

MASTER OF COMPUTER APPLICATIONS (MCA)

MCA/ASSIGN/SEMESTER-V

**ASSIGNMENTS
(July - 2020 & January - 2021)**

**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/2020-21**
Maximum Marks : **100**
Weightage : **25%**
Last Dates for Submission : **31st October, 2020 (For July, 2020 Session)**
: **15th April, 2021 (For January, 2021 Session)**

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

- Q1.** Define a scriptlet and expressions in JSP ? Create a simple JSP page which includes declaration, scriptlets, expressions and comments tag in it. **(10 Marks)**
- Q2.** Define authentication mechanism? Explain any two basic mechanisms through which a web client can authenticate a user to a web server using *http authentication*. **(10 Marks)**
- Q3.** Create a LOGIN page using JSP and JDBC. Database is created in Oracle. **(7 Marks)**
- Q4.** Write a servlet program to fetch and display all the fields of student table having 10 records with field names as student name, enrollment number, email ID and grades achieved in TEE., **(7 Marks)**
- Q5.** Define DTD. What is its use in XML? Write the DTD of an XML document that describe the bank account which has the following attributes : **(8 Marks)**
Account number (mandatory)
Customer_id (can be multiple)
First name (mandatory)
Middle name (optional)
Last name (optional)
Account type (mandatory)
Balance (mandatory)
- Q6.** What is the purpose of message-driven beans and define its structure? Explain the various circumstances under which a message-driven bean should be used. What makes message driven beans different from session beans? **(8 Marks)**
- Q7.** Briefly explain any seven JSP implicit objects. **(7 Marks)**

- Q8.** What are Cookies ? Briefly explain the following methods of Cookie class: **(8 Marks)**
- (i) setMaxAge
 - (ii) setVersion
 - (iii) setDomain
 - (iv) setPath
- Q9.** What is the need of web security ? Explain data integrity and system integrity in the context of web security. **(7 Marks)**
- Q10.** What are the advantages of using Java's multiple layer security implementation ? Explain with the help of an example program. **(8 Marks)**

Course Code	:	MCS-052
Course Title	:	Principles of Management and Information
Assignment Number	:	MCA(V)/052/Assignment/2020-21
Maximum Marks	:	100%
Weightage	:	25%
Last Dates for Submission	:	31st October, 2020 (For July, 2020 Session)
	:	15th April, 2021 (For January, 2021 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.

Q1.What is an Organisation? Briefly describe different types of Organisations. What do you mean by structure of an Organisation? **(10 Marks)**

Q2. Explain need of system analysis for design of an Information system. Also briefly describe tools and methods used in Analysis. **(10 Marks)**

Q3. What is an Information system? Explain impact of information systems on business. **(10 Marks)**

Q4. What is a management system? Explain different levels of management activities. Also briefly explain properties of business transaction processing. **(10 Marks)**

Q5. (a) What is "Total Cost of Ownership" of an Information system ? Explain with the help of example. **(5 Marks)**

Q5.(b)What is supply chain management(SCM) software? How does the concept of SCM differ from enterprise resource planning (ERP) software? Explain briefly. **(5 Marks)**

Q6. What is "Intellectual Property" ? What is its relevance in corporate world? How can intellectual property be protected? Explain in detail. **(10 Marks)**

Q7. What is Knowledge Management (KM)? Explain need of KM in Business Organisations. **(10 Marks)**

Q8. Explain major security threats to information systems? Also describe the terms Cyberwar and Cyberterrorism? **(10 Marks)**

Course Code	:	MCS-053
Course Title	:	Computer Graphics and Multimedia
Assignment Number	:	MCA (V)/053/Assign /2020-21
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	31st October, 2020 (For July, 2020 Session) 15th April, 2021 (For January, 2021 Session)

There are eight questions in this assignment (each carrying 10 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.

