PUBLIC SERVICE COMMISSION, PESHWAR

COMPETITIVE EXAMINITION FOR PROVENCIAL MANAGEMENT SERVICES, 2018

PURE MATHEMATICS (PAPER-I)

TIME ALLOWED: Three Hours   Max. Marks: 100

Instruction: Attempt three questions from Section A and two questions from section B

SECTION A

Q1. (a) State and prove the first isomorphism theorem for groups. (10)

(b) Evaluate the normalizer and centralizer of Q_8. (10)

Q2. (a) Define subring, Integral domain and the relation between them. (10)

(b) Show that $\alpha = \sqrt{1+\sqrt[3]{2}}$ is algebraic over Q by finding $f(x) \in Q[x]$ such that $f(\alpha) = 0$. (10)

Q3. (a) Prove the following results:

Let S be a non-empty set of vectors in a vector space V over a field F. Then $< S >$ is a subspace of V containing S and it is the smallest subspace of V containing S. (10)

(b). Determine a basis for the null space of matrix. (10)

$$\begin{bmatrix} 1 & 2 & -4 & 2 & -3 \\ 2 & -2 & 1 & -2 & 0 \\ 0 & 1 & -1 & 1 & -1 \\ 1 & 3 & 5 & -6 & -3 \end{bmatrix}$$

Q4. (a) Solve the system of equations. (10)

$$2x + y - 2z = 10$$

$$3x + 2y + 2z = 1$$

$$5x + 4y + 3z = 4$$

(b) Find the eigenvalues and eigenvectors of the matrix.

$$A = \begin{bmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{bmatrix}$$ (10)

PTO →