

**DETAILED SYLLABUS FOR THE POST OF JUNIOR INSTRUCTOR (TECHNICIAN
MEDICAL ELECTRONICS) IN INDUSTRIAL TRAINING DEPARTMENT**

CAT NO:649/2023

1) Electrical Engineering

Electrical Terms, Ohms law, Kirchhoff's law, Network theorems, AC fundamentals, Resonance, Faradays law electromagnetic induction, Basic concepts of voltage, current, power and energy. Single Phase and Three Phase, Star and Delta Configurations, Types and Properties of magnets, Electromagnetic Relays, Fuse, types of Fuses, MCB, ELCB, Contactors, Transformers and their Types, losses in Transformers. AC and DC motors, Earthing, Hospital Wiring. **(15 marks)**

2) Electronics and Semiconductor devices

Resistors. Capacitors, Inductors, Concept of Time constant, Resonance and Q factor, Semiconductors, PN Junction diode, Bi Polar Junction Transistors, Field Effect Transistors, MOSFET, Working and characteristics of Power electronic devices such as SCR, TRIAC, DIAC, UJT, MOSFET and IGBT. **(10 marks)**

3) Electronic Circuits

Clipper circuits, clamping circuits, RC and LC filters, Rectifiers and Filters, Regulated power supplies, Transistor configuration, Transistor biasing, Methods of coupling, Single stage and multi stage Transistor amplifiers, Concept of feedback and feedback amplifiers, Principles of Oscillation and types of Oscillators, Multivibrators, IC 555 and its applications, Op- Amp and its characteristics, Applications of Op-Amp. Soldering and De soldering techniques, SMD Soldering and Surface Mounting Technology. **(15 marks)**

4) Digital Electronics

Analog and Digital signals, Various Number systems and its conversion, Digital codes: Binary, Octal, Hexal, Gray code, BCD, ASCII code, Logic Gates and Universal gates, Combinational and Sequential Circuits: Half Adder, Full adder, Parallel Binary adders, Multiplexers and De Multiplexers, Latches, Flip Flopes, Counters, Shift Registers, Memory concepts, types of memories such as RAM, ROM, EPROM, FLASH PROM. **(10 Marks)**

5) Electronics and Instrumentation

Thermistors, Thermocouple, Strain gauge, PMMC and PMMI meters. Conversion of Ammeter and Voltmeter, Wheatstone bridge, Digital Multimeter, Cathode Ray Oscilloscope, Digital Storage Oscilloscope, Man Instrumentation system, Telemetry.

(10 Marks)

6) Bio Medical Engineering

Bio potential Electrodes, Bio chemical electrodes & Other electrodes ,Centrifuges, Hot air oven, Incubator, Water bath, Nebulizer, Incubators, Radiant Warmer, Sphygmomanometers, Diathermy, Microscope, Colorimeter and Spectrophotometer, Ultrasound Doppler, Patient monitoring displays, Defibrillators, Pacemakers, EMG, EEG, X Ray machine, Ultrasound scanners, Ultrasound scanners.

Various certification/ licenses for biomedical equipment's. **(20 Marks)**

7) Microprocessors

Microprocessors (8085 & 8086) : features, Internal architecture, Assembly level programming, Interfacing using peripheral ICs. **(5 Marks)**

8) Microcontrollers

Microcontroller (8051): features, Internal architecture, SFRs, Assembly level programming. **(5 Marks)**

9) Batteries and Power Supply

Batteries: various types, grouping of cells and batteries, Battery charging circuits, Maintenance of Batteries. Working principle and types of Inverters and UPS, Selection of UPS - calculation of load power. **(5 Marks)**

10) Fiber Optics Communication

Properties of light, Total internal reflection, optic fiber: testing, losses , types of fiber optic cables and specifications, Working principle of transmitter and receiver in fiber optic communication,

OPTICAL SOURCES AND DETECTORS : LEDs, Laser diode, Photo diode, Photo Transistor. Fiber Optic joints, Splicing, Testing equipments in fiber Optic Communication. **(5 Mark)**

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the Question Paper.