# MASTER OF COMPUTER APPLICATIONS

# (MCA)

MCA/ASSIGN/V/YEAR/2013

**ASSIGNMENTS**
**Year, 2013-14**

**(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/2013
Maximum Marks             :         100
Weightage                 :         25%
Last Dates for Submission :         15th October, 2013 (For July 2013 Session)
                                    15th April, 2014 (For January 2014 Session)

**There are eight questions in this assignment. Each question carries 10 marks. 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.**

**Question1:**

Assume that there is a table named as product in oracle with          **(10 marks)**
the following fields (Prod-ID, Product-name, Price, Vender-name)
Write a Java Programme to insert and then display the records of this
table using JDBC.

**Question 2**:

(a) Write an XML DTD to represent the Grade Card of a student          **(5 marks)**
    which contains:
    (i) Name- Last, Middle, and First
    (ii) Subjects- Five subjects
    (iii) Assignments marks
    (iv) Total Marks
    (v) Result- Pass/Fail

(b) How does Session bean different from Entity bean in terms of       **(5 marks)**
    object sharing and failure recovery?

**Question 3:**

Explain four basic mechanisms through which a web client can           **(10 marks)**
authenticate a user to a web server during HTTP authentications.

**Question 4:**

(i) What do you mean by XML parsing? Briefly describe the parser       **(5 marks)**
    involved with XML.

(ii) Compare and contrast SSL and TLS.                                 **(5 marks)**

**Question 5**:

(i) With the help of a sample code. Describe the use of SSL            **(6 marks)**
    authentication in Java Client.

(ii) Why do we need inter servelet communication? **(4 marks)**

**Question 6**:

(i) What are the benefits of using Entity beans for database operations over directly using JDBC API to do database operation? **(6 marks)**

(ii) Differentiate between JSP and servelets. **(4 marks)**

**Question 7:**

(i) The container of EJB provides certain built-in services to EJB, which is used by EJB to perform different functions. Define all these functions. **(6 marks)**

(ii) What criteria should be taken while choosing between Session bean and Entity bean? **(4 marks)**

**Question 8:**

Write a programme using servelet and JDBC for developing an online submission of a telephone bill. You are required to create a database of the following fields: **(10 marks)**

- Telephone no.
- Name
- Amount

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|---|---|---|
| Course Code | : | MCS-052 |
| Course Title | : | Principles of Management and Information Systems |
| Assignment Number | : | MCA(5)/052/Assign/2013 |
| Maximum Marks | : | 100 |
| Weightage | : | 25% |
| Last Dates for Submission | : | 15<sup>th</sup> October, 2013 (For July 2013 Session) |
| | | 15<sup>th</sup> April, 2014 (For January 2014 Session) |

**This assignment has five questions. Answer all questions, which carry 80 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 350 words.**

**Question 1:**

(a) 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? Justify your answer with suitable examples. **(10 Marks)**

(b) Discuss the role of artificial intelligence technology in the Management and Marketing. List the different AI based softwares used in the Management and Marketing. **(10 Marks)**

**Question 2:**

(a) What are steps in IT Risk management process? **(5Marks)**

(b) What is the purpose of Decision Support Systems in MIS? List a few characteristics of DSS. **(10Marks)**

**Question 3:**

Define Enterprise Resource Planning (ERP). Discuss some of the basic features of ERP. Differentiate between ERP and Supply Chain Management (SCM). **(10 Marks)**

**Question 4:**

(a) What is the difference between system analysis and system design? Explain, Why does sometimes a new system does not meet user requirements? **(5Marks)**

(b) Classify the different computer crimes. Discuss the solution of each type of computer crime. **(10 Marks)**

**Question 5:**

(a) Discuss the importance and drawbacks of Knowledge **(10 Marks)**
Management in Organisations.  Also, explain different
role of business intelligence tools in different management levels.

(b) What is Portfolio Management? Explain different tools used to **(10 Marks)**
automate the portfolio management processes.

| Course Code | : | MCS-053 |
| --- | --- | --- |
| Course Title | : | **Computer Graphics and Multimedia** |
| Assignment Number | : | MCA (5)/053/Assign /2013 |
| Maximum Marks | : | 100 |
| Weightage | : | 25% |
| Last Dates for Submission | : | 15th October, 2013 (For July 2013 Session) |
| | | 15th April, 2014 (For January 2014 Session) |

**There are fifteen 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.**

**Question 1:** (6 Marks)

Differentiate between following:
(i)     Painting and Drawing
(ii)    Computer Graphics and Animation
(iii)   Printer and Plotter
(iv)   Random Scan Display Devices and Raster Scan Display Devices

**Question 2:** (5 Marks)

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.

