MASTER OF COMPUTER APPLICATIONS

(MCA)

ASSIGNMENTS
Year, 2012-13

(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/2012**
Maximum Marks   :   **100**
Weightage   :   **25%**
Last Dates for Submission   :   **15th October, 2012 (For July 2012 Session)**
                                                15th April, 2013 (For January 2013 Session)

There are nine 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.

Q 1: Write an online student registration application using JSP/servlet and JDBC. Use the following table to store student information.   **(10 marks)**

STUDENT_REG

ENR_ID	S_NAME	REG_YEAR	ADDRESS

Q 2: What is a custom tag in JSP? Create a custom tag that will accept a full name and convert into initials. For example Surendra Kumar Sharma should be displayed as S.K. Sharma. Please use proper error handling feature.   **(10 marks)**

Q 3: What is Servlet Collaboration? Explain two ways used for Servlet Collaboration through an example.   **(6 marks)**

Q 4: Write a MDB (Message Driven Bean) for news agency that has to capture the data from various news sources. The newly written MDB should accept the XML format of the news. The XML data needs to be parsed and stored in the database. The news format is as follows:

          \<news_id\> \</ news_id\>
          \<sources\> \</source\>
          \<date\> \</date\>
          \<type_of_news\> \</type_of_news\>
          \<priority\> \<priority\>
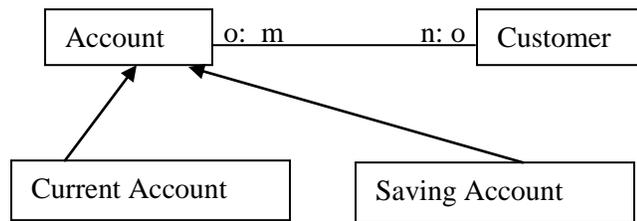   \<news_content\> \</news_content\>   **(6 marks)**

Q 5: Write an application to create a XML document from a telephone directory database. The XML document should contain the name of a customer, address, telephone number and the last twelve months bill payment summary.   **(8 marks)**

Q 6: Create a mini bank application, where the new bank customer can register and opt for different bank accounts.

```
┌──────────┬─o: m──────────n: o─┬──────────┐
│ Account  │                     │ Customer │
└──────────┴─────────────────────┴──────────┘
      ↑        ↖
┌────────────────┐        ┌────────────────┐
│ Current Account│        │ Saving Account │
└────────────────┘        └────────────────┘
```

The application should capture the customer details and depending upon the type of the account, it should ask about their employment details (e.g. for saving account, there should be salary details and for commercial account, there should be business turnover). Put the necessary validation also.
You are required to use Servelet, JSP and JDBC.   **(10 marks)**

Q 7: (i) Describe the use of SSL Authentication in Java Clients with the help of sample code.   **(5 marks)**

(ii) Describe the components of a digital certificate.   **(5 marks)**

Q 8: (i) Assume that there is a table named Fecully in Oracle with fields (f_id, f_name, f_room, f_ department). Write a code using servlet which will display all the fields of a faculty table is tabular manner.   **(5 marks)**

(ii) Describe 5 benefits of EJB architecture to an application developer.   **(5marks)**

Q9: (i) List the features of Semantic database.   **(5 marks)**

(ii) What are the challenges in designing multimedia database? **(5 marks)**

Course Code	:	MCS-052
Course Title	:	Principles of Management and Information Systems
Assignment Number	:	MCA(5)/052/Assign/2012
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	15th October, 2012 (For July 2012 Session)
		15th April, 2013 (For January 2013 Session)

This assignment has seven questions. Answer all questions, carries 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.

