

**TEZPUR UNIVERSITY**  
**Assignment Spring 2022**  
**MMS 404 : Graph Theory**  
**Total Marks: 30**

*The figures in the right-hand margin indicate marks for the individual question.*

*All questions are compulsory.*

*Answers should be concise and entire answer to a question should be together. State assumptions wherever made.*

1. Let  $S = \{2, 3, 4, 7, 11, 13\}$ . Draw the graph  $G$  whose vertex set is  $S$  and such that  $ij \in E(G)$  for  $i, j \in S$  if  $i + j \in S$  or  $|i - j| \in S$ . What is the degree of the vertex 7? **4+1**
2. If  $G$  is a graph on  $n$  vertices, then show that at least two vertices of  $G$  have the equal degree. **5**
3. Show that any gathering of six people contains either three mutual acquaintances or three mutual strangers. **5**
4. Let  $G$  and  $H$  be two graphs such that  $G$  is isomorphic to  $H$ . Show that  $G$  is bipartite if and only if  $H$  is bipartite. **5**
5. The degree of each vertex of a certain graph of order 12 and size 31 is either 4 or 6. How many vertices of degree 4 are there? **5**
6. Find the complement of  $C_4$ . Show that  $P_4$  is self complementary. **2+3**

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