

EXAMINATION PROCEDURE AND SYLLABUS FOR TECHNICAL SUBJECT FOR RECRUITMENT TO THE POSTS OF NAVIGATIONAL ASSISTANT GRADE III, TECHNICIAN (ELECTRONICS), TECHNICIAN (ELECTRICAL), TECHNICIAN (DIESEL), TECHNICIAN (GENERAL) AND RADIO TECHNICIAN:

The examination shall be multiple choice question (MCQ). There will be 100 questions of one mark each from the following subjects.

Sl.No	Subject	Marks
1	General knowledge/Aptitude test (numerical aptitude/qualitative aptitude/quatitative aptitude/reasoning etc.)	40
2	Technical*	60
	Total	100

Note: * Technical subject will be varying as per the post.

There will be negative mark in written examination and 1/3rd of the mark shall be deducted for each wrong answer. However, no marks will be deducted for the questions which were kept unattended. The qualified candidates has to under go a trade test which will be of qualifying in nature. The committee shall fix qualifying standard in the trade test. The candidate who qualify in the trade test will be considered for final selection on the basis of their merit in the written examination.

Mobile phones, Calculators or any other devices will not be allowed in the examination hall.

The qualifying/cut off marks will be decided by the concerned recruitment committee constituted by various Directorates.

WARNING:

DGLL has not appointed any agencies/agents or centers for action on its behalf. Candidates are warned against any such claims made by the persons/agencies. Candidates are selected purely as per the merit. Please beware unscruplus element and not fall in their trap. Candidates attempting to influence the Director directly or indirectly shall be disqualified and legal action shall be intiated against them.

Syllabus for the post of Navigational Assistant Grade III

Part A – General knowledge/Aptitude test (numerical aptitude/qualitative aptitude/quantitative aptitude/reasoning etc.)

Part B - Technical

Syllabus for technical subject

Electronic components & materials:	Conductors, semiconductor & insulators, magnetic materials, jointing & cleaning materials for U/G copper cables & OFC; cells and batteries (chargeable and non-chargeable) relays, Switches, MCB & Connectors.
Electronic Devices and circuits	PN junction diodes, Thyristor; Diode and triode circuits; junction transistors; Amplifiers; oscillator; multivibrator; counters; rectifiers; inverter and UPS.
Digital Electronics	Number system & Binary codes; Boolean Algebra & Logic gates; Combinational & Sequential logic circuits, A/D & D/A converter, counters; memories
Linear Integrated circuit	Introduction to operational Amplifier; Linear applications; Non-Linear applications; Voltage regulators, Timers, Phase lock loop.
Electronic Measurements	Measuring systems; basic principles of measurement, range extension methods, cathode ray oscilloscope, LCD, LED panel; Transducers.
Communication Engineering	Introduction to communication, Modulation techniques, multiplexing techniques, wave propagation, transmission line characteristics, OFC, Fundamentals of Public Address system, Electronic exchange, basics of Radar, Cellular and Satellite Communication. Basic knowledge of wave propagation, VSAT and microwave antennas, operation of VHF sets, transceivers.
Basic Electrical Engineering	DC Circuits, AC Fundamentals; Magnetic, Thermal and chemical effects of Electric current; Earthing – Installation, Maintenance, Testing
Equipments	Knowledge of Voltage stabilizers, Isolation transformers, AMF panel for generators, Different types of timers and switching circuits.
Solar power plant	Basic knowledge of solar power plants, different types of Solar panels, MPPT, Mini Charge Regulators, solar power conditioning units etc.
Aids to Navigation	Basic knowledge of marine lanterns, Racons, DGPS, NAVTEX, AIS, GPS etc.
Basic concepts:	Concepts of resistance, inductance, capacitance, and various factors affecting them Concepts of current, voltage, power, energy and their units
Circuit law:	Kirchhoff's law, Simple Circuit solution using network theorems