**Question 3:** (5 Marks)

Draw line segment joining (20, 10) and (25, 14) by using Bresenham Line Generation algorithm.

**Question 4:** (5 marks)

Given a circle radius r = 5, determine positions along the circle octants in $1^{st}$ Quadrant from x = 0 to x = y.

**Question 5:** (5 Marks)

How Cyrus Back line clipping algorithm, clips a line segment, if the window is non-convex?

**Question 6:** (5 Marks)

Find the normalization transformation N, which uses the rectangle W(1, 1); X(5, 3); Y(4, 5) and Z(0, 3) as a window and the normalized deice screen as viewpoint.

**Question 7:** (5 Marks)

Show that two successive reflections about either of the coordinate axes is equivalent to a single rotation about the coordinate origin.

**Question 8:** (6 Marks)

Reject the Diamond-shaped polygon whose vertices are A(−1, 0), B(0, −2); C(1, 0) and D(0, 2) about (a) Horizontal line Y = 2; (b) the vertical line X = 2; (c) the line Y = X +2.

**Question 9:** (5 Marks)

Find the principal vanishing point, when the object is first rotated with respect to y-axis by −30° and x-axis by 45°, and projected onto z = 0 plane, with the centre of projection being (0, 0, −5).

**Question 10:** (5 marks)

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.

**Question 11:** (6 marks)

Prove the following:

(a) $\sum_{i=0}^{n}$  $B_{n, i} = 1$        b) $P(u = 1) = p_n$        c) $P(u=0) = P_0$

**Question 12:** (4 Marks)

Distinguish between Z-buffer method and scan-line method. What are the visibility test made in these methods ?

**Question 13:** (10 Marks)

Explain the following:
   (i) Anti-aliasing   (ii) Phong shading     (iii) Specular reflection
   (iv) Ray tracking   (v) Ray casting

**Question 14:** (2 Marks)

How many key frames does a one minute animation film sequence with no duplications require, if there are five in between for each pair of key frames?

**Question 15:** (6 Marks)

(i)    Differentiate between   Bitmap Graphics & Vector Graphics
(ii)   Simulation of positive acceleration & Simulation of negative acceleration
(iii)  Analog Sound & Digital Sound

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|---|---|---|
| **Course Code** | : | **MCSL-054** |
| **Course Title** | : | **Laboratory Course (Advanced Internet Technologies & Computer Graphics and Multimedia)** |
| **Assignment Number** | : | **MCA (5)/L054/Assign /2013** |
| **Maximum Marks** | : | **100** |
| **Weightage** | : | **25%** |
| **Last Dates for Submission** | : | **31st October, 2013 (For July 2013 Session)** |
| | | **30th April, 2014 (For January 2014 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. Please go through the guidelines regarding assignments given in the MCA Programme Guide for the format of presentation. Made assumptions if any while solving the problems and state them clearly.

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

**Question 1:** Write a program using Servlet/JSP that accepts the **(4 Marks)** account number of a bank customer as input. The program should print the details of the account. Make necessary assumptions whereever required.

**Question 2:** Write a JSP Program, which displays a web page **(6 Marks)** containing two web links one for showing schedule of counselling sessions at a **Study Centre** and other for **FAQs on Programme on offer** by the University. When one click on link **Study Centre** it goes to a page which show the counselling schedule for MCA students. Clicking on link for **FAQs on Programme on Offer,** another JSP page open, which consists of some FAQ related to different programme offered in the University.

**Question 3:** Write a program using JSP and JDBC to provide details **(7 Marks)** of MCA/BCA/CIT students at a IGNOU study centres. Also the program should enable any student to change his/her address. This program should provide the practical attendance detail of students in different semesters of MCA/BCA/CIT.

**Question 4:** Create an XML document for keeping students record **(3 Marks)** in a department of a University.

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

**Question 1:** Write a program in C/C++ using OpenGL to draw a rectangle of red colour inside of a circle of blue colour on a background of orange colour. **(3 Marks)**

**Question 2:** Write a program in C or C++ to implement Scan-Line Polygon Filling Algorithm. **(4 Marks)**

**Question 3:** Write a program in C or C++ to implement Cyrus Beck line clipping algorithm. **(4 Marks)**

**Question 4:** Write a program in C/C++ using OpenGL to draw a hard wire diagram as shown in figure given below. Use basic primitives of openGL. **(4 Marks)**
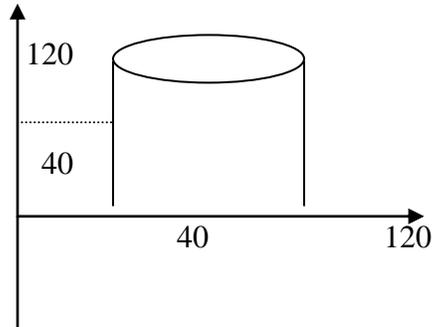