Q 1 (a) What are the different phases of decision making process? Explain. **(5 Marks)**

(b) Describe the role of ERP in contemporary business environment? Explain, how an ERP is different from conventional packages? Also, explain different components of an ERP. **(10 Marks)**

Q 2 (a) Explain the concept of data warehousing. Also, discuss its need in modem business. **(5 Marks)**

(b) Explain the significance and requirements of EIS (*Executive information system*) and *ESS* (*executive support system*). Also, write the differences between MIS and EIS. **(10 Marks)**

Q 3 What are the advantages and limitations of data mining to support an Information system? Also, write the importance of business intelligence. **(10 Marks)**

Q 4 (a) What is 'Copyright' protection? Explain its relevance in computer applications. **(5 Marks)**

(b) Explain MIS structure based on management activity. **(5 Marks)**

Q 5 Discuss the importance of security in Information System and explain the various measures against the threats to the system. **(10 Marks)**

Q 6 Explain the need for rapid system development tools and discuss CASE Tools, in detail, in this context. **(10 Marks)**

Q 7 Write short notes on the following:

  (i)   Knowledge Management in Organisations
  (ii) Portfolio Management **(10 Marks)**

Course Code	:	**MCS-053**
Course Title	:	**Computer Graphics and Multimedia**
Assignment Number	:	**MCA (5)/053/Assign /2012**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**15ᵗʰ October, 2012 (For July 2012 Session)**
		15ᵗʰ April, 2013 (For January 2013 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.

Question 1:

a) Differentiate the following in the context of Computer Graphics   **(5 Marks)**
    (i)   Vector Graphics vs. Bitmap Graphics
    (ii)   Simulation vs. Scientific Visualisation
    (iii)   Random Scan versus Raster scan display devices
    (iv)   CAD vs. Animation

b) What is the Staircase effect in Line Generation on a computer screen? Show step by step execution of Bresenham Line Generation algorithm for drawing a line having endpoints (1, 0) and (9, 8).   **(5 Marks)**

c) Define the term line clipping. The parametric equation of line PQ may be defined as P + t (Q-P) where $0 \leq t \leq 1$. Explain this equation with the help of an example. Derive the expression for t with respect to i^{th} edge and PQ (line to be clipped) in the context of Cyber Beck line clipping algorithm. How will you determine whether a point is P_E or P_L in Cyrus Beck line clipping algorithm.   **(5 Marks)**

d) Use the Cohen Sutherland line clipping algorithm to clip the line segment PQ having coordinates P(20, 30) and Q (100, 100). The clipping window ABCD's coordinates are – A(0,0), B(40,0), C(40,40) and D(0,40). What is the purpose of Sutherland Hodgman polygon clipping algorithm? Explain with the help of an example.   **(5 Marks)**

Question 2:

a) Why do we need Homogeneous Coordinate System for transformation? Assume that a triangle ABC has the coordinates A(0, 0), B(10,10), C(10,2). Find the transformed coordinates when the triangle ABC is subjected to the counter-clockwise rotation of 30° about the origin and then translate by 2 units in x-direction and 4 units in y-direction. You should represent the transformation using Homogeneous Coordinate System.   **(5 Marks)**

b)	A polygon having 4 vertices A (2, 2) B (4, 2), C (4, 4), D (2, 4) is reflected about the line y = 1. What would be the coordinates of the reflected vertices? Use Homogeneous coordinate system.	**(5 Marks)**

c)	What is isometric projection? Derive a general transformation matrix for isometric projection. Obtain an isometric view of a cube of the size 10 that is lying on the origin.	**(5 marks)**

d)	Consider a cube of size 4 units that is lying on the origin, obtain the perspective projection of this cube on z=0 plane having the centre of projection at E(0,0,-2) . Also find the vanishing point(s) for the projection.	**(5 Marks)**

Question 3:

a)	Explain the purpose of control points in Bezier Curves in Computer Graphics with the help of an example. Assume that p_0 (1, 1), p_1 (3, 4), p_2 (4, 2), and p_3 (2, 1) are the vertices of a Bezier curve, determine 3 points on this Bezier curve. Draw the rough sketch of the curve and show these points.	**(5 Marks)**

b)	What is reflection? What are different types of reflections? Derive a formula for every type of reflection and their combined effect.	**(5 Marks)**

c)	Explain the following terms in the context of computer Graphics using suitable diagram and /or mathematical equations or one example.	**(10 Marks)**
	(i)	Basic Ray Tracing algorithm
	(ii)	Anti-aliasing
	(iii)	Gourand Shading
	(iv)	Depth buffer method
	(v)	Properties of Bezier curves