Q1. Write the DDA algorithm and Bresenham Line generation Algorithm. Compare the line generation mechanism of DDA algorithm with Bresenham Line generation Algorithm while drawing a line segment from (1, 0) and (9, 8). Show step by step execution of both Line Generation algorithm, though a Graph. **(10 Marks)**

Q2. Compare Cohen Sutherland and Cyrus beck line clipping algorithms, with suitable example of each. In Cyrus Beck line clipping algorithm, How will you determine whether the point of intersection between line segment and clipping window is Potentially Entering (PE) or Potentially Leaving (PL). Derive the expression for the parameter (t) with respect to ith edge and the line segment PQ (line to be clipped) in the context of Cyber Beck line clipping algorithm. **(10 Marks)**

Q3. Differentiate between Euclidean Coordinate System and Homogeneous Coordinate system. Discuss the advantage of Homogeneous Coordinate system over Euclidean Coordinate System. Assume that a polygon ABCDE has the coordinates A(0, 0), B(10,10), C(10,2),D(5,5),E(7,6) is subjected to the clockwise rotation of 45° about an axis passing through the centroid of the polygon, find the final coordinates of the polygon ABCDE. You should represent the transformation using Homogeneous Coordinate System. **(10 Marks)**

Q4. Discuss the Taxonomy of Projection in computer graphics, with suitable diagram. Compare and contrast Parallel & Perspective projection, in detail (i.e. with suitable examples, equations, expressions etc.). What is isometric projection? What do you understand by the term vanishing point in context of projections, in computer graphics. Obtain a Projection matrix for perspective projection of a point P(x,y,z) onto $z = 5$ plane, provided the center of projection is at (0,0,-10), can we find the vanishing point(s) for this projection? Justify. **(10 Marks)**

Q5. What are the uses of Bezier Curves and Bezier Surfaces? Explain the Mathematical expression of Bezier Curves. Write the properties of the Bezier curves, prove all properties. Discuss the Parametric Continuities and Geometric Continuities of Bezier Curves, with suitable expressions,

equations and examples. Explain the purpose of control points in Bezier, a Cubic Bezier curve has control points P0 (0, 0); P1 (5, 40); P2 (40, 5); P3 (50, 15). Determine 2 more points on the same Bezier curve. Draw a rough sketch of the curve and show coordinates of various points on it?

(10 Marks)

Q6. 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?

(10 Marks)

Q7. Explain the following with suitable examples:

(10 X 1 = 10 Marks)

- (i) Windowing Transformations
- (ii) Scan Line Polygon Fill Algorithm
- (iii) Area Sub-Division Algorithm
- (iv) Sweep representations
- (v) Simulating Accelerations in Computer Animations
- (vi) Shading and its types
- (vii) Authoring Tools
- (viii) Animation and its types
- (ix) Audio File Formats and its type
- (x) Video File Formats and its types

Q8. Differentiate between the following

(10 X 1 = 10 Marks)

- (i) Key frame animation Vs Cel animation
- (ii) Analog Vs Digital Sound
- (iii) Hypermedia Vs hypertext
- (iv) Painting tools Vs drawing tools
- (v) Random Scan Display Devices Vs Raster Scan Display Devices
- (vi) Computer Graphics Vs Animation
- (vii) Interlaced Vs progressive scan
- (viii) Compression Vs decompression in digital video
- (ix) Hypermedia and hypertext
- (x) Ray tracing Vs Ray casting

Course Code : **MCSL-054**
Course Title : **Laboratory Course**
Assignment Number : **MCA(V)/L-054/Assignment/20-21**
Maximum Marks : **100**
Weightage : **25%**

Last Dates for Submission : 31st October, 2020 (For July, 2020 Session)
: 15th April, 2021 (For January, 2021 Session)

This assignment has two parts A (Advanced Internet Technologies) and part B (Computer Graphics & Multimedia). Each part is of 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. Please state the assumptions made, if any.