**Question 5:** Write a program in C/C++ using OpenGL to implement Sutherland Hodgman polygon clipping algorithm to clip the following polygon against the rectangular window as given below. Make suitable assumptions. **(5 Marks)**
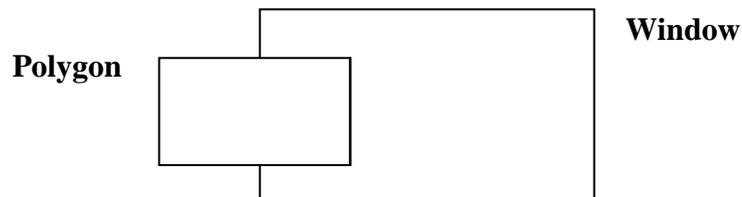
| Course Code | : | MCSE-003 |
| Course Title | : | Artificial Intelligence and Knowledge Management |
| Assignment Number | : | MCA(5)/E003/Assign/2013 |
| Maximum Marks | : | 100 |
| Weightage | : | 25% |
| Last Dates for Submission | : | 31st October, 2013 (For July 2013 Session) |
| | | 30th April, 2014 (For January 2014 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.**

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

(b) Discuss relations between 'organisation', 'information' and **(4 Marks)**
'intelligence'.

**Question 2:**
(a) For each of the following formulae, construct a truth-table, and **(4 Marks)**
then determine whether it is valid, consistent or inconsistent:
(i) $(\sim C \rightarrow \sim D) \rightarrow (D \rightarrow C)$
(ii) $((\sim C \vee D) \rightarrow B) \rightarrow (\sim C \rightarrow B)$

(b) Determine whether the following equivalence between the formulae **(4 Marks)**
on two sides of '=' holds or not
$(A \rightarrow B) \rightarrow C = (A \rightarrow B) \rightarrow (A \rightarrow C)$ ?,
by reducing each of the formulae on the two sides of '=' to one of the
normal forms (DNF or CNF).

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

**Premisses:** 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).

**Question 4:** (8 Marks)
Transform the following formula first in Prenex Normal Form and then into Skolem Standard Form
$(\forall x) ( [(\forall y) (\exists z) (\sim P(x, y) \wedge Q(x, z))] \rightarrow (\exists u) R(x, y, u) )$

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

**Question 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)

**Question 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 (4 Marks)

relations between parts. Include an as-needed slot for the gas of each type mileage.

**Question 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 ∪ Y    (ii) X ∩ Y     (iii) (X′ ∩ Y) ′

(b) Write a note on Non-monotonic reasoning systems.        **(3 Marks)**

(c) Discuss briefly various methods/ mechanism for handling     **(3 Marks)**
   incompleteness of a knowledge-base (KB).

**Question 9:**
Translate the following argument into FOPL and then using Deductive     **(8 Marks)**
Rules of Inference (given in Unit 2 of Block 2) prove/ refute the
following argument.

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*)

**Question 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     **(4 Marks)**
   agents.

| Course Code | : | MCSE-004 |
| Course Title | : | Numerical and Statistical Computing |
| Assignment Number | : | MCA(5)/E004/Assign/2013 |
| Maximum Marks | : | 100 |
| Weightage | : | 25% |
| Last Dates for Submission | : | 31st October, 2013 (For July 2013 Session) |
| | | 30th April, 2014 (For January 2014 Session) |

**This assignment has eleven 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.**

**Question 1:** If $\pi = \frac{22}{7}$, is approximated as 3.14, find the absolute error relative error and relative percentage error. **(6 marks)**

**Question 2:** Using Regula Falsi method, find the real-root of the equation $x^3 - x^2 - 2 = 0$ **(6 marks)**

**Question 3:** Solve by Jacobi iteration method, the system of equations $3x - 3y + 2z = 0$; $6x + 3y + 12z = 35$ and $4x + 11y - z = 33$ **(6 marks)**

**Question 4:** Prove that $\Delta\{\log f(x)\} = \log\left|\frac{1 + \Delta f(x)}{f(x)}\right|$ **(8 marks)**

**Question 5:** Estimate the missing term in the following data, using Difference table **(6 marks)**

| x | : 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| f(x) | : 3 | 7 | ? | 21 | 31 |

**Question 6:** Given the following system of linear equations, determine the value of each of the variable using LU Decomposition method. **(8 marks)**
$6x_1 - 2x_2 = 14$;      $9x_1 - x_2 + x_3 = 21$;      $3x_1 - 7x_2 + 5x_3 = 9$

