On completion of Step-II, after minimum of 24 to 36 hours candidate needs to Login and Click on **"Make Online Payment"** link and deposit the requisite application fee through On-line mode only.

I. METHOD FOR SUBMISSION OF APPLICATION FEE

Candidate needs to re-login and click the link/tab "Make Payment" active after 24 to 36 hours of submission of the application. The candidates are required to click on **"Make Online Payment"** after 24 to 36 hrs of submission of online application and deposit the requisite application fee online through **Internet Banking /Debit/Credit Card only** from State Bank Collect system of State Bank of India (SBI) website. The journal number or the Transaction number given by the Bank is to be retained for future reference.

Guidelines for deposit of Application Fee through State Bank Collect System of SBI. (Link will become active after 24 to 36 hours of submission of online Application (Step-II)).

- Click on **"Make Online Payment"** tab. The candidate will be navigated to State Bank Collect (State Bank India) page.
- Select disclaimer check box and proceed.
- On next screen select Category '***ESIC APPLICATION FEES 2018***'.
- The candidate will be navigated to State Bank Collect (State Bank India) page of ESIC displaying their logo.
- Enter your ESIC application sequence number.
- On the next screen, (following Data will appear automatically from database).
  Application Sequence Number,
  Name of applicant,
  Post Applied
  Category
  Application Fee
- Verify the details and click on 'Confirm'.
- Now you will be taken to payment gateway
- Select appropriate **'Mode of Payment'** i.e Internet Banking/Credit Card/Debit Card
- Check the charges/commission applicable for selected 'Mode of Payment'
- Pay 'online' **using Internet Banking/Credit Card/Debit Card** and print the e-receipt for your record.

J. <u>SCHEME, SYLLABUS OF EXAMINATION AND MODE OF SELECTION</u>

The Written Examination (Computer Based) shall be **Objective Type Multiple Choice** (to assess Professional Knowledge and General Knowledge/Intelligence) of total 200 Marks. The Scheme of Written Examination is as under:

Papers	Subject	Maximum Marks	Duration

Paper I – Objective Type	(i) General Intelligence & Reasoning. (ii) General Awareness	50 50	**02 Hrs**
Paper II – Objective Type	General Engineering (Civil or Electrical)	100	

Note:

i. **The Qualifying Marks in Written Examination will be decided at the discretion of ESIC.**
ii. **There will be negative marking of 0.25 marks for each wrong answer in Paper-I and Paper-II.**

SYLLABUS:

Indicative Syllabus for Junior Engineer (Civil).

Part-A (100 Questions/100 Marks)

(i) General Intelligence & Reasoning (50 Questions/50 Marks):

The Syllabus for General Intelligence includes questions of both verbal and non-verbal type. The test may include questions on analogies, similarities, differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc. The test will also include questions designed to test the candidate's abilities to deal with abstract ideas and symbols and their relationships, arithmetical computations and other analytical functions.

ii) General Awareness (50 Questions/50 Marks):

Questions will be aimed at testing the candidate's general awareness of the environment around him/her and its application to society. Questions will also be designed to test knowledge of current events and of such matters of everyday observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions relating to India and its neighboring countries especially pertaining to History, Culture, Geography, Economic Scene, General Polity and Scientific Research, etc. These questions will be such that they do not require a special study of any discipline.

Part-B (100 Questions/100 Marks)

Civil & Structural Engineering

A. Civil Engineering

i) Building Materials : Physical and Chemical properties, classification, standard tests, uses and manufacture/quarrying of materials e.g. building stones, silicate based materials, cement (Portland), asbestos products, timber and wood based products, laminates, bituminous materials, paints, varnishes.

ii) Estimating, Costing and Valuation : estimate, glossary of technical terms, analysis of rates, methods and unit of measurement, Items of work – earthwork, Brick work (Modular & Traditional bricks), RCC work, Shuttering, Timber work, Painting, Flooring, Plastering. Boundary wall, Brick building, Water Tank, Septic tank, Bar bending schedule, Centre line method, Mid-section formula, Trapezoidal formula, Simpson's rule. Cost estimate of Septic tank, flexible pavements, Tube well, isolates and combined footings, Steel Truss, Piles and pile-caps. Valuation –

Value and cost, scrap value, salvage value, assessed value, sinking fund, depreciation and obsolescence, methods of valuation.

iii) **Surveying :** Principles of surveying, measurement of distance, chain surveying, working of prismatic compass, compass traversing, bearings, local attraction, plane table surveying, theodolite traversing, adjustment of theodolite, Leveling, Definition of terms used in leveling, contouring, curvature and refraction corrections, temporary and permanent adjustments of dumpy level, methods of contouring, uses of contour map, tachometric survey, curve setting, earth work calculation, advanced surveying equipment.

