

# **MASTER OF COMPUTER APPLICATIONS (MCA)**

**MCA/ASSIGN/SEMESTER-V**

## **ASSIGNMENTS**

**(July - 2019 & January - 2020)**

**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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### 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(V)/051/Assignment/2019-20**  
**Maximum Marks** : **100**  
**Weightage** : **25%**  
**Last Dates for Submission** : **15<sup>th</sup> October, 2019 (For July, 2019 session)**  
**15<sup>th</sup> April, 2020 (For January, 2020 session)**

**Answer all the questions in the assignment which carry 80 marks in total. 20 marks are for viva voce. You may use illustrations. Place go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.**

- Q1.** (a) What are the main objectives of session tracking? What are the two ways to handle session tracking ? Explain with the help of an example. **(6 Marks)**
- (b) What are the major differences between a session and a cookie ? **(5 Marks)**
- Q2.** Assume there is a table named **students** which created is Oracle database having the following fields:
- E-number
  - S-name
  - Name - of school
  - Programme
  - Year of admission
  - Date of birth
- (a) Enter at least 5 records and write a servlet code which will display all the fields of the above table and all records entered in the table in a tabular form. **(4 Marks)**
- (b) Answer the following SQL queries related to the student table. **(4 Marks)**
- (i) List all the student enrolled in a school of computer sciences in the year 2016.
  - (ii) Count the number of students registered in BCA Programme.
  - (iii) List all the students below the age of 25 years.
- Q3.** Differentiate between the two different types of servlets? What are the two interfaces in the servlet API. **(6 Marks)**
- Q4.** (a) Explain the role of JSP in design of dynamic website. **(5 Marks)**
- (b) Define custom tags in JSP and describe components that make up a tag library in JSP. **(6 Marks)**

- Q5.** Assume there is product table in the company's database created in Oracle with the following fields:
- Product - ID
  - Product - name
  - Year of manufacturing
  - Product cost
- Write a code connecting JSP to Oracle database through JDBC and perform the following operations: **(6 Marks)**
- Insert 10 records in the database
  - Modify these records
  - Display the product name which was manufactured before 2017.
  - Display the product ID which costs more than Rs. 50000 and manufactured after 2017.
- Q6.** What is the need of connecting servlet and JSP and explain the process through a programme template. **(6 Marks)**
- Q7.** Describe the following HTTP authentication mechanism for authentication of a user to a web server: **(6 Marks)**
- (i) HTTP authentication
  - (ii) HTTP click authentication
- Q8.** Discuss advantage of using entity bean for database operations over directly using JDBC API. When would one need to be used over the other? **(5 Marks)**
- Q9.** (i) Explain the difference between external entity and internal XML entities **(5 Marks)**  
(ii) How Java Beans and enterprise java beans are different? **(5 Marks)**
- Q10.** (i) Design XML DTD for an organisation that contains employee information. An employee element has fields: first name, last name, age, address and department. The address element has fields: cities, state and pin code. **(3 Marks)**
- (ii) How can we check whether the DTD is correct? How many elements should you have in a DTD? **(3 Marks)**
- Q11.** Define the basic security concepts. **(5 Marks)**

<b>Course Code</b>	<b>:</b>	<b>MCS-052</b>
<b>Course Title</b>	<b>:</b>	<b>Principles of Management and Information Systems</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA (V)/052/Assignment/2019-20</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Last Date of Submission</b>	<b>:</b>	<b>15th October, 2019 (for July, 2019 session)</b> <b>15th April, 2020(for January, 2020 session)</b>

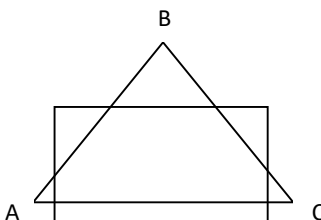
**Answer all questions. Each question is of 10 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Answer to each part of the question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

