



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

	InSem Examination-IWinter 2023		
	Exam Seat No.:		
	Academic Year:2023-2024	Semester:I	
	Name of Programme:MCA	Pattern:2022	
	Name of Course:Discrete Mathematics	Course Code:221001	
	Max. Marks:30	Duration:1	

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains _02_ page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question

Question No. 1 Attempt following Question

- a) Among the integers 1 to 1000:
- (i) How many of them are not divisible by 3 nor by 5 nor by 7? (8) CO1
- (ii) How many of them are not divisible by 5 and 7 but divisible by 3?

OR

- b) For a positive integer $n > 1$, prove that (8) CO1
- $$1 + 1/4 + 1/9 + \dots + 1/n^2 < 2 - 1/n$$
- c) Describe tautology, contingency and contradiction. Construct the truth tables for the following statement forms to determine whether each of the following is a tautology, contingency and contradiction (7) CO1
- (i) $(p \wedge q) \wedge \sim(p \vee q)$
- (ii) $(p \rightarrow q) \leftrightarrow (q \vee \sim p)$

OR

- d) Write the following statement in symbolic form: (7) CO1
- (i) Indians will win the World Cup if their fielding improves.
- (ii) If I am not in a good mood or I am not busy, then I will go for a movie
- (iii) If you know Object Oriented Programming and Oracle, then you will get a job.
- (iv) I will score good marks in the exam if I study hard.

(v) Whenever whether is nice, then we will have a picnic.

(vi) Unless he studies, he will fail in the examination.

(vii) If either Anil takes Mathematics or Aparna takes Biology, then Deepa will take Chemistry.

Question No. 2 Attempt following Question

- a) Describe Relations. Let $R = \{(1,4), (2,1), (2,5), (2,4), (4,3), (5,3), (3,2)\}$. Use Warshall's algorithm to find the matrix of transitive closure. (8) CO2

OR

- b) Explain partial ordering relations and Hasse diagram with example.
Let $A = \{2,3,4,6\}$ and let aRb if a divides b . Show that R is a partial order and draw its Hasse diagram. (8) CO2

- c) Explain Inverse function.
Functions f, g, h are defined on a set $X = \{1,2,3\}$ as
 $f = \{(1,2), (2,3), (3,1)\}$
 $g = \{(1,2), (2,1), (3,3)\}$ (7) CO2
 $h = \{(1,1), (2,2), (3,1)\}$
(i) Find $f \circ g$, $g \circ f$. Are they equal?
(ii) Find $f \circ g \circ h$ and $f \circ h \circ g$.

OR

- d) i) Describe Pigeonhole Principle. (7) CO2
ii) Describe Bijective and Injective function with example.