DEPT. OF MATHEMATICS

JHARGRAM RAJ COLLEGE

B.Sc(H) Sem – IV , INTERNAL ASSESSMENT-1st , 2018-19

Sub: MATHEMATICS, Course – C10

Full Marks: 10 **Time: 30 m.**

Answer any five questions: $(\mathbf{2 \times 5 = 10})$

1. Give an example of infinite ring of characteristic 2.
2. Find the number of divisor of zeros in the ring $M_2(\mathbb{Z}_3)$.
3. Let addition $\oplus$ and multiplication $\odot$ be defined on the ring $(\mathbb{Z}, +, \bullet)$ by $a \oplus b = a + b - 1, a \odot b = a + b = a + b - a \bullet b$ for $a, b \in \mathbb{Z}$. prove that $(\mathbb{Z}, \oplus, \odot)$ is a ring with unity containing no divisor of zero.
4. If $\mathbb{R}$ is a ring with unity such that $(xy)^2 = x^2y^2$ for all $x, y \in \mathbb{R}$, then show that $\mathbb{R}$ is a commutative ring.
5. Prove that a Boolean ring is a commutative ring.
6. Examine if the set S = $\{(x, y, z) \in \mathbb{R}^3 : x + 2y - z = 1, 2x - y = z = 2\}$ is a subspace of $\mathbb{R}^3$.
7. Let V be a real vector space with a basis $\{v_1, v_2, \dots \dots \dots \dots v_n\}$. Examine if $\{v_1 + v_2, v_2 + v_3, \dots \dots \dots v_n + v_1\}$ is also a basis of V.
8. Find the dimension of the subspace S = the set of all 2×2 real symmetric matrices of the vector space $\mathbb{R}_{2\times 2.}$

DEPT. OF MATHEMATICS
JHARGRAM RAJ COLLEGE
B.Sc(H) Sem – IV , INTERNAL ASSESSMENT-2nd , 2018-19
Sub: MATHEMATICS, Course – C10

Full Marks: 10 **Time: 30 m.**
Answer any five questions: $(\mathbf{2 \times 5 = 10})$

1. Examine if the ring of matrices $\left\{\begin{pmatrix} a & b \\ 2b & a \end{pmatrix} : a, b \in \mathbb{R}\right\}$ is a field.
2. Give an example of a finite ring R with unity I and a subring S of R with unity I' different from I.
3. Find the maximal ideals in the ring $\mathbb{Z}_6$.
4. Give an Example of a ring R and a maximal ideal M in R such that M is not a prime ideal in R.
5. Prove that a field is an integral domain.
6. If R be a ring, prove that Z(R) = $\{x \epsilon R: xr = rx, \forall\, r \epsilon R\}$ is a commutative subring of R.
7. Prove that a division ring is a simple ring.
8. Let S and T be two ideals of a ring R. Then show that S∩T is an ideal of R.