COURSE CODE: 10B11MA211   MAX. MARKS: 25
COURSE NAME: DISCRETE MATHEMATICS

COURSE CREDITS: 4   MAX. TIME: $1\frac{1}{2}$ Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

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1. [CO1]: Show that $\frac{3}{2}x^2 + \frac{5}{2}x - 1$ is $O(x^2)$ [2 Marks]

2. [CO2]: **(a)** Write the converse, inverse and contrapositive of the statement
   If it is cold, he wears a hat.
   Also rewrite the above statement without using conditional.   [2.5 Marks]

   (b) Let $A = \{1,2,3,4,5,6,7,8,9,10\}$, determine the truth value of the following statements
   (i) $(\forall x \in A)(\exists y \in A)(x + y < 14)$ (ii) $(\forall x \in A)(\forall y \in A)(x + y < 14)$
   Also negate the above statements.   [2.5 Marks]

3. [CO2]: **(a)** The maximum marks a student can score in Discrete Mathematics is 100. How many students must be in the class to ensure that at least two students get the same marks?
                    [1 Mark]
   (b) Using the principle of inclusion-exclusion find the number of integers from 1 to 500 (both inclusive), that are divisible by 3 or 5 or 7.   [4 Marks]

4. [CO2]: **(a)** Test the validity of following argument:
   If the market is free then there is no inflation. If there is no inflation then there are price controls. There are price controls. Therefore, the market is free.   [2.5 Marks]
   (b) Show that $[(p \wedge q) \rightarrow r] \equiv [p \rightarrow (q \rightarrow r)]$ [2.5 Marks]

5. [CO3]: Answer the following with justification:
   (a) There are 25 telephones in an office. Is it possible to connect them with wires so that each telephone is connected with exactly 7 others?   [1 Mark]
   (b) Draw the complement of $K_{3,3}$.   [1 Mark]
   (c) For which values of n, K_n is a wheel?   [1 Mark]

6. [CO3]: **(a)** Let G be a graph where 5 vertices are of degree 3, 6 vertices are of degree 4 and equal number of vertices of degree 2 and 5. If the graph has number of edges one less than the number of vertices then find the total number of vertices in the graph.   [2.5 Marks]
   (b) Draw a graph model of the problem of seven bridges of Konigsberg and prove that it has no solution.   [2.5 Marks]