Question 4:	Differentiate between the following	**(20 Marks)**
	(i)	Zero Acceleration versus Positive Acceleration in the context of simulation.
	(ii)	Key frame animation versus Cel animation
	(iii)	Analog versus Digital Sound
	(iv)	Vector Graphics versus Digitised(bitmap) graphics
	(v)	GIF versus JPEG
	(vi)	Hypermedia versus hypertext
	(vii)	Painting tools versus drawing tools
	(viii)	MPEG versus QuickTime

Course Code	:	MCSL-054
Course Title	:	Laboratory Course (Advanced Internet Technologies & Computer Graphics and Multimedia)
Assignment Number	:	MCA (5)/L054/Assign /2012-13
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	31st October, 2012 (For July 2012 Session)
		30th April, 2013 (For January 2013 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 and JDBC for developing online application for displaying the details of Cars owned by the residents in XYZ society. Make necessary assumptions and create appropriate databases. **(5 Marks)**

Question 2: Write a JSP Program, which displays a web page containing detailed Bio-Data of yours including your educational qualifications, photograph and photo album etc.. **(5 Marks)**

Question 3: Write a program using JDBC and JSP to display the names and addresses of all those saving account holders No 1002. **(5 Marks)**

Question 4: Write an XML document to represent the Items (at least three items) in a stationary shop. **(5 Marks)**

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

Question 1: Write a program in C/C++ using OpenGL to draw a circle of red color inside of a rectangle of blue color on a background of green colors.

(3 Marks)

Question 2: Write a C/C++ program to implement DDA algorithm for line generation. Use this algorithm to draw a line with endpoints (2, 3) and (9, 8).

(4 Marks)

Question 3: Write a C/C++ program to draw a Bezier curve having the control points as p0 (0, 0), P1 (2, 5), P2 (5, 9), P3 (10, 20). Calculate the coordinates of the points on the curve corresponding to the parameter u = 0.2, 0.4, 0.6.

(5 Marks)

Question 4: Write a program in C/C++ using OpenGL to perform a 3-Dimensional transformation, such as translation ,rotation and reflection, on a given triangle. **(3 Marks)**

Question 5: Write C/C++ program to implement the Sutherland Hodgman polygon clipping algorithm. Using this program clip the following polygon against the rectangular window as given below in figure 1. Make suitable assumptions. **(5 Marks)**
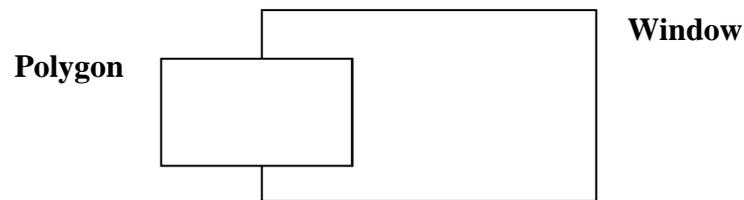

Window

Polygon

Figure 1.

Course Code   :   **MCSE-003**
Course Title   :   **Artificial Intelligence and Knowledge Management**
Assignment Number   :   **MCA(5)/E003/Assign/2012**
Maximum Marks   :   **100**
Weightage   :   **25%**
Last Dates for Submission :   **31st October, 2012 (For July 2012 Session)**
                                       30th April, 2013 (For January 2013 Session)

This assignment has six 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: Discuss state space representation for the following well-known problems:

    (i)   Water-Jug Problem,
    (ii) Human Cannibal River-Crossing Problem.   (**10 marks**)

Question 2: Answer the following questions:
    (a) Represent the following statement as a associating network: "*IGNOU is an open university established by an act of parliament. It has many divisions and schools of studies. Each school and division is headed by a Director*".   (**8 marks**)