Magnetic Circuit:	Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, Magnetic calculations for conductors of different configuration eg straight, circular, solenoidal, etc Electromagnetic induction, self and mutual induction
AC Fundamentals	Instantaneous, peak, RMS and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of RL and C, Resonance, Tank Circuit Poly Phase system – star and delta connection, 3 phase power, DC and sinusoidal response of R-Land R-C circuit
Measurement and measuring instruments	Measurement of power (1 phase and 3 phase, both active and re-active) and energy, 2 wattmeter method of 3 phase power measurement, Measurement of frequency and phase angle Ammeter and voltmeter (both moving coil and moving iron type), extension of range wattmeter, Multimeters, earth Megger, insulation megger.
Electrical Machines :	(a) DC Machine – Construction, Basic Principles of DC motors and generators, their characteristics, speed control and starting of DC Motors Method of braking motor, 17 Losses and efficiency of DC Machines (b) 1 phase and 3 phase transformers – Construction, Principles of operation, equivalent circuit, voltage regulation, OC and SC Tests, Losses and efficiency Effect of voltage, frequency and wave form on losses Parallel operation of 1 phase /3 phase transformers Auto transformers (c) 3 phase induction motors, rotating magnetic field, principle of operation, equivalent circuit, torque-speed characteristics, starting and speed control of 3 phase induction motors Methods of braking, effect of voltage and frequency variation on torque speed characteristics Fractional Kilowatt Motors and Single Phase Induction Motors: Characteristics and applications
Utilization of Electrical Energy	Illumination, Electric heating, Electric welding, Electroplating, Electric drives and motors
Protective device	Basic knowledge of earthing, lightning conductor, surge protector and isolation transformer.
Fire & fire fighting	Basic knowledge of different kinds of fire and fire fighting equipments.
Solar power plant	Basic knowledge of solar power plants, different types of Solar panels, MPPT, Mini Charge Regulators, solar power conditioning units etc.

Syllabus for the post of Technician (Electronics)

Part A – General knowledge/Aptitude test (numerical aptitude/qualitative aptitude/qualitative aptitude/reasoning etc.)

Part B - Technical

Syllabus for technical subject

Atomic Structure	Atomic model, Energy levels, Energy bands, Important Energy bands in Crystal
Semi-conductor Physics	Bands in Semi-conductor-conductor, commonly used Semi-conductors, Energy band description of Semi-conductor, Effect of temperature on Semi-conductor, Hole current, Intrinsic & Extrinsic Semi-conductor, Majority and Minority carriers, Properties on PN Junction
Electronic components & materials:	Conductors, semiconductor & insulators, magnetic materials, jointing & cleaning materials for U/G copper cables & OFC; cells and batteries (chargeable and non-chargeable) relays, Switches, MCB & Connectors.
Electronic Devices and circuits	PN junction diodes (various diodes), Thyristor; Diode and triode circuits; junction transistors; Amplifiers; oscillator; multivibrator; counters; rectifiers; inverter and UPS, voltage regulator.
Digital Electronics	Number system & Binary codes; Boolean Algebra & Logic gates; Combinational & Sequential logic circuits, A/D & D/A converter, counters; memories
Linear Integrated circuit	Introduction to operational Amplifier; Linear applications; Non-Linear applications; Voltage regulators, Timers, Phase lock loop.
Microprocessor and Microcontroller	Introduction to microprocessor, 8085 microprocessor working, Assembly language programming; peripherals & other microprocessors; microcontrollers.
Electronic Measurements	Measuring systems; basic principles of measurement, range extension methods, cathode ray oscilloscope, LCD, LED panel; Transducers. Digital multimeter-At Freq.measurement-RF Freq. measurement signal generator
Communication Engineering	Introduction to communication, Modulation techniques, multiplexing techniques, wave propagation, transmission line characteristics, OFC, Fundamentals of Public Address system, Electronic exchange, Radar, Cellular and Satellite Communication. Electronic signal-Radio Broad