- Q1.** Explain in brief the basic principles that should be considered while designing an organization structure. Explain organizational characteristics? **(10 Marks)**
- Q2.** What are different levels of management? Explain functions of employees at different levels of management. **(10 Marks)**
- Q3.** What is Information System? What is need requirement analysis ? Explain. Also describe tools used in requirement analysis of Information System. **(10 Marks)**
- Q4.** (a) Explain functions of DSS and ESS. **(5 Marks)**
- Q4.** (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)**
- Q5.** (a) Explain job of system analyst. Why are interpersonal and technical skills necessary in system development? Explain issues and challenges in system analysis. **(6 Marks)**
- Q5.** (b) Discuss Social Global impact of Information System. **(4 Marks)**
- Q6.** (a) What is portfolio management? Explain its benefits. **(5 Marks)**
- Q6.** (b) What is risk management? Explain risk management process. **(5 Marks)**
- Q7.** (a) What is ERP? Explain ERP components. **(4 Marks)**
- Q7.** (b) Discuss the role of intelligent systems in e-business. Also, explain different roles of business intelligence tools in different management levels. **(6 Marks)**
- Q8.** What is business intelligence (BI)? Explain role of BI in successful business. Critically explain use of Information Technology in BI. **(10 Marks)**

<b>Course Code</b>	<b>:</b>	<b>MCS-053</b>
<b>Course Title</b>	<b>:</b>	<b>Computer Graphics and Multimedia</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA(V)/053/Assignment/2019-20</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Weightage</b>	<b>:</b>	<b>25%</b>
<b>Last Date of Submission</b>	<b>:</b>	<b>15thOctober,2019 (For July,2019 Session)</b> <b>15thApril, 2020 (For January,2020 Session)</b>

**Note: This assignment has 10 questions of 80 marks (All Questions carries equal marks). Answer all the questions. Rest 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.**

- Q1.** Write the DDA line drawing algorithm and modify the same for negative sloped lines. What are the limitations of DDA algorithm? Apply DDA line generation algorithm to produce a line segment from (1, 1) to (9, 7).
- Q2.** Write Bresenham Line Generation Algorithm. How Bresenham line generation algorithm overcomes the limitations of DDA algorithm? Use Bresenham line generation algorithm to draw a line segment from (15, 5) to (20, 9).
- Q3.** Write the Midpoint circle generation algorithm and use the same to produce a circular arc of radius 8 units in the first quadrant from  $x = 0$  to  $x = y$ .
- Q4.** Write Translational, Rotational, Scaling, Reflection, Shear Transformation matrix for 2D and 3D homogeneous system. Determine the final coordinates of a polygon ABCD, A (1, 4), B(-4, 1) C(-1, -1) D(2, -2) when it is scaled up to twice its size with respect to an arbitrary point P(1, 1).
- Q5.** What do you mean by simulating acceleration in animation ? What type of acceleration will be simulated by a straight line function ? Draw suitable graph for the mathematical function used to describe the frame spacing regulation when positive acceleration is desired to be produced.
- Q6.** Compare Perspective projection with the Parallel projection, give the taxonomy of projection. Obtain a Projection matrix for perspective projection of a point P(x,y,z) onto  $x = 5$  plane, provided the center of projection is at (0,0,-10)
- Q7.** Compare Cohen-Sutherland Clipping with Sutherland-Hodgman clipping. Explain all the four cases of the Sutherland – Hodgman polygon clipping algorithm. Use the Sutherland – Hodgman polygon clipping algorithm to clip the  $\triangle ABC$  given below.



- Q8.** What is a Bezier curve? Explain the Mathematical expression of Bezier Curves. Derive all the properties of Bezier curves. A Cubic Bezier curve has control points  $P_0 (0, 0)$ ;  $P_1 (5, 40)$ ;  $P_2 (40, 5)$ ;  $P_3 (50, 15)$ . Determine 2 more points on the same Bezier curve.
- Q9.** Write and discuss Z-Buffer algorithm with suitable example. What are the maximum number of objects that can be handled by the Z-buffer algorithm? What will happen if Z-buffer algorithm is used and it is found that two polygons have same Z-value?
- Q10.** Compare the following:
- a) Ray tracing and Ray casting
  - b) Scan line Polygon fill algorithm and Flood Fill Algorithm
  - c) Phong shading and Gourand Shading
  - d) Lossy and Lossless compression techniques
  - e) Graphics and Animation
  - f) JPEG and TIFF
  - g) Bitmap Graphics and Vector Graphics
  - h) Parametric and Geometric Continuity

