SEMESTER

III

QP CODE

3201

P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA SEM III EXAMINATIONS JANUARY -2024

II B.SC/B.VOC. SUBJECT: MATHEMATICS

DATE &
SESSION

3.02.2024 AN

REG

MARKS

50

SECTION-A

Answer any Three questions, selecting at least one question from each part.

Each question carries 10 marks.

3x10M = 30M

PART-I

1. If $G = Q - \{-1\}$ and * is defined on G as a* $b = a + b + ab \forall a, b \in G$,

then show that (G,*) is an abelian group.

(BT - 2)

- 2. Prove that a finite semigroup (G, .) satisfying cancellation laws is a group. (BT -3)
- 3. State and prove Lagrange's Theorem. Is converse of this theorem is true? (BT -4)

PART-II

- 4. State and prove fundamental theorem of homomorphism of groups? (BT -4)
- 5. State and prove Cayley's theorem? (BT -2)
- 6. If A and B are two ideals of a ring R. Then prove that AUB is an ideal of R

iff $A \subseteq B$ or $B \subseteq A$.

(BT - 3)

SECTION-B

Answer any FOUR questions. Each question carries 5 marks.

 $4 \times 5 M = 20 M$

- 7. Show that the fourth roots of unity form an abelian group under multiplication. (BT -2)
- 8. Let G be a group and a, b EG, then prove that $(ab)^{-1} = b^{-1}a^{-1}$. (BT -3)

9. If H is a subgroup of a group G, then prove that H¹= H. Is converse of this theorem is true? (BT -3)
10. Prove that the intersection of any two normal subgroups of a group is a normal subgroup. (BT -3)
11. Prove that the homomorphic image of an abelian group is abelian. (BT -3)
12. If f = (2 3 6), g = (1 4 6) then find fg, gf. (BT -2)
13. Prove that every field is an integral domain. (BT -3)