

## **PMN6J004 GROUND CONTROL INSTRUMENTATION**

### **Module-I:**

Deformation and Strain Measuring Instruments: Convergence meters, convergence recorders, tape extensometers, bore hole deformation, gauge, multipoint borehole extensometers and bore hole camera

### **Module-II:**

Load and Pressure Measuring Instruments: Load cells, pressure measuring instruments – stress capsules, stress meters, borehole pressure, cells and flat jacks. Strain gauges and transducers, readout units, sensors, transmitters and data acquisition systems

### **Module-III:**

Testing Equipment: UTM, MTS and acoustic emission equipment. Rock bolt pull tester, Monitoring and interpretation of the data

### **Module-IV:**

Applications: Mining Engineering applications: Instrumentation in underground mines and opencast mines; Civil Engineering applications; Instrumentation in Hydro electric projects and Tunnels, case studies

## **GROUND CONTROL INSTRUMENTATION LAB**

1. Bore hole extensometer and measurement of displacement with its help.
2. Measurement of strain by tape extensometer.
3. Load cell and measurement of convergence.
4. Flat jack method and measurement of insitu stress.
5. Determination of ground vibrations with seismograph, and its effect on designing slopes.
6. Factors influencing the stability of slope. Design for maintaining of slope in adverse conditions.
7. Mechanics of caving in metalliferous mine.
8. Mechanism of subsidence and factors influencing it.
9. Mechanism of rock burst and bumps and factors influencing it
10. Design of support system.