**Course Code** : **MCSL-054**  
**Course Title** : **Laboratory Course (Advanced Internet Technologies & Computer Graphics and Multimedia)**  
**Assignment Number** : **MCA(V)/L054/Assignment/2019-20**  
**Maximum Marks** : **100**  
**Last Date of Submission** : **15th October, 2019 (for July, 2019 session)**  
**15th April, 2020(for January, 2020 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)**

- Q1.** Develop a web page using servlet and JDBC to display the details of books on topic DBMS available in library. Make necessary assumptions. **(4 Marks)**
- Q2.** Write a program using JDBC and JSP to display the name, address and account number of all the saving account holders of a branch of a Bank, having balance of Rs. 5000/- or more in their account. Make necessary assumptions. **(4 Marks)**
- Q3.** Write a JSP program using JDBC to keep records of personal information of its employees. The program should provide facility of view details of employees, modify their details and add details of new employees. Design appropriate User Interface and implement proper validation mechanism for proper and correct data entry. Make necessary assumptions. **(8 Marks)**
- Q4.** Create an XML document for keeping MCA students information at a study centre of IGNOU. **(4 Marks)**

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

- Q1.** Write a program in C/C++ using OpenGL to draw a Triangle of orange colour and inside that draw a Circle of green colour. **(3 Marks)**
- Q2.** Write a program in C/C++ using OpenGL to draw a hard wire house as shown in figure given below using OpenGL. **(4 Marks)**

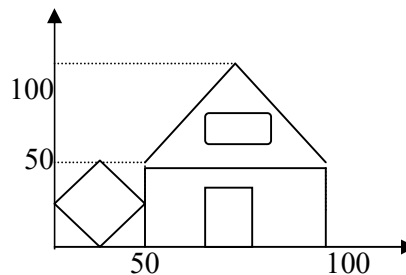


Figure: House



- Q3.** Write a program in C or C++ to implement Scan-Line Polygon Filling Algorithm. **(6 Marks)**
- Q4.** Write a program in C/C++ to implement Cohen-Sutherland line clipping algorithm. In this implementation consider two cases of a line: totally visible, totally invisible, against the rectangular clipping window. **(7 Marks)**

<b>Course Code</b>	<b>:</b>	<b>MCSE-003</b>
<b>Course Title</b>	<b>:</b>	<b>Artificial Intelligence and Knowledge Management</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA(V)E003/Assignment/2019-20</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Weightage</b>	<b>:</b>	<b>25%</b>
<b>Last Date of Submission</b>	<b>:</b>	<b>15thOctober,2019 (For July,2019 Session)</b> <b>15thApril, 2020 (For January,2020 Session)</b>

**Note: This assignment has 10 questions of 80 marks (All Questions carries equal marks). Answer all the questions. Rest 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.**

**Q1.** What is “Turing test” ? Give a brief outline of the Turing test. What are the limitations of Turing test? How “Chinese Room Test” took over the limitations of Turing test? How did the outcomes of the Chinese Room Test contribute in the development of machine intelligence?

**Q2.** Briefly discuss the concept of Resolution and Unification mechanism in Artificial intelligence. Given knowledge consists of the facts

- (i) Whoever can read is literate.
- (ii) Dolphins are not literate.
- (iii) Some Dolphins are intelligent.

Use the available knowledge and the concept of resolution to prove the statement “Some, who are intelligent, cannot read”.

**Q3.** (a) Transform the following to **DNF** :

- (i)  $P \rightarrow (\sim (Q \rightarrow R))$
- (ii)  $(P \rightarrow Q) \rightarrow \sim P$
- (iii)  $\sim (P \rightarrow Q) \rightarrow \sim R$
- (iv)  $(P \rightarrow (\sim (Q \rightarrow R)))$

(b) Given the formulae

$$E_1 : A \rightarrow B : E_2 : \sim B: G: \sim A$$

Prove the G is logical Consequence of E1 and E2 without truth table.

(c) Transform the following well formed formula to Prenex normal form  
 $(\forall_x) (Q(x) \rightarrow (\exists_x) R(x, y))$

(d) Write well formed formulae of following statements

- (i) Person respected by every other person is a king.
- (ii) Some, who are intelligent, can't read.