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

Q1. Develop a web page using servlet and JDBC to display the account balance of a saving account. Make necessary assumptions. (8 Marks)

Q2. Write a JSP program to create a web page which display the image of products, price, discount on products and brief description of products for an online toy shelling company which sells toys kids of age 5-10 years. Make necessary assumptions. (8 Marks)

Q3. Create an XML document for Books in a book shop. (4 Marks)

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

Q1. Write a program in C/C++ using OpenGL to draw a rectangle green color and inside that draw a circle of blue color. (4 Marks)

Q2. Write a program in C/C++ using OpenGL to show that a ball is expanding then shrinking. (4 Marks)

Q3. Write a program in C/C++ to implement DDA circle generation algorithm. (4 Marks)

Q4. Write a program in C/C++ to implement Bresenham's line generation algorithm. (4 Marks)

Q5. Write a program in C/C++ to implement Cohen-Sutherland line clipping algorithm. (4 Marks)

Course Code : MCSE-003
Course Title : Artificial Intelligence and Knowledge Management
Assignment Number : MCA(V)-E003/Assignment/2020-21
Maximum Marks : 100
Weightage : 25%
Last Dates for Submission : 31st October, 2020 (For July, 2020 Session)

: 15th April, 2021 (For January, 2021 Session)

Note: This assignment has 20 questions of 80 marks (each question 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. State and justify the validity of following inference rules

- (i) Chain rule
- (ii) Simplification

Q2. Determine whether each of the following sentences are satisfactory, contradictory or valid

- (i) $(P \wedge Q) \vee \sim (P \wedge Q)$
- (ii) $(P \rightarrow Q) \rightarrow \sim P$

Q3. Transform the following in to CNF (Any two) :

- (i) $\sim (C \rightarrow D) \vee (C \wedge D)$
- (ii) $\sim (X \rightarrow Y) \rightarrow Z$
- (iii) $P \rightarrow (\sim C \rightarrow R)$

Q4. With the help of a suitable example, describe the “member” function of PROLOG. How searching of a data in a list, recursively.

Q5. What is Turing Test ? If the machine passes Turing Test, does it mean that the system is intelligent ? What are the associated problems with Turing Text? What are required improvements/advances to overcome these problems?

Q6. Transform the following conceptual graph in to FOPL statement
[PERSON: Anita] \leftarrow (AGENT) \leftarrow [DRINK] \rightarrow (OBJECT) \rightarrow [Food: MILK] \rightarrow \leftarrow (Instrument Glass)

Q7. Write a recursive program in LISP to find factorial of a number given by the user?

Q8. How a language for artificial intelligence differs from normal programming languages? Give name of three languages frequently used as programming language for developing Expert System

Q9. What do you mean by term “Agents” in Artificial Intelligence? Classify the various types of agents.

Q10. Briefly describe the term “Truth Maintenance System – TMS”.

Q11. Explain the following logic concepts, if required use suitable examples (Any two):

- (i) Modus Tollens
- (ii) Satisfiable statement
- (iii) Resolution principle in proposition logic

Q12. Give conceptual dependency representation of the sentence give below:

“Mohan will eat pizza from the plate with fork and knife ”

Q13. Compare and contrast the following:

- (i) Frames and scripts
- (ii) Informed search and uniformed search

Q14. Define following properties of propositional statement :

- (i) Satisfiable
- (ii) Contradiction
- (iii) Valid
- (iv) Equivalence
- (iii) Logical consequence

Q15. What is meant by ‘Closed Word Assumption’? Where is it used in AI?

Q16. Write short notes on any two of the following:

- a. Expert systems
- b. Non Deductive Inference rule
- c. Methods to deal with Uncertainty in knowledge systems

Q17. Explain the difference between Forward and Backward Chaining. Under which situation which mechanism is best to use, for a given set of problems?