**Question 7:** Find the interpolating polynomial that fits the data **(8 marks)**

| $x_k$ | 0 | 1 | 2 | 5 |
|---|---|---|---|---|
| $f_k$ | 2 | 3 | 12 | 147 |

**Question 8:** Solve the initial value problem $u' = -2tu^2$ with $u(0) = 1$ and $h = 0.2$ on the interval $[0, 1]$. Use the fourth order classical Runge-Kutta Method. **(8 marks)**

**Question 9:** Calculate the value of the integral $\int_4^{5.2} \log x \, dx$ by **(8 marks)**
a) Trapezoidal rule      c) Simpson's 3/8 rule
b) Simpson's 1/3 rule      d) Weddle's rule

**Question 10:** Study the case below and answer the respective questions. **(8 marks)**
Ticket of a game costs Rs. 500/- 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. 200/-
and for each head a sum of Rs. 100/- 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.

**Question 11:** A survey was conducted to relate the time required to     **(8 marks)**
deliver a proper presentation on a topic, to the performance
of the student with the scores received, 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) | 57 | 64 | 59 | 68 | 74 | 76 | 79 | 83 | 85 | 86 | 88 | 89 | 90 | 94 | 96 |

    i)       Find the regression equation to predict students score on the basis of
            duration of study.
    ii)      If a student has studied for 0.85 hours, what is the predicted score of the
            student ?

Course Code : MCSE-011
Course Title : Parallel Computing
Assignment Number : MCA(5)/E011/Assign/2013
Maximum Marks : 100
Weightage : 25%
Last Dates for Submission : 31st October, 2013 (For July 2013 Session)
                                           30th April, 2014 (For January 2014 Session)

**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.**

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

**Quesiton1:** Discuss each of the following concepts, with at least one **(10 marks)**
appropriate example not discussed in course material.
(i) Granularity in parallel/ concurrent environment
(ii) Speed-up
(iii) Data-flow computing
(iv) Scalability

**Question 2:**
(a) Use Bernstein's conditions for determining the maximum **(3 marks)**
parallism between the instructions in the following segment.
     S1: Y = X + Z
     S2: Z = U + X
     S3: S = R + V
     S4: Z = Y + R
     S5: P = N + Z

(b) Discuss essential features of each of the following schemes for **(7 marks)**
classification of parallel computers:
(i) Flynn's      (ii) Handler's      (iii) Structural    (iv) Based on grain-size

**Question 3:**
(a) How the following properties can be used in determining the **(2 marks)**
quality of an interconnection network:
(i) Network diameter     (ii) Latency     (iii) Bisection bandwidth

(b) Discuss relative merits and demerits of Tree Interconnection **(2 marks)**
Network vis-à-vis Systolic Array Network.

(c) For K-ary n-cube network calculate each of the following **(6 marks)**
(i) Number of nodes in the network
(ii) The Network diameter
(iii)Bisection bandwidth of the network.

**Question 4:** Write brief notes on any five of the following:                           **(10 marks)**
   (i)  Pipeline processing
   (ii) Array processing
   (iii)Associative Array Processing
   (iv)VLIW architecture
   (v)  Multi-threaded processor
   (vi)Superscalar processor

**Question 5:**
   (a) Using sorting algorithm for combinational circuit given in            **(5 marks)**
       Section 1.7 of Block 2, sort the following sequence of
       numbers in increasing order.
       3, 8, 5, 10, 9, 12, 20, 14, 90, 40, 95, 0, 60, 23, 83

   (b) Using matrix multiplication algorithm given in Section 1.10,   **(5 marks)**
       compute the following product:

$$\begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix}\begin{pmatrix} 8 & 4 \\ 6 & 2 \end{pmatrix}$$

**Question 6:**
   (a) Discuss relative merits and demerits of three types of              **(5 marks)**
       implementations, viz.,
       (i)  Message passing   (ii) Shared memory
       (iii) Data parallel of PRAM model

   (b) Write short notes for any two of the following data structures   **(5 marks)**
       for parallel algorithms
       (i)  Linked list     (ii) Array pointers     (iii) Hypercube

**Question 7:**
   (a) Enumerate different steps to write a general parallel              **(3 marks)**
       programme
   (b) In High-performance Fortran, write a FOR ALL statement           **(3 marks)**
       to set upper triangle of a matrix to zero.
   (c) Write a pscudo-code to find the product f(a) * f(B) of two        **(4 marks)**
       functions in shared memory programming using library routines.

**Question 8:**
   Discuss in detail synchronization problem and its possible              **(10 marks)**
   solutions for performance and correctness of execution in parallel
   computing environment.