**Q4.** Differentiate the following:

- (i) Monotonic reasoning and Non-Monotonic reasoning
- (ii) Predicate logic and Propositional logic
- (iii) Supervised learning and Unsupervised learning
- (iv) Scripts and Frames

- Q5.** What are the systems available to handle the incompleteness of a knowledge base? Discuss each in detail with suitable example. What do you understand by the term “Fuzzyfication”? Given below a fuzzy set to describe the term tall

tall = (5’/0’0; 5’5”/0’2; 5’8” /0’5 6’/0’7; 6’5”/0’8; 7’/1’0)

Discuss and describe membership function for the fuzzy sets for each of the terms:

- (i) Very tall
- (ii) More or less tall
- (iii) Not tall

- Q6.** (a) What do you mean by S-Expression in LISP? Briefly describe by the type of S-Expressions available in LISP.

(b) Write a program in LISP to find the factorial of a number, entered by the user. Give comments in the program to explain your logic.

(c) Evaluate the following **LISP** expressions:

- 1. (greaterp 18 151 76)
- 2. (reverse ((p q) r (s t)))
- 3. (list ‘a’(b c))
- 4. (cadadr ‘(x (y z) l))
- 5. (append ‘a ‘(b c d))
- 6. (list ‘a ‘(bc))
- 7. (append ‘(a) ‘(bc))
- 8. (equal ‘a (car ‘(ab))))
- 9. (+5 (read))
- 10. (cdr car ‘((ab)cd))

(d) Discuss the following :

- (i) Lambda Function
- (ii) Mapcar Function
- (iii) Cond Function

- Q7.** (a) What do you mean by backtracking? Briefly describe the concept with the help of an example prolog program.

(b) Consider the following PROLOG program say with the following knowledge base:

*Sister (sue, bill)*  
*Parent (ann, sam)*  
*Parent (joe, ann)*  
*Male (joe)*  
*female (ann)*

the rule applicable to the given knowledge base is say :

*grandfather (X,Z) :- parent (X,Y), parent (Y, Z), male (X)*

Now perform following tasks :

- (i) Explain the actual meaning of above rule.
- (ii) What will be the output when given knowledge base is inquired for
  - (A) ? – parent (X, sam)
  - (B) Grandfather (X,Y)
- (c) Write a Prolog program to find factorial of a number given by the user.
- (d) Explain the difference between Forward and Backward Chaining. Under which situation which mechanism is best to use, for a given set of problem?

**Q8.** Write Short notes on the following

- (i) Classification of Agents in Artificial Intelligence
- (ii) Truth Maintenance System – TMS.
- (iii) Skolomization
- (iv) Expert System and its architecture

**Q9.** Express the following knowledge as a semantic network structure with Interconnected nodes and labeled arcs.

“IGNOU is an open university established by an act of parliament. It has various schools of studies and Divisions to support academic activities at the Head Quarters. IGNOU’s regional centers are spread all over the country to manage the academic and administrative activities. Each School and Division is headed by a Director and each Regional Center is headed by Regional Directors.”

**Q10.** How PROLOG system solves the problem? Discuss with suitable example. Briefly discuss the Data Types, structures and operations in PROLOG.

<b>Course Code</b>	<b>:</b>	<b>MCSE-004</b>
<b>Course Title</b>	<b>:</b>	<b>Numerical and Statistical Computing</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA(V)E004/Assignment/2019-20</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Weightage</b>	<b>:</b>	<b>25%</b>
<b>Last Date of Submission</b>	<b>:</b>	<b>15thOctober,2019 (For July,2019 Session)</b> <b>15thApril, 2020 (For January,2020 Session)</b>

**Note: This assignment has 20 questions of 80 marks (All Questions carries equal marks). Answer all the questions. Rest 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.**

- Q1.** Evaluate the sum  $S = \sqrt{3} + \sqrt{5} + \sqrt{7}$  to 4 significant digits and find its absolute and relative errors.
- Q2.** Find the root of the equation  $2x = \cos x + 3$  by using Bisection method, correct to three decimal places.
- Q3.** Use the Newton – Raphson method to find a root of the equation  $x^3 - 2x - 5 = 0$ .
- Q4.** Use Lagrange’s Interpolation formula to find the value of  $\cos(\pi/6)$  given  $y = \cos x$ .

