ammini College of Engineering

CS09 304 Discrete Computational Structures

Question Bank – Module III- Group Theory

Prepared By
Win Wilson P,
E Mail: win.wilson@ammini.edu.in
Mob : 9946449118

Topic	Question	Mark	Month &Year	Regulation
Sub groups, Abelian Groups, Cosets	Show that x*y = x – y is not a binary operation over the set of natural numbers but it is a binary operation on the set of integers.	7	June 2009	04
	Prove that G is an abelian group if and only if $(a.b)^2 = a^2.b^2$ for all a,b ϵ G	5	Oct 2011	09
	Prove that G is an abelian group if and only if $(a.b)^{-1} = a^{-1}.b^{-1}$ for all a,b ϵ G	5	Dec 2010	09
	If (G,*) is a group of even order prove that it has an element a≠e satisfying a^2=e	8	Dec 2007	04
	Show that Z_7=({1,2,3,4,5,6),*mod7) is an abelian group	5	Oct 2011 Nov 2012	09
	Show that Z_4 forms a group with respect to the operation, addition modulo 4	7	Dec 2009	04
	Let S be the set of real numbers except -1. Define * on S by a*b = a+b+ab. Show that (S,*) is an abelian group.	10	Oct 2011	09
	Show that the set Q^+ of all positive rational numbers forms an Abelian group under the operation defined by a * b = $\frac{ab}{2}$ where a,b ϵ Q^+	8	June 2009	04
	Define coset of a subgroup and show that for any subgroup H of a group G both right and left cosets of H have same number of elements.	5	Dec 2005	04
	Show that the set G = {-1,1}is a finite abelian group of order 2 under multiplication.	7	Dec 2007	04
	Let G be a group of 2x2 matrices $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ where a,b,c d are real numbers such that ad–bc ≠ 0. Show that G is a group under matrix multiplication. Let H = $\begin{bmatrix} a & b \\ 0 & d \end{bmatrix}$ where a,b,d are real numbers such that ad ≠ 0. Show that H is a subgroup.	10	Oct 2011 Nov 2012	09
	Let G ={(a,b):a≠0,bϵR} and * be the binary composition defined by (a,b) * (c,d) = (ac, bc+d) Show that (G,*) is a group. Also show that it is non abelian	10	Dec 2010	09
Cyclic Groups	Every subgroup of a cyclic group is cyclic	5	Dec 2001	2k
	Show that every cyclic group is abelian	3	Dec 2006 Dec 2007	04

	Let G be a finite cyclic group of order 60 with generator g. Find the order of the subgroup generated by g^{25}	5	Dec 2010	09
	Prove that if G is a finite group whose order is a prime number p then G is a cyclic group	5	Dce 2010	09
Lagrange's Theorem	State and prove Lagrange's theorem	5	Dec 2008 Dec 2009 Dec 2010 Nov 2012	09
	State and prove Lagrange's theorem with necessary results	15	Dec 2005	04
Homomorphism	Explain homomorphism function	2	Dec 2010	09
	Show that group homomorphism preserves identity, inverse and subgroup.	5	Nov 2012	09
	Let (G,*) be a group and a ϵ G. Let f:G→G be given by f(x) = a*a^{-1} for every xϵG. Prove that f is an isomorphism of G onto G	10	Nov 2012	09
	Let R be the group of real numbers under addition and R^+ be the group of positive real numbers under multiplication. Let f: R→ R^+ be defined by f(x) = e^x. Then show that f is an isomorphism.	7	Dec 2008	04
Coding Theory	Prove that the minimum weight of the non zero code words in a group code is equal to its minimum distance.	8	Dec 2009	04
	Define generator matrices	2	Nov 2012	09
	Define Hamming Code	2	Dec 2009 Oct 2011	04,09
	Define group code	5	Dec 2008	04
	Show that (2,5) encoding function defined by e(00) = 00000, e(01) = 01110, e(10) = 10101, e(11) = 11011 is a group code	8	Dec 2008	04