Q18. Express the following knowledge as a semantic network structure with Interconnected nodes and labeled arcs. “Ram is Vice President of ABC Company. He is married to Raj and has a male child RamRaj. RamRaj Goes to school. Ram plays golf and owns a silver color German made car Mercedez Benz”

Q19. What will be the output of the function when invoked with $n = 5$ and $n = 6$. Write each step, while calculating the result

```
(defun myfun (n)
  (cond ((zerop n) - 1)
        (t(* (- 0 n)
              myfun (- n 1) ) )
        )))
```

Q20. Consider the following PROLOG program say the knowledge base is :

```
Sister (sue, bill)
Parent (ann, sam)
Parent (joe, ann)
```

Male (joe)
Female (ann)

the rule applicable to the 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)

Course Code	:	MCSE-004
Course Title	:	Numerical and Statistical Computing
Assignment Number	:	MCA(V)-E004/Assignment/2020-21
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	31 st October, 2020 (For July, 2020 Session)
	:	15 th April, 2021 (For January, 2021 Session)

Note: This assignment has 16 questions of 80 marks (each question 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.** Find the value of 'e', correct to 3 decimal places. $e = 1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots$ (5 Marks)
- Q2.** If 0.333 is the approximate value of $\frac{1}{3}$, find absolute, relative and percentage error. (5 Marks)
Explain how these errors measure accuracy.
- Q3.** If a bank receives on an average six bad cheques per day, then what is the probability that it will receive four bad cheques on any given day? (5 Marks)
- Q4.** Use the Newton-Raphson method to find a root of the equation $x^3 - 2x - 5 = 0$. (5 Marks)
- Q5.** Find the value of $\sin(\pi/6)$ by using Lagrange's interpolation, the related data is given below : (5 Marks)

x	:	0	$\pi/4$	$\pi/2$
y = sin(x)	:	0	0.707	1.0

- Q6.** Find the roots of the equation $f(x) = \frac{e^x}{2} - 5x + 2$, by using Secant method. (5 Marks)
- Q7.** 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} . (5 Marks)
- Q8.** Evaluate $\int_0^1 \frac{dx}{1+x}$, using Composite Trapezoidal rule with n = 2 and 4. (5 Marks)
- Q9.** What are the pitfalls of Gauss-Elimination method? Solve the following system, using Gauss Elimination Method : (5 Marks)
- $$2x + y + z = 10$$
- $$3x + 2y + 3z = 18$$
- $$x + 4y + 9z = 16$$
- Q10.** An irregular six faced die is thrown and the expectation that in 10 throws it will give five even numbers is twice the expectation that it will give four even numbers. How many times in 10,000 sets of 10 throws would you expect it to give no even number? (5 Marks)

Q11. 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. **(5 Marks)**

Q12. Solve by Jacobi’s method, the following system of linear equations : **(5 Marks)**

$$2x_1 - x_2 + x_3 = -1$$

$$x_1 + 2x_2 - x_3 = 6$$

Q13. 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 $I = 1$. **(5 Marks)**

Q14. Evaluate the integral $I = \int_0^1 \frac{dx}{1+x}$ by using Simpson’s $\frac{1}{3}$ rule with $h = 0.25$ (or 5 points, viz. $0.0, 0.25, 0.50, 0.75$ and 1.00). **(5 Marks)**

Q15. A polynomial passes through the following set of points : **(5 Marks)**

x	1	2	3	4
y	-1	-1	1	5

Find the polynomial, using Newton’s forward interpolation.

Q16. 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 **(5 Marks)**

- (i) neither car is used
- (ii) some demand is refused

Course Code : **MCSE-011**
Course Title : **Parallel Computing**
Assignment Number : **MCA(5)/E011/Assign/2020-21**
Maximum Marks : **100**
Weightage : **25%**
Last Dates for Submission : **31st October, 2020 (For July, 2020 Session)**
: **15th April, 2021 (For January, 2021 Session)**

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.

Q1: Develop a Parallel Algorithm for addition of Two Sparse Matrices. Make necessary assumptions. **(40 Marks)**

Q2: Distinguish among Computer Terminologies in each of the following groups:
(4 X 10 = 40 Marks)

- (a) Data processing, Information processing, Knowledge processing, and Intelligence processing
- (b) Batch processing, Multiprogramming, Time sharing, and multiprocessing
- (c) Parallel processing at the job level, the task level, the interinstruction level, and the intrainstruction level
- (d) Uniprocessor systems versus Multiprocessor systems