Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**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**

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

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **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  is a large one. | CO1 | **12** |
| b. | Solve the system of congruence  ; ; | 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 Pn | O(G) and  O(G), then G has a subgroup of order Pn. | CO2 | **15** |
|  | b. | Find all the P-sylow subgroup of (Z6 , ). | 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 with kernel I(Φ), then   1. I (Φ) is a subgroup of R under addition. 2. 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