MASTER OF COMPUTER APPLICATIONS (MCA_NEW/MCAOL)

SEMESTER-4 ASSIGNMENTS OF MCA_NEW/MCAOL PROGRAMME

(July - 2026 & January - 2027)

MCS-230, MCS-231

SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
MAIDAN GARHI, NEW DELHI – 110 068

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Important Notes

1. MCA_NEW Student need to submit the assignments to the Coordinator of your Study Centre on or before thedue date.
2. MCAOL Student need to submit the assignments on LMS Portal on or before the due date.
3. Assignment submission before due dates is compulsory to become eligible for appearing in corresponding Term End Examinations. For further details, please refer to Programme Guide.
4. 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 Programme Guide.
5. 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-230**
Course Title	**:**	**Digital Image Processing and Computer Vision**
Assignment Number	**:**	**MCA_NEW/MCAOL(IV)/230/Assign/2026-27**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**31st October, 2026 (For July, 2026 Session)** **15th April, 2027 (For January, 2027 Session)**

This assignment has sixteen questions of 5 Marks each; answer all questions. The remaining 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: Given an image is a gray-scale image with an aspect ratio of 8:2 and pixel resolution of 1280000 pixels, calculate the following:

a) Resolve pixel resolution to calculate the dimensions of the image
b) Calculate the size of the image

Q2: Solve the following problems:

a) What is the storage requirement for a 1024 x 1024, 24-bit colour image?
b) Calculate pixel resolution of a camera in megapixels, capturing an image of dimensions: 2000 X 3000

Q3: Explain how image enhancement is better in the frequency domain as compared to the spatial domain.

Q4: For the given 4x4 image having grey scales between [0, 9], carry out histogram equalization. Also, draw the histogram of the image before and after equalization.

1	4	5	3
3	3	7	4
3	4	6	2
1	2	7	2

Q5: What do you mean by Camera Calibration? Explain how intrinsic and extrinsic parameters of a camera are estimated.

Q6: Explain the following Smoothing Filter(s):

(i) Ideal Low Pass Filters (ILPF) **(ii)** Butterworth Low Pass Filters (BLPF) **(iii)** Gaussian Low Pass filters (GLPF)

Q7: Explain the following Image Sharpening Filter(s):

(i) Ideal High Pass Filters (ILPF) **(ii)** Butterworth High Pass Filters (BLPF) **(iii)** Gaussian High Pass filters (GLPF)

Q8: Perform partitional clustering using Frogy's method for the data given in the table below with k-2 (two clusters). Use the first two sample points (3,3) and (6,8) as seed points.

S. No.	X	Y
1	4	4
2	5	7
3	11	11
4	5	5
5	2	2
6	13	11
7	18	16
8	20	18

Q9: Explain Bayesian Classification with the help of a suitable example. Also discuss its properties.

Q10: Explain Optical flow in the context of motion perception in computer vision.

Q11: What are the different distance measures used for clustering? Explain each with the help of a suitable example.

Q12: Describe the Discrete Cosine Transform (DCT) and compare it with the Discrete Fourier Transform (DFT)

Q13: Describe the following with respect to Haar:

(i) Haar basis functions,
(ii) Haar transform matrix,
(iii) Its mathematical formulation and orthogonality property,
(iv) Computation of Haar transform,
(v) Advantages and applications of Haar in image processing with suitable illustrations.

Q14: Explain the role of camera models in three-dimensional scene reconstruction with suitable diagrams and examples

Q15: Explain Linear Discriminant Function (LDF), Piecewise Linear Discriminant Function, and Quadratic Discriminant Function with their mathematical formulations, properties, decision boundaries, advantages, limitations, and applications in pattern recognition.

Q16: Explain different image representation models (pixel model and vector model) and classify digital images based on attributes, colour, dimensions, and data types with suitable examples.

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Course Code	**:**	**MCS-231**
Course Title	**:**	**Mobile Computing**
Assignment Number	**:**	**MCA_NEW/MCAOL(IV)/231/Assign/2026-27**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**31st October, 2026 (For July, 2026 Session)** **15th April, 2027 (For January, 2027 Session)**

There are four questions in this assignment, which carry 80 marks. Each question carries 20 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance theexplanations, if necessary. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1: Explain the architecture of a Mobile Computing System. Discuss the roles of mobile devices, wireless communication infrastructure, mobile support stations, and cloud services. Illustrate your answer with a neat diagram.

Q2: Describe the IEEE 802.11 WLAN architecture. Explain the operation of infrastructure mode and ad hoc mode. Compare WLAN with cellular networks in terms of coverage, mobility, bandwidth, and applications.

Q3: Discuss the design issues in Mobile Database Management Systems (MDBMS). Explain the challenges of data replication, synchronization, transaction management, and recovery in mobile environments with suitable examples.

Q4: Explain the architecture of the Android Operating System. Discuss the functions of its major software layers and describe the Android application life cycle with the help of appropriate diagrams.