iv) **Soil Mechanics :** Origin of soil, phase diagram, Definitions-void ratio, porosity, degree of saturation, water content, specific gravity of soil grains, unit weights, density index and interrelationship of different parameters, Grain size distribution curves and their uses. Index properties of soils, Atterberg's limits, ISI soil classification and plasticity chart. Permeability of soil, coefficient of permeability, determination of coefficient of permeability, Unconfined and confined aquifers, effective stress, quick sand, consolidation of soils, Principles of consolidation, degree of consolidation, pre-consolidation pressure, normally consolidated soil, e-log p curve, computation of ultimate settlement. Shear strength of soils, direct shear test, Vane shear test, Triaxial test. Soil compaction, Laboratory compaction test, Maximum dry density and optimum moisture content, earth pressure theories, active and passive earth pressures, Bearing capacity of soils, plate load test, standard penetration test.

v) **Hydraulics:** Fluid properties, hydrostatics, measurements of flow, Bernoulli's theorem and its application, flow through pipes, flow in open channels, weirs, flumes, spillways, pumps and turbines.

vi) **Irrigation Engineering :** Definition, necessity, benefits, 2II effects of irrigation, types and methods of irrigation, Hydrology – Measurement of rainfall, run off coefficient, rain gauge, losses from precipitation – evaporation, infiltration, etc. Water requirement of crops, duty, delta and base period, Kharif and Rabi Crops, Command area, Time factor, Crop ratio, Overlap allowance, Irrigation efficiencies. Different type of canals, types of canal irrigation, loss of water in canals. Canal lining – types and advantages. Shallow and deep to wells, yield from a well. Weir and barrage, Failure of weirs and permeable foundation, Slit and Scour, Kennedy's theory of critical velocity. Lacey's theory of uniform flow. Definition of flood, causes and effects, methods of flood control, water logging, preventive measure. Land reclamation, Characteristics of affecting fertility of soils, purposes, methods, description of land and reclamation processes. Major irrigation projects in India.

vii) **Transportation Engineering :** Highway Engineering – cross sectional elements, geometric design, types of pavements, pavement materials – aggregates and bitumen, different tests, Design of flexible and rigid pavements – Water Bound Macadam (WBM) and Wet Mix Macadam (WMM), Gravel Road, Bituminous construction, Rigid pavement joint, pavement maintenance, Highway drainage, Railway Engineering- Components of permanent way – sleepers, ballast, fixtures and fastening, track geometry, points and crossings, track junction, stations and yards. Traffic Engineering – Different traffic survey, speed-flow-density and their interrelationships, intersections and interchanges, traffic signals, traffic operation, traffic signs and markings, road safety.

viii) **Environmental Engineering :** Quality of water, source of water supply, purification of water, distribution of water, need of sanitation, sewerage systems, circular sewer, oval sewer, sewer appurtenances, sewage treatments. Surface water drainage. Solid waste management – types, effects, engineered management system. Air pollution – pollutants, causes, effects, control. Noise pollution – cause, health effects, control.

B. Structural Engineering

i) **Theory of structures :** Elasticity constants, types of beams – determinate and indeterminate, bending moment and shear force diagrams of simply supported, cantilever and over hanging beams. Moment of area and moment of inertia for rectangular & circular sections, bending moment and shear stress for tee, channel and compound sections, chimneys, dams and retaining walls, eccentric loads, slope deflection of simply supported and cantilever beams, critical load and columns, Torsion of circular section.

ii) **Concrete Technology :** Properties, Advantages and uses of concrete, cement aggregates, importance of water quality, water cement ratio, workability, mix design, storage, batching, mixing, placement, compaction, finishing and curing of concrete, quality control of concrete, hot weather and cold weather concreting, repair and maintenance of concrete structures.

iii) **RCC Design :** RCC beams-flexural strength, shear strength, bond strength, design of singly reinforced and double reinforced beams, cantilever beams. T-beams, lintels. One way and two way slabs, isolated footings. Reinforced brick works, columns, staircases, retaining wall, water tanks (RCC design questions may be based on both Limit State and Working Stress methods).

iv) **Steel Design :** Steel design and construction of steel columns, beams roof trusses plate girders.

