SYLLABUS FOR ELECTRONICS AND TELECOMMUNICATION

1. **Analog Electronic Circuits :**
   Principles and operation of Transistors of Diodes, Power Amplifiers, Feedback Amplifiers, Rectifiers and power supplies, Operational Amplifiers, LED, LCD, Photo Transistors, Photovoltaic cell, Applications of Analog electronic circuits in different systems and equipments working in coal mines.

2. **Power Electronics :**
   Thyristor, Power transistor, MOSFETS characteristics and operation. AC to DC convertors, 1 phase and 3 phase, AC regulators, Invertors, Switched mode power supplies and types of UPS and operation. Applications of power electronic devices in coal mining operations.

3. **Electrical Systems:**
   Basics concepts of electricity, application of registers ad capacitors in mines, power factor, AC and DC motor principle and application, transformer, switch gears and isolators its principle and application in coal mines, transmission line and its losses, measurement of insulation, megger, underground power supply system, principle and operation of diesel generators

4. **Digital Electronic Circuits :**
   Transistor as a switching element, IC logic gates, Multiplexer, Demultiplexer, A/D and D/A convertors. Applications of computer and peripherals. Memory : RAM, ROM, EPROM, Flash ROM. Fundamentals of Microprocessor and its application in electronic and telecommunication systems working in coal mines.

5. **Electronic Measurement and Instrumentation :**
   Principles of working and applications of Analog instruments, digital instruments : Voltmeter, Multimeter, IC tester, Oscilloscopes and power meters. Types of electronic road and rail weighbridges: Principles of working, accuracy, features and its operation in coal mines. Mine Environmental and status monitoring systems. Types and operation of portable and fixed monitors for CO, O2, Moisture, dust, CH4, Airvelocity and Temperature etc in coal mines.Intrinsically safe circuits and flame proofing standards. Basic Principle and acquisition of Data acquisition System.

6. **Communication systems :**
   Difference between analog and digital communications, Basic communication elements. Fundamentals of modulation, Digital modulation and demodulation. Transmission media, Types of modems, Digital subscriber line, ADSL. Packet, Message and circuit switching, Frame relay, Telephony, Functions of switching, stored programmed controlled switch, ISDN, ATM, Public switched telephone network (PSTN), FDM & TDM in telephony, EPABX, digital EPABX system features and operation. Numbering, Routing, MPLS(Multiprotocol Level Switch), VOICE over IP, IP / PSTN platform, introduction to IN (Intelligent Network), basics of GIS (Geographical information system). Intrinsically safe underground communication systems and its operation in UG mines. Basics of video conferencing and video surveillance.

7. **Data communication and network :**
Data transmission, Media, UTP cables, Hub, Switches, Routers, Network Topology. OSI reference model and network architecture, TCP / IP, concept and classes of IP address, LAN, WAN &introduction to network management, internet, security on the internet, firewalls, intranet and wi-fi, domain name services, E mail, FTP, TELNET and world wide web. Types and properties of optical fibre. Applications of optical fibre networks. Applications, features and operations of online integrated mine management system and on line integrated truck dispatch system in coal mines.

8. **Wireless communication:**
Propagation of signals at HF, VHF, UHF, microwave frequency. Walkie talkie/different types for radio equipments working in coal mines. Antenna parameters and types of antenna. Basics of TDMA, FDMA, CDMA & GSM and 3G. Fundamentals of satellite communication, radio spectrum and satellite antennas, Digital satellite communication systems, VSAT stations its sub systems, applications of satellites. Basic concepts of GPS & its application in mines.