    (b) Show the conceptual dependency representation of the following sentence:
       "*John wanted Marry to go to store*".   (**7 marks**)

    (b) Obtain CNF and DNF for the following given formula:
       $\sim (A \rightarrow (\sim B \cap C))$ (**5 marks**)

    (d) Discuss Rule-Based Representation of knowledge.   (**5 marks**)

Question 3: Discuss the 'Physical Symbol System Hypothesis'. Also, critically examine its validity, relevance and significance.   (**10 marks**)

Question 4: Give Frame-Based Representation for the following facts:

    "*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*".

    Also, Give Semantic Net representation of the facts given in this question.
                                        (**10 marks**)

Question 5: Write A* algorithm. How is A* algorithm different from AO*? Out of the two which one is better and why?   (**10 marks**)

Question 6: Write the following programmes:

(a) Write a LISP programme to convert temperature in Centigrade to equivalent temperature in Fahrenheit.

(b) Write a LISP function that counts the number of atoms in a list.

(15 marks)

Course Code : MCSE-004
Course Title : Numerical and Statistical Computing
Assignment Number : MCA(5)/E004/Assign/2012
Maximum Marks : 100
Weightage : 25%
Last Dates for Submission : 31st October, 2012 (For July 2012 Session)
                            30th April, 2013 (For January 2013 Session)

This assignment has five 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:

(a) A can solve 90% of the problems given in a book and B can solve 70%. What is the probability that at least one of them will solve a problem selected at random? **(8 marks)**

(b) When a computer uses a number base 2, how many significant decimal digits are contained in the mantissa of floating numbers? **(7 marks)**

(c) Evaluate the integral

$$I = \int_0^1 \frac{dx}{1+x}$$

using (i) composite trapezoidal rule, (ii) composite Simpon's rule, with 2, 4 and 8 equal subintervals. **(5 marks)**

Question 2: Write the following programme in C language:

(a) Write a programme in C to find a root using bisection method. Perform the five iterations of the bisection method to obtain the smallest positive root of the equation $f(x) = x^3 - 5x + 1 = 0$, verify your answer with the programme written by you. **(8 marks)**

(b) Write a programme in C to find a root using Newton Raphson Method. Apply Newton-Raphson's method to determine a root of the equation $f(x) = \cos x - xe^x = 0$, if exists verify your answer with the programme written by you. **(7 marks)**

Question 3:

