve the difference equation $\frac{dy}{dx} = y - x$ (where y(0) = 2) *(12 Marks)*
find y(0.1) and y(0.3) correct to four decimal places using

    (i) Runge-kutta second order formula

    (ii) Runge-Kutta Fourth order formula

5. Find the two regression lines from the following data *(6 Marks)*

X	1	2	3	4	5	6	7	8	9	10
Y	10	12	16	28	25	36	41	49	40	50

Course Code	:	**MCSE-011**
Course Title	:	**Parallel Computing**
Assignment Number	:	**MCA(5)/E-011/Assignment/16-17**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**31st October, 2016 (For July 2016 Session)**
		30th April, 2017 (For January 2017 Session)

20 marks are for viva voce. All questions given carry equal marks. Answer all the questions. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

1. Explain how instruction set, compiler technology, CPU implementation and Control affect the CPU performance and Justify the effects in terms of Program Length, Clock Rate, and Effective CPI. *(25 Marks)*

2. Compare control-flow and data flow in terms of the Program Flow mechanism used. *(25 Marks)*

3. Explain the applicability and the restrictions involved in using Amdahl's law and Gustafson's Law to estimate the speed up performance of an n-processor system compared with that of a single processor system. Ignore all communication overheads. *(25 Marks)*

4. Explain the structures and operational requirements of the instruction pipelines used in CISC and Scalar RISC. Comment on the cycles per instruction expected from these processor architectures. *(25 Marks)*