Indicative Syllabus for Junior Engineer (Electrical) in ESIC

Part-A (100 Questions/100 Marks)

(i) General Intelligence & Reasoning (50 Questions/50 Marks):

The Syllabus for General Intelligence would include questions of both verbal and non-verbal type. The test may include questions on analogies, similarities, differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series etc. The test will also include questions designed to test the candidate's abilities to deal with abstract ideas and symbols and their relationships, arithmetical computations and other analytical functions.

ii) General Awareness (50 Questions/50 Marks):

Questions will be aimed at testing the candidate's general awareness of the environment around him/her and its application to society. Questions will also be designed to test knowledge of current events and of such matters of everyday observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions relating to India and its neighboring countries especially pertaining to History, Culture, Geography, Economic Scene, General Polity and Scientific Research, etc. These questions will be such that they do not require a special study of any discipline.

Part-B (100 Questions/100 Marks)

Electrical Engineering

i) Basic concepts

Concepts of resistance, inductance, capacitance, and various factors affecting them. Concepts of current, voltage, power, energy and their units.

ii) Circuit law

Kirchhoff's law, Simple Circuit solution using network theorems.

iii) Magnetic Circuit

Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, Magnetic calculations for conductors of different configuration e.g. straight, circular, solenoidal, etc. Electromagnetic induction, self and mutual induction.

iv) AC Fundamentals

Instantaneous, peak, R.M.S. and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of R.L. 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.

v) 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.

vi) Electrical Machines

(a) D.C. Machine – Construction, Basic Principles of D.C. motors and generators, their characteristics, speed control and starting of D.C. Motors. Method of braking motor, Losses and efficiency of D.C. Machines. (b) 1 phase and 3 phase transformers – Construction, Principles of operation, equivalent circuit, voltage regulation, O.C. and S.C. 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.

vii) Synchronous Machines

Generation of 3-phase e.m.f. armature reaction, voltage regulation, parallel operation of two alternators, synchronizing, control of active and reactive power. Starting and applications of synchronous motors.

viii) 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, H.R.C. 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.

ix) Estimation and costing

Estimation of lighting scheme, electric installation of machines and relevant IE rules. Earthing practices and IE Rules.

x) Utilization of Electrical Energy
Illumination, Electric heating, Electric welding, Electroplating, Electric drives and motors.

xi) Basic Electronics
Working of various electronic devices e.g. P N Junction diodes, Transistors (NPN and PNP type), BJT and JFET. Simple circuits using these devices.

MODE OF SELECTION:

The final selection for the post of Junior Engineer (Civil) and Junior Engineer (Electrical) will be made on the basis of merit position in Written Examination (Computer Based).

I. IMPORTANT INSTRUCTIONS TO CANDIDATES

1.	**Candidates are not required to submit to ESIC, either by post or by hand, the printouts of their online applications or any other document.**
2.	The printout of online application must be retained and produced on demand.
3.	**Admit Card will not be sent by post. It should be downloaded by the candidates from the website.**
4.	ESI Corporation will not undertake detailed scrutiny of online applications for eligibility and other aspects at the time of written examination and, therefore, the **candidature is accepted only provisionally**. Before applying, **candidates are advised to go through the requirements of essential qualification, age etc. and satisfy themselves that they are eligible for the post**. When scrutiny is undertaken, if any claim made in the application is not found substantiated, the candidature will be cancelled and the **decision of ESIC shall be final**.
5.	**Before applying, candidates in their own interest are advised to go through the detailed instructions contained in this notice and also available on the website of ESI Corporation(www.esic.nic.in)**
6.	**Candidates seeking reservation benefits under SC/ST/OBC /PWD category must ensure that they are entitled to such reservation as per eligibility prescribed in the Notice and as per the instructions issued by Govt. of India. They should also be in possession of the certificates in the prescribed format of Govt. of India in support of their claim.** Candidates claiming reservation/ age relaxation under OBC Category should submit the OBC Certificate given at Annexure -"A" prescribed vide Govt. of India, Department of Personal and Training OM No. 36012/22/93-Estt.(SCT) dated 15.11.93 along with Self Declaration given at Annexure "B" failing which the benefit of reservation or age relaxation will not be given.
7.	**CLOSING DATE: The Closing Date for submission of Online Application through ESIC website www.esic.nic.in is 15.12.2018.**
8.	**The crucial date for determining the age limit, essential qualification and other criteria regarding eligibility for the post shall be the closing date of submission of online application i.e. 15.12.2018.**
9.	**The selected candidates are liable to be posted anywhere in India.**
10.	**Mobiles, other electronic gadgets and wireless equipments are banned within the premises of the examination centres. Their possession in switched on or switched off mode is considered by the ESI Corporation as a manipulative practice and will**