x	0	$\pi/4$	$\pi/2$
y = Cos x	1.0	0.70711	0

- Q5.** Determine the value of y when  $x = 0.1$ . Given that  $y(0) = 1$  and  $y' = x^2 + y$ . Use Euler’s method.
- Q6.** Determine the constants a and b by the method of least squares such that  $y = ae^{bx}$  fits the following data:

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

- Q7.** A car hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as Poisson variate with mean  $1.5$ . Calculate the proportion of days on which
- neither car is used
  - some demand is refused
- Q8.** What are the two pitfalls of the Gauss Elimination Method? Solve the following system, using Gauss Elimination Method:
- $$2x + y + z = 10$$
- $$3x + 2y + 3z = 18$$
- $$x + 4y + 9z = 16$$
- Q9.** Use secant method to find the roots of the equation  $f(x) = 0.5e^x - 5x + 2$

- Q10.** Evaluate  $\int_0^1 \frac{dx}{1+x}$  with an accuracy  $10^{-6}$ , by using the Simpson rule.
- Q11.** Evaluate  $\int_0^1 \frac{dx}{1+x}$  using composite trapezoidal rule with  $n = 2$  and  $4$ .
- Q12.** Solve the initial value problem  $\frac{dy}{dx} = y - x$  with  $y(0) = 2$  and  $h = 0.1$   
Using fourth order classical Runge –Kutta Method, find  $y(0.1)$  and  $y(0.2)$  correct to four decimal places.
- Q13.** An irregular six faced die is thrown and the expectation that in 10 throws it will give live even numbers is twice the expectation that it will give four even numbers. How many times in 10000 sets of 10 throws would you expect it to give no even number ?
- Q14.** Following data is given for marks in subject A and B of a certain examination.

	Subject A	Subject B
Mean Marks	36	85
Standard Deviation	11	8

Coefficient of correlation between A and B =  $\pm 0.66$

- Determine the two equations of regression.
  - Calculate the expected marks in A corresponding to 75 marks obtained in B.
- Q15.** The population of a town in the decennial census was as given below:

Year	1891	1901	1911	1921	1931
Population : y (in thousands)	46	66	81	93	101

Estimate the population for the year 1895 using forward difference table.

- Q16.** A chemical engineer is investigating the effect of process operating temperature on product yield. The study results in the following data :

Term ( $^{\circ}\text{C}$ ) (X)	Yield % (Y)
100	45
110	51
120	54
130	61
140	66
150	70
160	74
170	78
180	85
190	89

Determine the Goodness to fit parameter 'R' and comment on whether the predicted line fits well into the data or not.

**Q17.** The tangent of the angle between the lines of regression y on x and x on y is  $0.6$  and  $\sigma_x = \frac{1}{2} \sigma_y$ . Find  $r_{xy}$ .

**Q18.** Solve the following system of linear equations by using Jacobi's method:

$$2x_1 - x_2 + x_3 = -1 ; x_1 + 2x_2 - x_3 = 6 ; x_1 - x_2 + 2x_3 = -3$$

**Q19.** Evaluate the integral  $I = \int_0^{\pi/2} \sin x \, dx$  using Gauss-Legendre formula. Compare the results with exact solution obtained by Simpson rule. The exact value of  $I = 1$ .

**Q20.** Discuss the following

- (i) Non Linear Regression
- (ii) Acceptance Rejection Method
- (iii) Moment Generating Function
- (iv) Probability Distributions

**Course Code** : **MCSE-011**  
**Course Title** : **Parallel Computing**  
**Assignment Number** : **MCA (V)/E011/Assignment/2019-20**  
**Maximum Marks** : **100**  
**Weightage** : **25%**  
**Last Dates for Submission** : **15<sup>th</sup> October, 2019 (For July, 2019 session)**  
**15<sup>th</sup> April, 2020 (For January, 2020 session)**

**Note: 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.**

**Q1. Develop a Parallel Algorithm for Matrix multiplication. Make necessary assumptions. (40 Marks)**

**Q2. The traveling salesman problem is to find the shortest route connecting a set of cities, visiting each city only once. This problem is known to be NP-complete and the simulating annealing method has been used to solve it heuristically. Write a Message Passing Interface parallel Algorithm / Program to solve the problem for a fixed number of cities. (40 Marks)**