SYLLABUS FOR WRITTEN TEST (Objective Type)

\# Practical knowledge in the Electronics and Communication Engineering area related to different areas listed below.

\# Trouble-shooting, repair and maintenance of experimental trainer kits/modules, devices, Instruments of various labs of Electronics and Communication Engineering.

1) **Basic Electronics, Devices and Circuits:**
   Semiconductor Physics, Diode, Bipolar-Transistors, Transistor Biasing Circuits, FET. Amplifiers and Oscillators, Wave Shaping Circuits, Multivibrator Circuits and Operational Amplifiers. VCO, PLL and their Applications. Knowledge of hardware used in electronics labs multimeter, CRO, signal generator, LCR meter, single phase, three phase and regulated power supply. Cables, connectors and switches.

2) **Electrical Circuits:** Familiarisation with active and passive components; Circuit laws andtheir applications. Fundamentals of DC and AC Circuits, Circuit Theorems, Voltage andCurrent Sources, EMI, Batteries.

3) **Electronic Instruments, Measurement and Medical Electronics:** Basics of Measurements,Sensors & Transducers, CRO, DSO, Voltage, Current and Resistance Measurement Signal Generators and Analytical Instruments, Digital Instruments. Medical Electronics - Micro Electrodes – Skin Surface Electrodes- Needle Electrodes – Reference Electrodes - Digital Thermometer – SphygmoManometer - Electronic Stethoscope - Recorders and Meters: ECG - EEG - EMG - Cardiac Stress Test - Equipment – Cardio Topography - Electro Oculography - Electro Retinography – Poly Somnography - Spirometer - Blood Flow Meter - Vascular Doppler – Audiometer.

4) **Digital Electronics:** Difference between analog and digital signal. Number System , Codes and Parity, Logic Gates and Families , Logic Simplification, Arithmeticcircuits, Decoders, Multiplexers and De-Multiplexers, Latches and flip flops, Shift Register, Counters, A/D and D/A converters.

5) **Network Filters and Transmission Lines:** Symmetrical Network, Asymmetrical Network, Attenuators, Filters Prototype Filter, M-Derived Filter, Crystal Filters and active filters. Transmission Lines.

6) **Power Electronics:** Thyristors and other Power Electronics Devices, SCR, DIAC, TRIAC, UJT, Controlled Rectifiers, Inverters, Choppers, Dual Converters and Cyclo converters. Thyristorised Control of AC &DC Electric drives. UPS.

7) **Microprocessors, Microcontrollers and Embedded System:** Architecture of 8085 Microprocessor, Memories and I/O interfacing, Programming, Instruction Timing and Cycles, Interrupts, Peripheral devices, Architecture and instruction set of 8086 Microprocessor. Architecture and instruction set of 8051 Microcontroller. Assembly/C programming (KEIL) for Micro controller, interfacing, PIC, ARDUINO- architecture and programming – Introduction to Raspberry Pi – ARM Controllers.

8) **Electronics Design and Simulation Techniques:** Testing of active and passive components, assembly of components, soldering techniques, PCB Fabrication, PSpice/ ORCAD/EDA based Circuit Simulations.

9) **Audio and Video Systems:** Microphones and Loudspeakers, Digital Audio Fundamentals, Television fundamentals, colour television, Digital Video, Compression Techniques and Standards, Digital Television-Transmission and Reception, Projection Display Systems and Television. Home Theatre, Smart TV – Bluetooth - OTT (over-the-top) Platform.

10) **VLSI Design:** Overview of VLSI, VHDL Programming, Combinational & Sequential circuit design, CPLDs & FPGAs.

11) **Principles of Communication Engineering:** Analog and Digital Need for modulation, Amplitude, frequency and phase modulation and demodulation.AM/FM Transmitters, Radio Receivers, Antennas, Different modes of wave propagationand typical areas of application. Digital communication: Coding, ModulationTechniques, Modems, Characteristics and working of data transmission circuits, ISP,Wireless Communication, Mobile Communication Systems, Introduction to 3G, 4G, 5G.

12) **Satellite Communications**: Basic idea of passive and active satellites. Meaning of the terms orbit , apogee, perigee, Geostationary satellite and its need. Block diagram and explanation of a satellite communication link. Link losses etc. Transponders multiple access techniques, VSAT & its features - Applications.

13) **Microwave & Fiber Optic Communication**: Introduction to Microwaves, Microwave Devices, Wave Guides, Microwave Components, Introduction to Optic fiber - fiber Materials, Optical Sources, and Photo Detectors - fiber Fabrication - Optical Couplers and WDM Concepts - System Design and Optical fiber Applications.

14) **Computer Networks and Industry 4.0:** Networking Basics, Cables & Connectors, Network Trouble shooting techniques, Wireless Networking, Industry 4.0 - Internet of Things (IoT) - Wireless Sensor Networks (WSN) – Introduction to Robotics in Automation - Software defined radio (SDR) – Cognitive Radio.