

MASTER OF COMPUTER APPLICATIONS

(MCA)

MCA/ASSIGN/V/YEAR/2014

**ASSIGNMENTS
Year, 2014-15**

(5th Semester)

(MCS-051, MCS-052, MCS-053, MCSL-054, MCSE-003, MCSE-004, MCSE-011)



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

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Course Code : **MCS-051**
Course Title : **Advanced Internet Technologies**
Assignment Number : **MCA(5)/051/Assign/2014-15**
Maximum Marks : **100**
Weightage : **25%**
Last Dates for Submission : **15th October, 2014 (For July 2014 Session)**
15th April, 2015 (For January 2015 Session)

There are nine questions in this assignment. Rest 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.

- Q.1.** Implement award list of MCA 1st year as a XML document. The table must have semester No, student's Enrollment No, TEE marks of all the theory subjects, practical subjects and assignments. *(10 marks)*
- Q.2.** Create a student enquiry system using EJB which a student could enquire for taking admission to BCA & MCA programmes of the University. More fields may be added if required. *(10 marks)*
- Q.3.** Create a database of employee working in the university. Write programme using JSP & JDBC to display names of those employees who are pursuing academic programme from different schools of the University. *(10 marks)*
- Q.4.** Write a code in JSP to stop the caching of a page by a browser. *(5 marks)*
- Q.5.** Write code to use a form to authenticate a client using the session information stored in the HTTP session object to the web server. *(10 marks)*
- Q.6.** Write a web based student registration application where the students can register online with their enrollment no. You are required to use JSP, Servlet and JDBC. *(10 marks)*
- Q.7.** Differentiate between structured, semi-structured and unstructured data. *(5 marks)*
- Q.8.** Describe the use of SSL authentication in Java clients with the help of a sample code. *(10 marks)*
- Q.9.** Explain the benefit offered by EJB component architecture to application developers and customers in brief. *(10 marks)*

Course Code : **MCS-052**
Course Title : **Principles of Management and Information Systems**
Assignment Number : **MCA(5)/052/Assign/2014-15**
Maximum Marks : **100**
Weightage : **25%**
Last Dates for Submission : **15th October, 2014 (For July 2014 Session)**
15th April, 2015 (For January 2015 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.

- Q.1.** What are the different components of an ERP? *(10 Marks)*
Outline the main stages in the development of an ERP system ?
- Q.2.** What is the role of OLAP in decision-making? *(10 Marks)*
What does the term drill mean down in an executive information system?
- Q.3.** Explain the advantages of outsourcing computer facilities. *(10 Marks)*
Also, explain its major drawbacks. In Indian context.
- Q.4.** How does e-business fit into different locations within the *(10 Marks)*
production chain? Discuss.
- Q.5.** What is the purpose of Decision Support Systems in MIS? *(10 Marks)*
List the characteristics of Decision Support Systems.
- Q.6.** Discuss the security threats to information systems? *(10 Marks)*
How does encryption ensure data security?
- Q.7.** What is total cost of ownership (TCO)? *(10 Marks)*
What are the different cost factors for computation of the TCO of any system? Explain.

Q.8. Explain the different advantages of Knowledge Management in Organisations. Also, explain different the role of business intelligence tools in different management levels *(10 Marks)*

Course Code	:	MCS-053
Course Title	:	Computer Graphics and Multimedia
Assignment Number	:	MCA (5)/053/Assign /2014-15
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	15th October, 2014 (For July 2014 Session) 15th April, 2015 (For January 2015 Session)

There are four questions in this assignment. 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.

- Q.1.** Write a program in C/C++ to generate line segment between two points, by using DDA line generation Algorithm. Your program should map each and every step of pseudo algorithm, in the form of comments. What are the advantages and disadvantages of using DDA algorithm for line generation? List the steps of the algorithm. Use this algorithm to draw a line with endpoints (2, 3) and (9, 8). *(10 marks)*
- Q.2.** Write the Bresenham Circle Generation Algorithm and use it to draw a circle with radius $r = 10$, determine positions along the circle octants in 1st Quadrant from $x = 0$ to $x = y$. *(10 marks)*
- Q.3.** What is line clipping? Compare Cohen Sutherland Line Clipping Algorithm with the Cyrus Beck line clipping algorithm. Explain the Cyrus Beck line clipping algorithm with the help of an example. How Cyrus Back line clipping algorithm, clips a line segment, if the window is non-convex? *(10 marks)*
- Q.4.** Explain the Homogeneous Coordinate System with the help of an example. Assume that a triangle ABC has the coordinates A(0, 0), B(5,8), C(4,2). Find the transformed coordinates when the triangle ABC is subjected to the clockwise rotation of 45° about the origin and then translation in the direction of vector (1, 0). You should represent the transformation using Homogeneous Coordinate System. *(10 marks)*
- Q.5.** What are Bezier Curves? Briefly discuss their properties, with the help of the proof for each of the property. How Bezier surfaces contributes to the world of computer games and simulations? Given $p_0(1, 1)$; $p_1(2, 3)$; $p_2(4, 3)$; $p_3(3, 1)$ as vertices of Bezier Curve. Determine 3 points on Bezier Curve. *(10 marks)*