	casting Transmission-Reception-modulation, Demodulation-Carrier Wave sideband; Radio wave propagation of waves; Superhetrodyne receiver; Antennas-diff. type of antennas; Satellite communication
Data communication and network	Introduction to data communication, Hardware and interface, introduction to networks and networking devices, local area network and wide area network, internetworking.
Computer programming	Basic knowledge of computer hardware, Programming concepts, fundamentals of 'C' and C++; operators in 'C' and C++, Control statements, functions, Array string & Pointes, File structure, Data structure and DBMS.
Basic Electrical Engineering	DC Circuits, AC Fundamentals; Magnetic, Thermal and chemical effects of Electric current; Earthing – Installation, Maintenance, Testing
Equipments	Knowledge of Voltage stabilizers, Isolation transformers, AMF panel for generators, Different types of timers and switching circuits.
Solar power plant	Basic knowledge of solar power plants, different types of Solar panels, MPPT, Mini Charge Regulators, solar power conditioning units etc.
Basic knowledge of AtoNs	Basic knowledge of marine lanterns, Racons, DGPS, NAVTEX, AIS, GPS, VHF sets etc.
Antena	Basic knowledge of wave propogation, VSAT and microwave antenas, tranreceivers and various types of antenas.
Security system	Basic knowledge of digital security system.

Syllabus for the post of Technician (Electrical)

Part A – General knowledge/Aptitude test (numerical aptitude/qualitative aptitude/qualitative aptitude/reasoning etc.)

Part B - Technical

Syllabus for technical subject

Basic concepts:	Concepts of resistance, inductance, capacitance, and various factors affecting them Concepts of current, voltage, power, energy and their units
Circuit law:	Ohms law, Simple Circuit solution and calculations using Ohms law.
Magnetic Circuit:	Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, inductance, inductance calculation in series and parallel.
Electro statics	Concepts of electric flux, emf, capacitors, values of capacitors, measurement of capacitors, capacitor calculation in series and parallel.
AC Fundamentals	Instantaneous, peak, RMS and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of RL and C, Resonance, Tank Circuit Poly Phase system – star and delta connection, 3 phase power, DC and sinusoidal response of R-L and R-C circuit
Measurement and measuring instruments	Measurement of power (1 phase and 3 phase, both active and re-active) and energy, 2 wattmeter method of 3 phase power measurement, Measurement of frequency and phase angle Ammeter and voltmeter (both moving coil and moving iron type), extension of range wattmeter, Multimeters, Megger, Energy meter AC Bridges Use of CRO, Signal Generator, CT, PT and their uses Earth Fault detection
Electrical Machines :	(a) DC Machine – Construction, Basic Principles of DC motors and generators, their characteristics, speed control and starting of DC Motors Method of braking motor, 17 Losses and efficiency of DC Machines (b) 1 phase and 3 phase transformers – Construction, Principles of operation, equivalent circuit, voltage regulation, OC and SC Tests, Losses and efficiency Effect of voltage, frequency and wave form on losses Parallel operation of 1 phase /3 phase transformers Auto transformers (c) 3 phase induction motors, rotating magnetic field, principle of operation, equivalent circuit, torque-speed characteristics, starting and speed control of

	3 phase induction motors Methods of braking, effect of voltage and frequency variation on torque speed characteristics Fractional Kilowatt Motors and Single Phase Induction Motors: Characteristics and applications
Synchronous Machines	Generation of 3-phase emf armature reaction, voltage regulation, basic knowledge of AC alternators, synchronizing, control of active and reactive power Starting and applications of synchronous motors
Generation, Transmission and Distribution	Different types of power stations, Load factor, diversity factor, demand factor, cost of generation, inter-connection of power stations Power factor improvement, various types of tariffs, types of faults, short circuit current for symmetrical faults Switchgears – rating of circuit breakers, Principles of arc extinction by oil and air, HRC Fuses, Protection against earth leakage / over current, etc Buchholtz relay, Merz-Price system of protection of generators & transformers, protection of feeders and bus bars Lightning arresters, various transmission and distribution system, comparison of conductor materials, efficiency of different system Cable – Different type of cables, cable rating and derating factor
Estimation and costing	Estimation of lighting scheme (domestic as well as industrial wiring), electric installation of machines and relevant IE rules Earthing practices and IE Rules, load calculation.
Utilization of Electrical Energy	Illumination, different type of light fittings, Electric heating, Electric welding, Electroplating, Electric drives and motors (three phase and single phase), Basic knowledge of lift and escalators.
Protective device	Basic knowledge of earthing, lightning conductor, surge protector and isolation transformer.
Alternator	Maintenance and varnishing of alternators

Syllabus for the post of Technician (Diesel)

Part A – General knowledge/Aptitude test (numerical aptitude/qualitative aptitude/quatitative aptitude/reasoning etc.)

