NATIONAL INSTITUTE OF TECHNOLGY PATNA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
END SEMESTER EXAMINATION – Dec 2021

B.Tech 3rd Sem
Sub: Discrete Mathematics and Graph Theory **Code: CS3402**
Time: 2 hrs **Marks: 40**

Answer all the questions. Answer to sub-questions must be done sequentially.

1. Answer the following sub questions

a. Six men and six women are to be seated around a table, with men and women alternating. The chairs don't matter, only who is next to whom, but right and left are different. How many seating arrangements are possible? **05 Marks**

b. Each user of a computer system has a password, which is of length six to eight characters. Each character is either a capital letter {A to Z} or a digit {0 to 9}. Each password must contain at least one digit. How many possible passwords are there? **05 Marks**

c. Find the solution of the recurrence relation $\mathbf{f_n = f_{n-1} + 2f_{n-2}}$ **with** $\mathbf{f_0=2}$ **and** $\mathbf{f_1=7}$? **06 Marks**

d. Suppose that every student in a discrete mathematics class of 25 students is a freshman, a sophomore, or a junior. Show that there are at least nine freshmen, or at least nine sophomores, or at least nine juniors in the class. **04 Marks**

2. Answer the following sub questions

a. Construct the tree for the Prufer's code (3, 1, 3, 4). Show the intermediate steps. **07 Marks**
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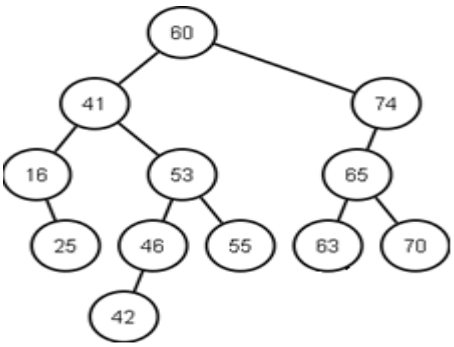
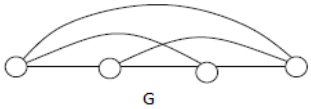
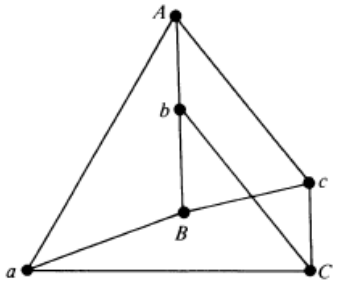
b. Compute the diameter, radius and centre of the following tree **03 Marks**



c. Find its chromatic number and independence number of the following graph **04 Marks**



d. Test the planarity of the following graph. **06 Marks**



***** All the BEST *****

Question Number	Course Outcome and Bloom's Level
Q1	(CO-1, 5), (CO-3, 4), (CO-1, 5), (CO-2, 4)
Q2	(CO-4, 5), (CO-4, 2), (CO-6, 2), (CO-5, 5)