

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

**ASSIGNMENTS  
OF MCA\_NEW (2Yrs) PROGRAMME  
SEMESTER-I**

**(January - 2025 & July - 2025)**

**MCS-211, MCS-212, MCS-213, MCS-214, MCS-215**

**MCSL-216, MCSL-217**



**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 Programme Guide of MCA (2Yrs).
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 Programme Guide of MCA (2yrs).
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.

<b>Course Code</b>	<b>:</b>	<b>MCS-212</b>
<b>Course Title</b>	<b>:</b>	<b>Discrete Mathematics</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA_NEW(I)/212/Assign/2025</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Weightage</b>	<b>:</b>	<b>30%</b>
<b>Last Dates for Submission</b>	<b>:</b>	<b>30<sup>th</sup> April 2025 (for January Session) 31<sup>st</sup> October 2025 (for July Session)</b>

**This assignment has 20 questions of 4 Marks each, amounting to 80 marks. Answer all questions. 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:** Prove by mathematical induction that  $\sum_{i=1 \text{ to } n} \frac{1}{i(i+1)} = n/(n+1)$

**Q2:** Verify whether  $\sqrt{11}$  is rational or irrational.

**Q3:** Write the following statements in the symbolic form.

- i) Some students can not appear in exam.
- ii) Everyone can not sing.

**Q4:** Draw logic circuit for the following Boolean Expression:

$$(x \ y \ z) + (x+y+z)' + (x'zy')$$

**Q5:** Explain whether function:  $f(x) = x^2$  posses an inverse function or not.

**Q6:** Write the finite automata corresponding to the regular expression  $(a + b)^*ab$

**Q7:** If  $L_1$  and  $L_2$  are context free languages then, prove that  $L_1 \cup L_2$  is a context free language.

**Q8:** Explain Decidable and Undecidable Problems. Give example for each.

**Q9:** What is equivalence relation? Explain use of equivalence relation with the help of an example.

**Q10:** There are three Companies,  $C_1$ ,  $C_2$  and  $C_3$ . The party  $C_1$  has 4 members,  $C_2$  has 5 members and  $C_3$  has 6 members in an assembly. Suppose we want to select two persons, both from the same Company, to become president and vice president. In how many ways can this be done?

**Q11:** How many words can be formed using letter of DEPARTMENT using each letter at most once?

- i) If each letter must be used,
- ii) If some or all the letters may be omitted.

**Q12:** What is the probability that a number between 1 and 10,000 is divisible by neither 2, 3, 5 nor 7?

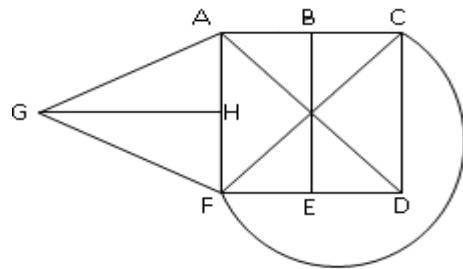
**Q13:** Explain inclusion-exclusion principle and Pigeon Hole Principle with example.

**Q14:** Find an explicit recurrence relation for minimum number of moves in which the n-disks in tower of Hanoi puzzle can be solved! Also solve the obtained recurrence relation through an iterative method.

**Q15:** Find the solution of the recurrence relation  $a_n = a_{n-1} + 2a_{n-1}$ ,  $n > 2$  with  $a_0 = 0$ ,  $a_1 = 1$

**Q16:** Prove that the complement of  $\bar{G}$  is  $G$

**Q17:** What is a chromatic number of a graph? What is a chromatic number of the following graph?



**Q18:** Determine whether the above graph has a Hamiltonian circuit. If it has, find such a circuit. If it does not have, justify it.

**Q19:** Explain and prove the Handshaking Theorem, with suitable example

**Q20:** Explain the terms PATH, CIRCUIT and CYCLES in context of Graphs.