MASTER OF COMPUTER APPLICATIONS (MCA)

MCA/ASSIGN/SEMESTER-V

ASSIGNMENTS
(July - 2021 & January - 2022)

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/2021-22**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October, 2021 (For July, 2021 Session)**
	:	**15th April, 2022 (For January, 2022 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: Write and run a server program for online submission of an examination form which comprizes the following fields and display its records. **(6 Marks)**

- Student name
- Enrollment Number
- Course code (s)
- Regional center code
- Email ID

You are required to create at least 5 records in a database in and connect the servlet with the database using JDBC API and run the SQL query.

Q2: What is the purpose of session tracking? Describe the methods used by Servlet for session tracking. **(6 Marks)**

Q3: (a) Describe all the JDBC SQL Statement APIs and its methods **(5 Marks)**

(b) Modify the database created in Q1 by adding 5 more record using the JDBC SQL Statement method **(5 Marks)**

Q4: Write a JSP code fragments for the following tasks:

(a) Insert the following fields into a database after extracting them from an HTML from. **(6 Marks)**

Student _name

Enrolmentnumber

e-mail ID

(b) Retrieve records from a database using JSP. **(4 Marks)**

Q5: (a) Write an application to create a XML document from an employee database. The XML document should contain the name of an employee, address, mobile number and the last 6 months mobile recharge payment summary. **(7 Marks)**

(b) Differentiate between HTML and XML with the help of an example. **(5 Marks)**

Q6: (a) Under what conditions the use of entity beans is done? Describe the entity beans methods to update and destroy a database. **(5 Marks)**

(b) Write the advantage of using an entity bean for database operations over directly using JDBC API. **(6 Marks)**

Q7: With the help of an example, show implementation of a massage driven bean and explain the methods required to implement it. **(10 Marks)**

Q8: What are the advantages of using Java's multiple layer security implementation? Explain with the help of an example program. **(9 Marks)**

Q9: Discuss the security measures taken in SSL protocol. **(6 Marks)**

Course Code	**:**	**MCS-052**
Course Title	**:**	**Principles of Management and Information Systems**
Assignment Number	**:**	**MCA (V)/052/Assign/2021-2022**
Maximum Marks	**:**	**100**
Last Date of Submission	**:**	**31th October, 2021(for July, 2021 session)** **15th April, 2022(for January, 2022 session)**

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. Make suitable assumption is necessary.

Q1. Briefly describe different types of Organizations. Explain in brief the basic principles that should be considered while designing an organization structure. **(10 Marks)**

Q2. What are different levels of management? Explain role and functions of employees at different levels of management. **(10 Marks)**

Q3. What is Information System? Describe need of requirement analysis in designing Information Systems. List various tools used in requirement analysis of Information System. **(10 Marks)**

Q4. What is DSS? How is it useful for any organization? Explain in detail. **(10 Marks)**

Q5. What is Transaction Processing System (TPS)? Explain with example. Also write featurs of TPS. **(10 Marks)**

Q6. (a) What is discounted cash flow (DCF)? Explain with example. **(5 Marks)**

Q6. (b) Describe total cost of ownership (TCO). **(5 Marks)**

Q7. (a) What is portfolio management? Write steps for portfolio management implementation. **(5 Marks)**

Q7. (b) Describe use of intelligent systems in e-business. Also, explain different roles of business intelligence tools in different management levels. **(5 Marks)**

Q8. What is ERP? Explain need of ERP. Also, briefly explain practicalities in an ERP implementation. **(10 Marks)**

Course Code	**:**	**MCS-053**
Course Title	**:**	**Computer Graphics and Multimedia**
Assignment Number	**:**	**MCA(V)-053/Assignment/2021-2022**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Date of Submission	**:**	**31th October, 2021(for July, 2021 session)** **15th April, 2022(for January, 2022 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: What is frame buffer ? How it is different from the display buffer ? How a frame buffer is used for putting colour and controlling intensity of any display device ?

Q2: What is animation ? How it is different from Graphics? Explain how acceleration is simulated in animation? Discuss all the cases i.e. zero acceleration, Positive acceleration, Negative acceleration and combination of positive and negative acceleration.

Q3: Explain the scan line polygon filling algorithm with the help of suitable diagram..

Q4: Write Z-Buffer Algorithm for hidden surface detection. Explain how this algorithm is applied to determine the hidden surfaces.

Q5: Write Midpoint Circle Generation Algorithm. Computer coordinate points of circle drawn with centre at (0,0) and radius 5, using midpoint circle algorithm.

Q6: Discuss Shear Transformation with suitable example, write Shear transformation matrix for Shear along X- axis, Y-axis and Generalized Shear. Show that the simultaneous shearing shxy (a, b), is not same as the shearing in x-direction, shx(a) followed by a shearing in y-direction, shy(b).

Q7: What is the role of light in computer graphics? Discuss the Lamberts Cosine Law? Explain ambient, diffused and specular reflection. Give general mathematical expression of each, also give the mathematical expression to determine the Intensity when all three type of reflections are available.