Q.6. Why do you need to use visible-surface detection in Computer Graphics? Explain Scan Line method along with the algorithm for the visible-surface detection with the help of an example. How scan line method is different to z-buffer method? *(10 marks)*

Q.7. Explain the following terms in the context of computer Graphics using suitable diagram and /or mathematical equations or one example. *(10 marks)*

- i)* Depth Buffer Method
- ii)* Area Subdivision Method
- iii)* Basic Ray Tracing Algorithm
- iv)* Projections and its Types

Q.8. Compare and contrast the following: *(10 marks)*

- i)* Interlaced and progressive scan
- ii)* Compression and decompression in digital video
- iii)* Hypermedia and hypertext
- iv)* Types of Bitmap and Vector graphics
- v)* Ray tracing and Ray casting

Course Code	:	MCSL-054
Course Title	:	Laboratory Course (Advanced Internet Technologies & Computer Graphics and Multimedia)
Assignment Number	:	MCA (5)/L054/Assign /2014-15
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	31st October, 2014 (For July 2014 Session) 30th April, 2015 (For January 2015 Session)

This assignment has **two parts A (Advanced Internet Technologies) and B (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. Write proper comments while programming. Please go through the guidelines regarding assignments given in the MCA Programme Guide for the format of presentation. Make assumptions if any while solving the problems and state them clearly.

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

- Q.1.** Write a Program using Servlet and JDBC for developing online application for students attendance management for MCA –V semester students of a computer science department. Make necessary assumptions and create appropriate databases. *(7 Marks)*
- Q.2.** Write a JSP Program, to manage saving account of a bank with basic feature including opening new account, cash deposit & withdrawal, providing account details and closing of accounts. *(8 Marks)*
- Q.3.** Write an XML document to represent the medicines in a medical store. This document should include generic medicines, restricted medicines and life saving drugs. *(5 Marks)*

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

- Q.1.** a) Write a program in C/C++ using OpenGL to perform a 3-Dimensional transformation, such as translation, rotation and reflection, on a given triangle. (5 Marks)
- b) Write a program in C/C++ using OpenGL to implement the Cohen Sutherland line clipping algorithm. (5 Marks)
- Q.2.** Write a program in C/C++ using OpenGL to draw a polygon having 4 vertices A (4, 2) B (8, 2), C (4, 12), D (8, 12), it is reflected about the line $y = 2$. Using homogeneous coordinate system this program should find the coordinates of the reflected vertices. (5 Marks)
- Q.3.** Write a program in C/C++ using OpenGL to draw Bezier curves, make necessary assumption and take required input from console. (5 Marks)

Course Code	:	MCSE-003
Course Title	:	Artificial Intelligence and Knowledge Management
Assignment Number	:	MCA(5)/E003/Assign/2014-15
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	31st October, 2014 (For July 2014 Session) 30th April, 2015 (For January 2015 Session)

This assignment has Ten questions and carries 80 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.

- Q.1.** a) Explain with suitable examples, significance of each of the following in solving problems: *(4 Marks)*
- i) Contextual information
 - ii) Simultaneous availability of information

- b) Discuss relations between ‘organisation’, ‘information’ and ‘intelligence’. *(4 Marks)*

- Q.2.** a) For each of the following formulae, construct a truth-table, and then determine whether it is valid, consistent or inconsistent: *(4 Marks)*

- i) $(\sim C \rightarrow \sim D) \rightarrow (D \rightarrow C)$
- ii) $((\sim C \sqcap D) \rightarrow B) \rightarrow (\sim C \rightarrow B)$

- b) Determine whether the following equivalence between the formulae on two sides of ‘=’ holds or not *(4 Marks)*

$(A \rightarrow B) \rightarrow C = (A \rightarrow B) \rightarrow (A \rightarrow C)$?, by reducing each of the formulae on the two sides of ‘=’ to one of the normal forms (DNF or CNF).