(a) Find the probability of getting between 6 and 9 tails inclusive in
20 tosses of a fair coin by using (i) the binomial distribution,
(ii) the normal approximation to the binomial distribution.   **(8 marks)**
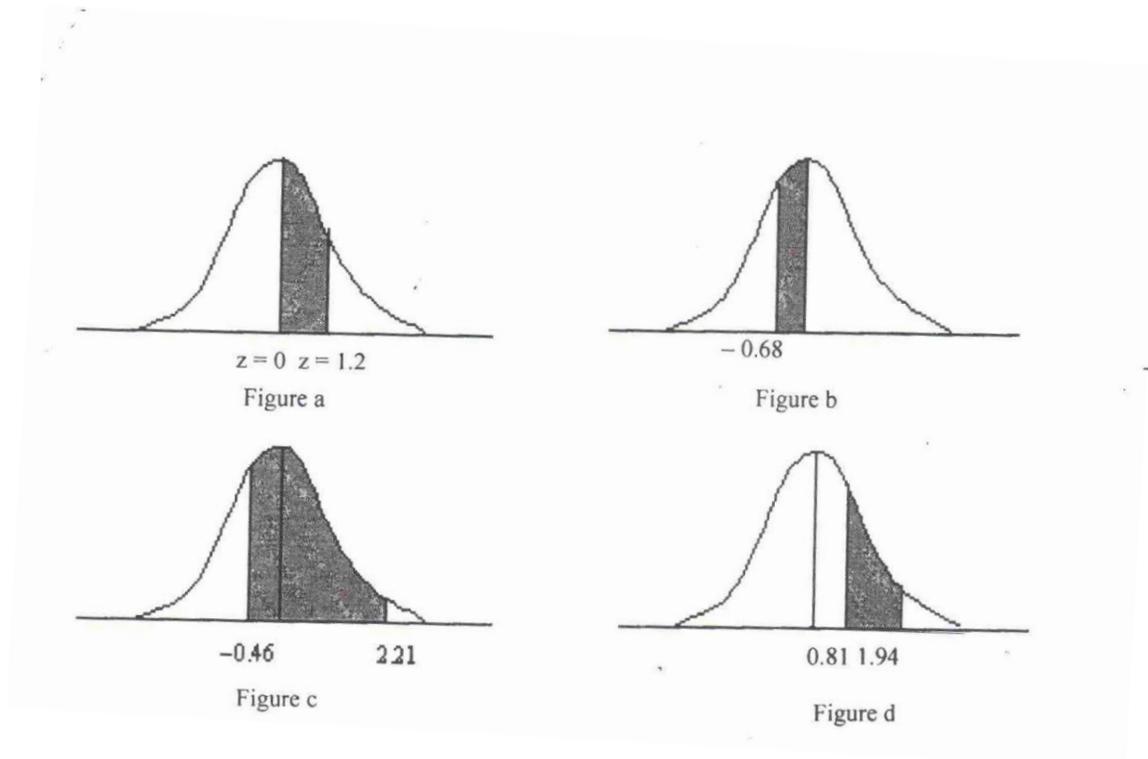
(b) Table 2 below shows the respective heights x and y of a sample of
12 fathers and their oldest sons.

(i) Construct a scatter diagram.
(ii) Find the least-squares regression line of y on x.
(iii) Find the least-squares regression line of x and y.   **(9 marks)**

Table 2

Height x of Father (centimetres)	165	160	170	163	173	158	178	168	173	170	175	180
Height y of Son (centimetres)	173	168	173	165	175	168	173	165	180	170	173	178

(c) Find the area under the standard normal curve (a) between $z = 0$ and $z = 1.2$, (b)
between $z = -0.68$ and $z = 0$, (c) between $z = -0.46$ and $z = 2.21$, (d) between
$z = 0.81$ and $z = 1.94$.   **(8 marks)**

z = 0 z = 1.2

Figure a

− 0.68

Figure b

−0.46   2.21

Figure c

0.81 1.94

Figure d

Question 4: Solve the following equation (if a solution exists) using given method:

(a) Solve the equation:

$$10x_1 - x_2 + 2x_3 = 4$$
$$x_1 + 10x_2 - x_3 = 3$$
$$2x_1 + 3x_2 + 20x_3 = 7$$

using the Gauss elimination method.

(b) Solve the questions:
$$10x_1 - x_2 + 2x_3 = 4$$
$$x_1 + 10x_2 - x_3 = 3$$
$$2x_1 + 3x_2 + 20x_3 = 7$$

using the LU decomposition method. **(10 marks)**

Question 5: Out of the three method i.e. Secant method, Regula Falsi method and the Newton Raphson method which method is more efficient and why? Determine the efficiency or the order of these three methods? **(10 marks)**

Course Code : **MCSE-011**
Course Title : **Parallel Computing**
Assignment Number : **MCA(5)/E011/Assign/2012**
Maximum Marks : **100**
Weightage : **25%**
Last Dates for Submission : **31st October, 2012 (For July 2012 Session)**
30th April, 2013 (For January 2013 Session)

This assignment has two questions, each of 40 marks. 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.

Question 1: **(40 marks)**

Determine the dependency relations among the following instructions:
I1:a = b+c;
I2:b = a+d;
I3:e = a/f;

Question 2: **(40 marks)**

Write the syntax of the following compiler directives in OpenMP:
   (a) Parallel (b) Sections (c) Master