BAS 27

Roll No. | | | | | | | | | | | |

B. Tech
Year 2nd Semester: III
Major Examination-2016-2017
Subject Name: Discrete Mathematics

Time: 3 hrs. Max. Marks: 40

Note: Attempt all questions. Each question carries equal marks.

Q. 1. Attempt **any three** of the following questions. Q.1 (a) is compulsory.

a) Show that $A \cap (A' \cup B) = A - (A - B) = A \cap B$. 4

b) In a survey of 600 students in a school. 150 students were found to be taking tea and 225 taking coffee. 100 were taking both coffee and tea. Find the number of those students who take neither coffee nor tea. 3

c) Define equivalence classes. Show that two equivalence classes are either equal or disjoint. 3

d) Consider the function $f: R \to R$ given by $f(x) = 4x + 3$. Show that f is invertible and find the inverse of f. 3

Q. 2. Attempt **any three** of the following questions. Q.2 (a) is compulsory.

a) What do you understand by Subgroup of a group? Show that intersection of two sub groups is again a subgroup. Give an example to prove that union of two subgroup is not a subgroup. 4

b) Define permutation and find the inverse of the permutation $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 5 & 6 & 2 & 4 & 1 & 3 \end{pmatrix}$. Check whether the permutation is even or odd. 3

c) Define cyclic group and field with examples. Prove that a finite integral domain is a field. 3

d) Define order of group. If order of a group G is 16 then find the number of generators of G 3

Q. 3. Attempt **any three** of the following questions. Q.3 (a) is compulsory.

a) Explain cyclic. bipartite. Hamiltoninan graph. Give examples of each of the above graph. 4

b) What is the largest number of vertices in a graph with 35 edges-if all vertices are of degree at least three? . 3

c) What is coloring of a graph? Determine the chromatic number of the graph C_6 . 3

d) State the Kruskal's algorithm to minimize the total cost of a communication network 3

Q. 4. Attempt **any three** of the following questions. Q.4 (a) is compulsory.

a) Use generating functions to find the recurrence relation of $a_n = a_{n-1} + a_{n-2}$. $a_0 = 0, a_1 = 1$.. 4

b) Find the number of arrangements of the letters in the word ALGEBRA and show that if seven colors are used to paint 50 cars. at least 8 cars will have the same color. 3

c) Determine the recurrence relation given that $a_{n+2} - 5\,a_{n+1} + 3\,a_n = 0$ with initial condition $a_0 = 2$ and $a_1 = 4$.. 3

d) *Find the generating function of* 3

i) $0, 1, -2, 4, -8, \ldots\ldots$

ii) $a_r = 2r + 3\,, r = 0,1,2,3 \ldots\ldots$

(a). Determine the reactions at A and B for the steel bar and loading shown in Figure 4, assuming a close fit at both supports before the loads are applied. 4

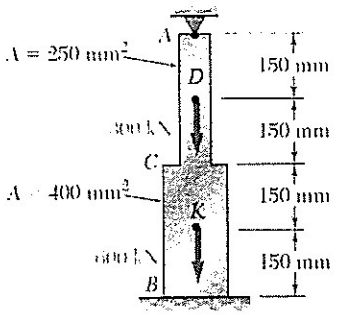

Figure-4

(b). Define the following terms: i) Normal stress ii) Shear stress iii) Poisson's ratio 3

(c). Draw and level the stress -strain diagram for ductile and brittle materials. 3

(d). What are the assumptions of Simple bending theory? Derive the formula of bending stress in a beam. 3