- Q.3.** Translate first statements, given in the following argument into Propositional Logic, and then show that the conclusion logically follows from the premisses (given statements): *(8 Marks)*

Premises: Either taxes are increased, or if expenditures rise, then the debt ceiling is raised. If taxes are increased, then the cost of collecting taxes increases. If a rise in expenditures implies that the government borrows more money, then if the debt ceiling is raised, then interest rates increase. If taxes are not increased and the cost of collecting taxes does not increase, then if the debt ceiling is raised, then the

government borrows more money. The cost of collecting taxes does not increase. Either interest rates do not increase or the government does not borrow more money.

Conclusion: Either the debt ceiling is not raised or expenditures do not rise.

You may use the symbols:

(T: Taxes are increased. E: Expenditures rise. D: The debt ceiling is raised. C: The cost of collecting taxes increases. G: The government borrows more money. I: Interest rates increase).

Q.4. Transform the following formula first in Prenex Normal Form and then into Skolem Standard Form (8 Marks)

$(\forall x) ([(\forall y) (\exists z) (\sim P(x, y) \wedge Q(x, z))] \rightarrow (\exists u) R(x, y, u))$

Q.5. Translate the following three statements in First Order Predicate Logic, (8 Marks)

and then deduce (iii) from (i) and (ii):

(You should not use resolution method)

i) Lord Krishna is loved by everyone who loves someone.

ii) No one loves nobody

iii) Lord Krishna is loved by everyone.

Q.6. a) Write a recursive function in LISP named **power** that takes two numeric arguments, n and m , that computes n^{th} power of m (i.e., m^n). (4 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, grand-child and uncle. The programme should be able to answer queries such as the following: (4 Marks)

? – father (X, mohit)

? – grandson (X, Y)

? – uncle (abdul, ruksana)

? – mother (mary, X)

Q.7. a) Give Semantic Net representation of the facts given below : (4 Marks)

“Ramesh is a 52 year old Professor of Mathematics in Delhi University. The name of his wife, son and daughter are respectively Seema, Yash and Kavita”.

- b) Create a frame network for terrestrial motor vehicles (cars, trucks, motorcycles) and give one complete frame in detail for cars which includes the slots for the main component parts, their attributes, and relations between parts. Include an as-needed slot for the gas of each type mileage. (4 Marks)
- Q.8.** a) For the following fuzzy sets: (2 Marks)
 $X = \{x/7, y/3, z/0, u/1, v/4\}$ and
 $Y = \{x/3, y/8, z/6, u/9, v/0\}$
 Find (i) $X \cup Y$ (ii) $X \cap Y$ (iii) $(X' \cap Y)'$
- b) Write a note on Non-monotonic reasoning systems. (3 Marks)
- c) Discuss briefly various methods/ mechanism for handling incompleteness of a knowledge-base (KB). (3 Marks)
- Q.9.** Translate the following argument into FOPL and then using Deductive Rules of Inference (given in Unit 2 of Block 2) prove/ refute the following argument. (8 Marks)
- No man who is a candidate will be defeated if he is a good campaigner. Any man who runs for office is a candidate. Any candidate who is not defeated will be elected. Every man who is elected is a good campaigner. Therefore, any man who runs for office will be elected if and only if he is a good campaigner.
- You may use the notation*
 (Mx, Cx, Dx, Gx, Rx, Ex)
- Q.10.** a) Describe briefly each of the components of an expert system shell. (4 Marks)
- b) What is an agent? Discuss briefly different (*at least four*) types of agents. (4 Marks)

Course Code	:	MCSE-004
Course Title	:	Numerical and Statistical Computing
Assignment Number	:	MCA(5)/E004/Assign/2014-15
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	31st October, 2014 (For July 2014 Session) 30th April, 2015 (For January 2015 Session)

This assignment has seven questions in all and carries 80 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.

