ADITYA DEGREE COLLEGES

♦ ANDHRA PRADESH ♦

IV SEMESTER – MID-I EXAMINATIONS

MATHEMATICS

Date:29-01-2025

Max. Marks: 60 M

Time: 3 Hours

SECTION - A

I. Answer any Five Questions: 5 x 4 = 20 M

1. If R is a Boolean ring then (i) a+a =0 ∀ a ϵ R (ii) a+b=0 => a=b and (iii) R is commutative under multiplication.
2. In a ring R with unity if a ϵ R has multiplicative inverse then a ϵ R is not a zero divisor.
3. If R is a ring and 0,a,b ϵ R,then i) 0a =a0 = 0, (ii) a(-b) =(-a)b= -(ab)
   (iii) (-a) (-b)=ab (iv) a(b-c)= ab-ac
4. A field has no zero – divisors.
5. The intersection of two Subrings of a ring R is a subring of R.
6. If D is an integral domain with unity element '1' prove that {n.1/ n ϵ z} a subdomain of D.
7. A field has no proper non –trivial ideals.
8. If R is a division ring show that C(R)={x ϵ R / xa=ax ∀ a ϵ R } is a field.

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SECTION – B

II. Answer all the Questions: 4 X 10 = 40 M

9. a) Every finite integral domain is a field.

OR

b)Prove that $Q(\sqrt{2})$ = {a+b $\sqrt{2}$ / a ,b ϵ Q }is a field with respect to ordinary addition and multiplication of numbers.

10. a) The characteristic of an integral domain is either a prime or zero.

OR

b) Prove that Z_m ={0,1,2...,m-1} is a ring with respect to addition and multiplication modulo m

11. a) Let S be a non-empty subset of a ring R. Then S is a subring of R if and only if a-b ϵ S and ab ϵ S ∀ a,b ϵ S.

OR

b) A commutative ring R with unity element is a field if R have no proper ideals

12 .a) Let K be a non-empty subset of a field F. Then K is a subfield of F if and only if a,b ϵ K => a-b ϵ K and a ϵ K, b≠ o ϵ K => ab^{-1} ϵ K.

OR

b) If U_1, U_2 are two ideals of a ring R then $U_1 + U_2 = \{x+y / x \in U_1, y \in U_2\}$ is also an ideal of R.