Part B - Technical

Syllabus for technical subject

Properties of metals	Introduction to basic metallic properties like elasticity, plasticity, ductility, brittleness, toughness, hardness, Ferrous Metals, Non Ferrous Metals/Alloys, Nonmetallic Materials
Refrigeration & Airconditioning System	Different types of refrigeration principles and refrigerants. Working of domestic refrigerator. Working of Window/Split type/tower type AC system.
IC Engine	Engine classification, Engine cycle, C.I. engine combustion, S.I. engine combustion, Engine structure, Fuel admission system, Air intake system, exhaust system, Engine cooling system, Lubrication system, Engine starting system, Working of two stroke and four stroke engines.
Fuel, combustion and lubrication	Diesel, Petrol and lubricating oils properties Introduction to common fuels - solid, liquid and gases and their composition. Combustion of fuels- their higher and lower calorific values. Combustion equations for carbon, sulphur, hydrogen and their simple compounds. Calculation of minimum amount of air required for complete combustion. Combustion analysis on mass basis and on volume basis. Heat carried away by flue gases. Analysis of flue gases by Orsat apparatus. Simple numerical problems Idea of specific properties of liquid fuels such as detonation, knock resistance (cetane and octane numbers), viscosity, solidification point, flash point and flame point.
Components and terms related to engine	Components of Diesel engines like cylinder block, cylinder head, piston, intake valve, piston rings, exhaust valve, piston pin, crank shaft, connecting rod, timing gears, camshaft, Description and function of fly wheel and vibration damper (AVM), Engine related terms like bore, stroke, TTC, BDC, Revolution, compression ratio, cycle etc.
WELDING:	Definition, Weldedge preparation, Introduction to various welding processes with procedure equipments and applications such as (i) Electric arc welding. (ii) Resistance welding-Spot welding, Flash

	butt, Percussion welding. (iii) Thermit welding. (iv) Carbon arc welding (v) Metal-Inert-Gas welding (MIG). (vi) Tungsten arc welding (TIG).
Brazing of metals:	Preparation for brazing and procedures for brazing.
Measuring instruments	System of measurement, description care and use of Measuring instruments like Vernier caliper, Micro meter/screw gauge, feeler gauge, injector calibrator, dial bore gauge, dial indicators etc.
Machine tools	drill, mill, grinding wheel, hacksaw blade, cutting tool etc.
Fire and fire fighting	Different types of Fire and fire fighting techniques
Fasteners	nut, bolt, screws etc
Pumps	Operation of monoblock, central fugal, immersion
Basic electrical	Basics of alternator and batteries

Syllabus for the post of Technician (General)

Part A – General knowledge/Aptitude test (numerical aptitude/qualitative aptitude/qualitative aptitude/reasoning etc.)

Part B - Technical

Syllabus for technical subject

Properties of metals	Introduction to basic metallic properties like elasticity, plasticity, ductility, brittleness, toughness, hardness, tenacity, fatigue, malleability, stiffness, elastic bodies, plastic bodies and rigid bodies, deformation, Ferrous Metals, Non Ferrous Metals/Alloys, Nonmetallic Materials, Basics of Stress and Strain.
Refrigeration & Airconditioning System	Different types of refrigeration principles and refrigerants. Working of domestic refrigerator. Working of Window/Split type/tower type AC system.
IC Engine	Engine classification, Engine cycle, C.I. engine combustion, S.I. engine combustion, Engine structure, Fuel admission system, Air intake system, exhaust system, Engine cooling system, Lubrication system, Engine starting system, Working of two stroke and four stroke engines.
Fuel, combustion and lubrication	Diesel, Petrol and lubricating oils properties Introduction to common fuels - solid, liquid and gases and their composition. Combustion of fuels-their higher and lower calorific values.
Components and terms related to engine	Components of Diesel engines like cylinder block, cylinder head, piston, intake valve, piston rings, exhaust valve, piston pin, crank shaft, connecting rod, timing gears, camshaft, Description and function of fly wheel and vibration damper (AVM), Engine related terms like bore, stroke, TTC, BDC, Revolution, compression ratio, cycle etc.
WELDING:	Definition, Weldedge preparation, Introduction to various welding processes with procedure equipments and applications such as (i) Electric arc welding. (ii) Resistance welding-Spot welding, Flash butt, Percussion welding. (iii) Thermit welding. (iv) Carbon arc welding (v) Metal-Inert-Gas welding (MIG). (vi) Tungsten arc welding (TIG).
Brazing of metals:	Preparation for brazing and procedures for brazing.
Measuring instruments	System of measurement, description care and use of Measuring instruments like Vernier caliper, Micro meter/screw gauge, feeler gauge, injector

