Reg.No. ____________

Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

			Semester	:	**2016-17 ODD**
Code	:	**15MA3001**	**Duration**	:	**3hrs**
Sub. Name :		**Algebra**	**Max. marks :**		**100**

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	State and prove fundamental theorem of arithmetic	CO1	**12**
	b.	Find the gcd(12378 , 3054) using Euclidean algoritham and then write gcd as a linear combination of 12378 and 3054	CO1	**8**
		(OR)		
2.	a.	If n is odd Pseudo prime, then $M_n = 2^n - 1$ is a large one.	CO1	**12**
	b.	Solve the system of congruence $x \equiv 2(\text{mod}\, 3)$; $x \equiv 3(\text{mod}\, 5)$; $x \equiv 2(\text{mod}\, 7)$	CO1	**8**
3.	a.	State and prove Chinese Remainder Theorem.	CO1	**10**
	b.	State and prove Fermat's theorem.	CO1	**10**
		(OR)		
4.	a.	Prove the number of P-sylow subgroup in G for a given prime is of the form 1+kp	CO2	**10**
	b.	Prove for any group G, conjugacy is an equivalence relation.	CO2	**10**
5.	a.	Prove that if G is a finite group and P is a prime number with $P^n \mid O(G)$ and $P^{n+1} \nmid O(G)$, then G has a subgroup of order P^n.	CO2	**15**
	b.	Find all the P-sylow subgroup of $(Z_6 , \oplus)$.	CO2	**5**
		(OR)		
6.	a.	State and prove Cayley theorem	CO2	**10**
	b.	Prove that any group of order 72 must have a non trival normal subgroup.	CO2	**10**
7.	a.	Prove that if R be a Euclidean ring, then every element in R is either a unit element or can be written as the product of finite number of prime elements of R.	CO3	**10**
	b.	Prove that if R be an Euclidean ring, then any two elements a and b in R have a greastest common divisor d. Moreover d=λa+μb for some λ, μ ϵ R.	CO3	**10**
		(OR)		
8.	a.	Prove that if Φ is a homomorphism of R into R' with kernel I(Φ), then (i) I (Φ) is a subgroup of R under addition. (ii) If a ϵ I(Φ) and r ϵ R, then ar and ra are in I(Φ).	CO3	**10**
	b.	Prove that if R be an Euclidean ring and suppose that for a,b,c in R , a|bc but (a,b)=1, then a|c.	CO3	**5**
	c.	Prove that if R be a commutative ring with unit element, then prove that every maximal ideal of R is a prime ideal.	CO3	**5**
		Compulsory:		
9.	a.	State and prove Unique Factorization Theorem.	CO3	**10**
	b.	Prove that the set of all complex number J[i] is a Euclidean ring.	CO3	**10**

ALL THE BEST