- Q.1.** a) Explain each of the following concepts, along with at least one suitable example for each: (5 Marks)
- i) round-off error
 - ii) chopping error
 - iii) truncation error
 - iv) floating-point representation
 - v) Significant digits in a decimal representation.
- b) Find out to how many decimal places the value $\frac{22}{7}$ is accurate as an approximation of 3.14159265, where the latter is value of π , calculated up to 8 places after decimal ? (2 Marks)
- c) Explain with suitable examples that in computer arithmetic's *i.e.*, numbers represented in computer, with +, -, \times , / as implemented in a computer (3 Marks)
- i) $(a + (b + c)) = ((a + b) + c)$, *i.e.*, associativity of +, may *not* be true for some computer numbers a , b and c
 - ii) $(a \times (b + c)) = ((a \times b) + (a \times c))$, distributivity of \times over +, may *not* be true for some computer numbers a , b and c
- Q.2.** a) Calculate a bound for the truncation error in approximating (3 Marks)
- $f(x) = \sin x$ by
 $\sin(x) = 1 - x^3 / (\text{fact } 3) + x^5 / (\text{fact } 5) - x^7 / (\text{fact } 7),$
 where $-1 < x < 1$ and (fact n) denotes factorial of n

- b) Solve the system of equations (4 Marks)

$$5x_1 + 2x_2 + x_3 = 12$$

$$4x_1 + 3x_2 + 4x_3 = 22$$

$$2x_1 + x_2 + 3x_3 = 13$$

using

i) Gauss elimination method ii) Gauss elimination method with partial pivoting.

- c) Perform four iterations (rounded to four decimal places) using Jacobi Method and Gauss-Seidel method, for solving the following system of equations. (3 Marks)

$$\begin{bmatrix} -8 & 1 & 1 \\ 1 & -5 & -1 \\ 1 & 1 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1 \\ 16 \\ 7 \end{bmatrix}$$

With $\mathbf{x}^{(0)} = (0, 0, 0)^T$. The exact solution is $(-1, -4, -3)^T$.

Which method gives better approximation to the exact solution?

- Q.3.** a) Consider the equation $2x - \log_{10} x = 7$ lies in the open interval $(3.78, 3.79)$. Apply bisection method to find an approximate root of the equation correct to three decimal places. (2 1/2 x 4 = 10 Marks)

- b) It is known that the equation $x^3 + 7x^2 + 9 = 0$ has a root between -8 and -7 . Use the regula-falsi method to obtain the root rounded off to 3 decimal places. Stop the iteration when $|x_{i+1} - x_i| < 10^{-4}$.

- c) Determine an approximate root of the equation

$$\cos x - x e^x = 0, \text{ using}$$

i) secant method starting with the two initial approximations as $x_0 = 1$ and $x_1 = 1$ and

ii) regula-falsi method.

- d) Find an approximate root of the equation

$$x^2 - 2x - 8 = 0$$

using fixed point iteration (successive substitution) method, starting with $x_0 = 5$. Stop the iteration whenever

$$|x_{i+1} - x_i| < 0.001.$$

Q.4. a) By decennial census, the population of a town was given below. (6 Marks)

Year (x) : 1971 1981 1991 2001 2011
Population (y): 46 66 81 93 101 (in thousands)

- i) Using Newton's forward formula, estimate the population for the year 1975.
- ii) Using Newton's backward formula, estimate the population for the year 2005.

b) If values of the function $g: x \rightarrow y$ are given as $g(1) = -3$, $g(3) = 9$, $g(4) = 30$, $g(6) = 132$, find the Lagrange's interpolation polynomial of $g(x)$. Also, find $g(5)$ (4 Marks)

Q.5. Compute the value of the integral (10 Marks)

$$\int_{0.5}^{2.5} (2e^x + 3x) dx$$

by

- i) Trapezoidal Rule
- ii) Simpson's 1/3 Rule
- iii) Simpson's 3/8 Rule

Q.6. a) Solve the Initial Value Problem, using Euler's Method (4 Marks)

$$y' = 1 + y^2, y(0) = 1.$$

Find $y(0.8)$ taking $h = 0.2$ and $h = 0.1$

b) Solve the following Initial Value Problem using (6 marks)

i) R-K method of $O(h^2)$

ii) R-K method of $O(h^4)$

$y' = 1 - 2ty$, $y(0.2) = 0.1948$. Find $y(0.4)$ taking $h = 0.2$, where $y' = \frac{dy}{dt}$

Q.7. a) If a bank receives 10 bad cheques per day. What is the probability that the bank receives 12 bad cheques on a particular day? (4 marks)

b) Study the case below and answer the respective questions. (6 marks)

Ticket of a game costs Rs. 750/- per person, the game comprises of an experiment where 3 coins are to be tossed once and for each tail the organizer claims to pay Rs. 250/- and for each head a sum of Rs. 150/- is to be paid.