Q8: Discuss the Taxonomy of projection with suitable diagram. How Perspective projection differs from Parallel projection. Derive a transformation matrix for a perspective projection of a point P (x,y,z) onto Z =4 plane as viewed from E (0, 0,-d)

Q9: Write Bresenham line drawing algorithm and DDA algorithm ? Compare both algorithms and identify which one is better and why? Draw a line segment joining (4, 8)and (8, 10) using both algorithms i.e. Bresenham line drawing algorithm and DDA algorithm.

Q10: What is Bezier Curve? Discuss the Role of Bernstein Polynomial in Bezier Curve. How Bezier curves contribute to Bezier Surfaces? Prove the following properties of Bezier curve.

(i) $P(u=1) = P_n$

(ii) $P(u=0)=P_0$

Given four control points P_O (2, 2) P_1 (3, 4) P_2 (5, 4) and P_3 (4, 2) as vertices of Bezier curve. Determine four points over the Bezier Curve, with given control points.

Q11: What is the advantage of using homogenous co-ordinate system over Euclidean coordinate system? Consider the square ABCD with vertices A(0, 0),B (0, 2),C (2, 0), D (2, 2). Perform the follows transformation.

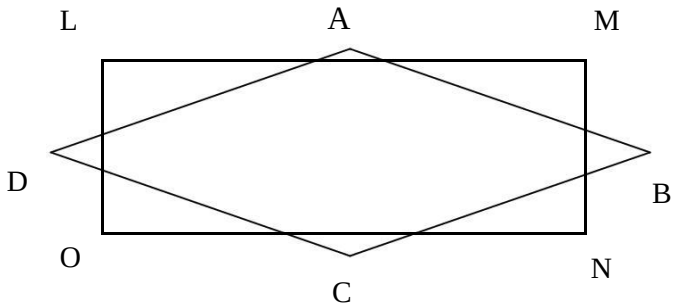
(i) Scale up the polygon to twice its size.
(ii) Rotate the polygon by 45° in anti clockwise direction.
(iii) Translate the centroid of the polygon to point (3,5)

Q12: Derive the 2D-transformtion matrix for reflection about the line y = x. Use this transformation matrix to reflect the triangle A (0,0) ,B(1, 1), C(2 ,0) about the line = 2 .

Q13: Why Shading is required in Computer Graphics? Briefly Discuss the role of interpolation technique in Shading. Compare intensity interpolation and Normal Interpolation ? Which Interpolation technique contributes to which type of shading? Which shading technique is better Phong shading or Gourand shading, give reasons.

Q14: What is windowing transformation ? Discuss the real life example where you can apply the windowing transformation? Explain the concept of window to view port transformation with the help of suitable diagram and calculations.

Q15: Write and explain the pseudocode for Sutherland Hodgman polygon clipping algorithm. Using this algorithm clip the following polygon LMNO against the rectangular window ABCD as given below.



Q16: Explain any five of the following terms with the help of suitable diagram/example, if needed.

(a) Ray Tracing (b)Ray Casting.
(c) Audio file formats (d) Video file formats
(e) Authoring tools

Course Code	**:**	**MCSL-054**
Course Title	**:**	**Laboratory Course**
Assignment Number	**:**	**MCA(V)-054/Assignment/2021-2022**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Date of Submission	**:**	**31th October, 2021 (For July, 2021 Session)** **15th April, 2022 (For January, 2022 Session)**

Note: 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: Write a Servlet program to display details of your Study Centre. Make necessary assumptions. **(6 Marks)**

Q2: Write a program using JDBC and JSP to display the current balance from a saving bank account. The program should take account number or registered mobile number as input. **(10 Marks)**

Q3: Create an XML document for Saving Accounts of a Bank. **(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 square of blue colour. **(4 Marks)**

Q2: Write a program in C/C++ using OpenGL to draw a hard wire house as shown in figure given below. Use basic primitives of openGL. **(4 Marks)**

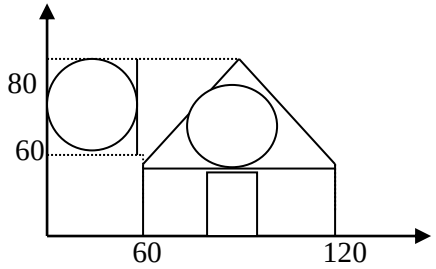


Figure: House

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. **(6 Marks)**

Course Code	**:**	**MCSE-003**
Course Title	**:**	**Artificial Intelligence and Knowledge Management**
Assignment Number	**:**	**MCA(V)-E003/Assignment/2021-2022**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Date of Submission	**:**	**31th October, 2021 (For July, 2021 Session)** **15th April, 2022 (For January, 2022 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: State and justify the validity of following inference rules
(i) Implication
(ii) Contra positive

Q 2: Transform the FOPL statement given below into equivalent English sentence & conceptual graph.
$\forall x$ (Has wings (x) Λ Layseggs (x) $\rightarrow$ is_Bird (x))

Q3: Determine whether each of the following WFF are satisfactory, contradictory or valid
(i) P Λ Q) V ~ (P Λ Q)
(ii) (P $\rightarrow$ Q) $\rightarrow$ ~ P

Q4: Transform the following in to CNF
(i) ~ (C $\rightarrow$ D) V (C Λ D)
(ii) ~ (X $\rightarrow$ Y) $\rightarrow$ Z

Q5: With the help of a suitable example, describe the "member" function of PROLOG. How it is used for Searching of a data in a list, recursively.