	caliberator, dial bore gauge, dial indicators etc.
Workshop technology	lathe machine, drilling machine, grinder, shaper, plainer, milling machine, hacksaw machine etc
Machine tools	drill, mill, grinding wheel, hacksaw blade, cutting tool etc.
Fire and fire fighting	Different types of Fire and fire fighting techniques
Fasteners	nut, bolt, screws etc
Pumps	Operation of monoblock, central fugal, immersion
Basic electrical	Basics of alternator and batteries

Syllabus for the post of Radio Technician

Part A – General knowledge/Aptitude test (numerical aptitude/qualitative aptitude/quatitative aptitude/reasoning etc.)

Part B - Technical

Syllabus for technical subject

Electronic components & materials:	Conductors, semiconductor & insulators, magnetic materials, jointing & cleaning materials for U/G copper cables & OFC; cells and batteries (chargeable and non-chargeable) relays, Switches, MCB & Connectors.
Electronic Devices and circuits	PN junction diodes, Thyristor; Diode and triode circuits; junction transistors; Amplifiers; oscillator; multivibrator; counters; rectifiers; inverter and UPS.
Digital Electronics	Number system & Binary codes; Boolean Algebra & Logic gates; Combinational & Sequential logic circuits, A/D & D/A converter, counters; memories
Linear Integrated circuit	Introduction to operational Amplifier; Linear applications; Non-Linear applications; Voltage regulators, Timers, Phase lock loop.
Microprocessor and Microcontroller	Introduction to microprocessor, 8085 microprocessor working, Assembly language programming; peripherals & other microprocessors; microcontrollers.
Electronic Measurements	Measuring systems; basic principles of measurement, range extension methods, cathode ray oscilloscope, LCD, LED panel; Transducers.
Communication Engineering	Introduction to communication, analog and digital Modulation techniques, multiplexing techniques, OFC, Fundamentals of Public Address system, Electronic exchange, Cellular and Satellite Communication. Basic knowledge of Radio transreceiver, operation of VHF sets, tranreceivers.
Wave Propogation	Ground wave, sky wave, space wave, space diversity, skip distance, standing wave ratio, transmission line characteristics
Antena	Basic knowledge of antenna theory, knowledge of VSAT, microwave antenas, T antenna and various types of antenas.
RADAR	Function, block diagram, various modules inside the radar, radar antenas, radar ranges, and other terms related to navigational radars.
Data communication	Introduction to data communication, Hardware and interface, introduction to networks and networking

and network	devices, local area network and wide area network, internetworking.
Computer programming	Programming concepts, fundamentals of 'C' and C++; operators in "C" and C++, Control statements, functions, Array string & Pointes, File structure, Data structure and DBMS.
Basic Electrical Engineering	DC Circuits, AC Fundamentals; Magnetic, Thermal and chemical effects of Electric current; Earthing – Installation, Maintenance, Testing
Equipments	Knowledge of Voltage stabilizers, Isolation transformers, AMF panel for generators, Different types of timers and switching circuits.
Solar power plant	Basic knowledge of solar power plants, different types of Solar panels, MPPT, Mini Charge Regulators, solar power conditioning units etc.
	Basic knowledge of GPS, marine lanterns, Racons, DGPS, NAVTEX, AIS, etc.