- i)* Prepare the probability distribution table
- ii)* What type of probability distribution it is
- iii)* Is it profitable to play the game, give justification on the basis of the analysis of probability distribution table.

Q.8. A survey was conducted to relate the time required to deliver a proper presentation on a topic, to the performance of the student with the scores received (out of 150), as below

Hours(x)	0.5	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
Scores(y)	77	84	79	88	94	96	109	104	107	110	108	110	114	118	120

- i)* Find the regression equation to predict students score on the basis of duration of study
- ii)* If a student has studied for 1.25 hours, what is the predicted score of the student ?

(8+2 marks)

Course Code : **MCSE-011**
Course Title : **Parallel Computing**
Assignment Number : **MCA(5)/E011/Assign/2014-15**
Maximum Marks : **100**
Weightage : **25%**
Last Dates for Submission : **31st October, 2014 (For July 2014 Session)**
30th April, 2015 (For January 2015 Session)

This assignment has eight questions in all and carries 80 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.

The answers are to be given in your own words and not as given in the Study Material.

Q.1. Discuss each of the following concepts, with at least one appropriate example not discussed in course material. *(10 marks)*

- i)* Temporal Parallelism
- ii)* Thread
- iii)* Data-flow computing
- iv)* Data Flow Computing

Q.2. *a)* Draw the dataflow graph for the sequence of instructions *(3 marks)*
 $z = w \times (x + y); u = z \times v$

b) Discuss essential features of each of the following scheme for classification of parallel computers: *(4 marks)*

(i) Handler's (ii) Uniform Memory Access Model (iii) Non-Uniform Memory Access Mode (iv) Cache-only Memory Architecture Model

c) Use Bernstein's conditions for determining the maximum parallelism between the instructions in the following segment. *(3 marks)*

$$S1: N = 2 \times X + 3 \times Z$$

$$S2: R = 4 \times U + X$$

$$S3: S = 3 \times Z + 2 \times V$$

$$S4: Z = 5 \times Y + Z$$

$$S5: P = 2 \times Y + R$$

- Q.3.** a) Discuss Permutation Networks in detail (3 marks)
- b) Discuss relative merits and demerits of Cross-bar Interconnection Network and Systolic Array Network. (3 marks)
- c) For K-ary n-cube network calculate each of the following (4 marks)
- i) Number of nodes in the network
 - ii) The Network diameter
 - iii) Bisection bandwidth of the network.
- Q.4.** Write brief notes on the following: (10 marks)
- i) Array processing
 - ii) Associative Array Processing
 - iii) VLIW architecture
 - iv) Multi-threaded processor
- Q.5.** a) Using sorting algorithm for combinational circuit given in Section 1.7 of Block 2, sort the following sequence of numbers in increasing order. (5 marks)
- 18, 15, 13, 10, 9, 12, 20, 14, 1000, 50, 1055, 0, 70, 33, 93
- b) Using matrix multiplication algorithm given in Section 1.10, compute the following product: (5 marks)
- $$\begin{pmatrix} 12 & 31 \\ 32 & 16 \end{pmatrix} \begin{pmatrix} 5 & 14 \\ 7 & 22 \end{pmatrix}$$
- Q.6.** a) Discuss Odd-Even Merging Circuit for sorting and then analyse for its complexity (5 marks)
- b) Write short notes for any two of the following data structures for parallel algorithms (5 marks)
- Linked list (ii) Array pointers (iii) Hypercube
- Q.7.** a) Discuss synchronization principle for parallel for multi-processing environment. (3 marks)
- b) In High-performance Fortran, write a FOR ALL statement to set Lower triangle of a matrix to zero. (3 marks)
- c) Write a pseudo-code to find the product $f(a) * f(B)$ of two functions in shared memory programming using library routines. (4 marks)

- Q.8.** *a)* Discuss the following recent parallel programming models: *(4 marks)*
(i) Threads model (ii) Data Parallel model (iii) Single Program Multiple Data
- b)* Discuss briefly factors affecting parallel overheads *(3 marks)*
- c)* Discuss various kinds of metrics involved for analysing the performance of parallel algorithms for parallel computers. *(3 marks)*