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 is 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 Maintainance System – TMS".

Q11: Explain the following logic concepts, if required use suitable examples
a) Satisfiable statement
b) 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
(iii) Forward and Backward Chaining
(iv) Modus Ponens and Modus Tollens
(v) Syllogism and Disjunctive Syllogism

Q14: Define following properties of propositional statement :

(i) Satisfiable
(ii) Contradiction
(iii) Valid
(iv) Equivalent
(v) Logical consequtence

Q15: Write short notes on any two of the following:
(i) Expert systems (ii) Non Deductive Inference rule (iii) Methods to deal with Uncertainty in knowledge systems (iv) Closed Word Assumption'(v) Properties of Agents

Q16: Express the following knowledge as a semantic network structure with Interconnected nodes and labeled arcs. "Ram is Vice President of AB 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"

Course Code	**:**	**MCSE-004**
Course Title	**:**	**Numerical and Statistical Computing**
Assignment Number	**:**	**MCA(V)-E004/Assignment/2021-2022**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Date of Submission	**:**	**31th October, 2021 (For July, 2021 Session)** **15th April, 2022 (For January, 2022 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: Obtain the roots of the equation $x^2 - 1 = 0$ by Regular Falsi method.

Q2: Apply Gauss – Elimination method to solve the following sets of equation

$x + 4y - z = -5$; $x + y - 6z = -12$; $3x - y - z = -4$

Q3: Use method of Lagrange's interpolation to find f(0.16), for Given Function f(x)= sin(x) where f (0.1) = 0.09983,f (0.2) =0.19867.
Also, Find error in f(0.16).

Q4: Find Newtons Forward difference interpolating polynomial for the following data:

X	0.1	0.2	0.3	0.4	0.5
f (x)	1.40	1.56	1.76	2.00	2.28

Q5: Calculate the value of integral : $\int_0^6 \frac{dx}{1+x^2}$ by
(i) Simpson's 1/3 rule.
(ii) Simpson's 3/8 rule.

Q6: A farmer buys a quantity of cabbage seeds from a company that claims that approximately 90% of the seeds will germinate if planted properly. If four seeds are planted, what is the probability that exactly two will germinate ?

Q7: Suppose that the amount of time one spends in a bank to withdraw cash from an evening counter is exponentially distributed with mean ten minutes, that is $\lambda = 1/10$. What is the probability that the customer will spend more than 15 minutes in the counter ?

Q8: Fit a straight line to the following data by the method of least square.

X	0	1	2	3	4
Y	1	1.8	3.3	4.5	6.3

Q9: Compute the approximate derivatives of $f(x) = x^2$ at x = 0.5 for the increasing value of h from 0.01 to 0.03 with a step size of 0.005 using :
(i) first order forward difference model
(ii) first order backward difference model.

Q10: Find the root of the equation $x^3 - x - 1 = 0$ lying between 1 and 2 by Bisection method.

Q11: A problem in statistics is given to the three students A, B and C, whose chances of solving it are ½, ¾ ,and ¼ respectively. What is the probability that the problem will be solved ?

Q12: In a partially destroyed laboratory, the record of an analysis of correlation data was found, the following results are legible:
Variance of X = 9
Regression equations: 8X - 10Y + 66 = 0 ; 40X - 18Y - 214 = 0

Find :
(i) The mean values of X and Y
(ii) The correlation coefficient between X and Y
(iii) Standard deviation of Y

Q13: An individual's IQ score has a Normal distribution N (100,152). Find the probability that an individual IQ score is between 91 and 121.

Q14: Solve the initial value problem $\frac{dy}{dx} = y - x$ with $y(0) = 2$ and $h = 0 \cdot 1$ Using fourth order classical Runge –Kutta Method, find $y(0 \cdot 1)$ and $y(0 \cdot 2)$ correct to four decimal places.

Q15: The tangent of the angle between the lines of regression y on x and x on y is $0 \cdot 6$ and $\sigma_x = \frac{1}{2}\sigma_y$. Find r_{xy}.

Q16: 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 $I = 1$.

Course Code	**:**	**MCSE-011**
Course Title	**:**	**Parallel Computing**
Assignment Number	**:**	**MCA(5)/E011/Assign/2021-2022**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31th October, 2021 (For July, 2021 Session)** **15th April, 2022 (For January, 2022 Session)**

All questions given carry equal marks. Answer all the questions. 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: Explain how hypernets integrate positive features of hypercube and tree based topologies into one combined architecture.

Q2: Explain how instruction set , compiler technology, CPU implementation and control, and cache and memory hierarchy affect the CPU performance and justify the effects in terms of program length, clock rate, and effective CPI.