

**RITES LIMITED**  
**(A Govt. of India Enterprise)**  
**Shikhar, Plot No. 1, Sector – 29, Gurgaon – 122001**



**Engagement of Engineering Professionals on contract basis**

RITES Ltd., a Nav Ratna Central Public Sector Enterprise under the Ministry of Railways, Govt. of India is a premier multi-disciplinary consultancy organization in the fields of transport, infrastructure and related technologies.

RITES Ltd. is in urgent need of dynamic and hard-working professionals as under:

| VC No. | Post              | No. of Vacancies |     |           |    |    |       |
|--------|-------------------|------------------|-----|-----------|----|----|-------|
|        |                   | UR               | EWS | OBC (NCL) | SC | ST | Total |
| 154/24 | Resident Engineer | 9                | 2   | 5         | 3  | 1  | 20    |

**Age Limit**

|                    |
|--------------------|
| <b>Maximum Age</b> |
| 40 Years           |

**Note: Age, experience, and all other eligibility criteria shall be reckoned as on the last date of submission of the application (cut-off date)**

**Minimum Qualifications & Experience**

| VC No  | Position          | Minimum Qualification   | Minimum qualification experience | Post-work |
|--------|-------------------|---|----------------------------------|-----------|
| 154/24 | Resident Engineer | Full Time Diploma in Civil Engineering<br><br>Or<br><br>Full Time Diploma in Engineering in Mechanical /Production/ Production & industrial/ Manufacturing/ Mechanical & Automobile Discipline<br><br>Or<br><br>Full time Graduation in Engineering in Chemical/Petrochemical/ Chemical Technology/ Petrochemical Technology/Plastic Engg. Technology/Food/Textile/Leather Technology<br><br>Or<br><br>Full Time Diploma in Engineering in Electrical/ Electrical & Electronics | 3 years                          |           |

## Relaxations & Concessions

Reservation/ relaxation/ concessions to EWS/ SC/ST/OBC (NCL)/PWD/ Ex-SM/ J&K Domicile would be provided against reserved posts (where applicable) as per extant Govt. orders.

Relaxation in upper age limit to OBC (NCL)/ SC/ ST candidates shall be provided against reserved posts as per extant Govt. orders.

PWD candidates suffering from not less than 40% of the relevant disability shall only be eligible for the benefit of PWD. Such PWD candidates shall be eligible for relaxation of 10 years in upper age limit.

PWD candidates will have to meet the Physical Requirements and Functional Classifications which have been identified for the post as under:

| Discipline            | Categories for which identified | Functional Classification                  | Physical Requirements              |
|-----------------------|---------------------------------|--|------------------------------------|
| Electrical            | Locomotor disability            | OA, OL, Leprosy Cured, Acid Attack Victims | S, ST, BN, W, SE, MF, C, R, W & RW |
|                       | Hearing Impairment              | HI   |                                    |
| Mechanical / Chemical | Locomotor disability            | OA, OL, Leprosy Cured, Acid Attack Victims |                                    |

| Discipline | Categories for which identified | Functional Classification                  | Physical Requirements                      |
|------------|---------------------------------|--|--|
| Civil      | Locomotor disability            | OA, OL, Leprosy Cured, Acid Attack Victims | S, ST, BN, W, SE, MF, C, RW, KC, CL, JU, H |
|            | Hearing Impairment              | HH   |  |

Persons with Disabilities belonging to the category/ categories for which the post is identified (as indicated in Table above) can also apply even if no vacancies are specifically reserved for them. Such candidates will be considered for selection for appointment to the post by general standard of merit.

Functional Classification:

| Code | Functions                 |
|------|---------------------------|
| OL   | One leg affected (R or L) |
| OA   | One arm affected          |
| OAL  | One arm one leg affected  |
| BL   | Both legs affected        |
| HI   | Hearing Impaired          |
| LV   | Low Vision                |

Physical Requirements:

| Code | Physical Requirements                         |
|------|---|
| S    | Work performed by sitting (on bench or chair) |
| ST   | Work performed by standing                    |
| SE   | Work performed by seeing                      |
| RW   | Work performed by reading and writing         |
| BN   | Work performed by bending                     |

|    |   |
|----|---|
| MF | Work performed by manipulation by fingers |
| C  | Work performed by communication           |
| W  | Work performed by walking                 |
| H  | Hearing/ Speaking                         |
| KC | Kneeling and Crouching                    |
| JU | Jumping                                   |
| CL | Climbing                                  |

The above lists are subject to revision.

### Selection Process

The selection process will consist of two rounds:-

#### Round 1

The weightage distribution of various parameters of the selection shall be as under:

Written Test      -      100%

A minimum of 50% marks for UR/ EWS (45% for SC/ST/OBC (NCL)/PWD against reserved posts) in written test will be required to enable the candidate to be considered for Round 2.

There will be 125 objective type questions carrying one mark each for a duration of 2.5 Hours. There will be no negative marking system applicable and therefore, no marks will be deducted in case of an incorrect answer. Candidates belonging to PwD Category are eligible for an additional compensatory time of 50 minutes. **One common question paper consisting questions from all disciplines will be given to candidates.**

#### Round 2

**Candidates qualifying in Round 1 will have to appear in competency test which will be conducted by our client. Candidates need to qualify competency test by securing 95% qualifying marks for consideration of their candidature for placement on panel. Number of candidates who will be called for the competency test will depend on number of vacancies and decision of RITES Limited.**

Candidates need to qualify both rounds for being eligible for issuance of offer of engagement. Additionally, appointment of selected candidates will be subject to their being found medically fit in the Medical Examination to be conducted as per RITES Rules and Standards of Medical Fitness

### Nature & Period of Engagement

The appointment shall be purely on contract basis initially for a period of one year, extendable until completion of the assignment subject to mutual consent and satisfactory performance.

Selected candidates shall be liable for posting anywhere in India as per Company requirements.

### Remuneration

Pay, allowances and perks for the post would be as under:

|                  |                   |                    |
|------------------|-------------------|--------------------|
| <b>Basic pay</b> | <b>Allowances</b> | <b>Other perks</b> |
|------------------|-------------------|--------------------|

|  |   |   |
|--|---|---|
| Rs. 16828/- (1 to 3 % annual increment based on the performance) | 70% in Non-metro cities<br>75% in Metro Cities other than Mumbai/Bangalore<br>80% for Mumbai/Bangalore. | Medical & Accidental Insurance for self and Employer's contribution towards PF @ 12% would be borne by the company. |
|--|---|---|

The Consolidated monthly Gross Emoluments including PF contribution of Employer for posting in Non – Metro city comes out to be INR 30,627/- with approximate CTC of INR 3.67 Lacs.

**Remuneration mentioned above is only indicative. Actual remuneration shall depend upon place of posting and other terms & conditions of appointment.**

#### Fees

The candidates will have to deposit the under mentioned amount of fees during online application:

| Category                   | Fee                                |
|----------------------------|------------------------------------|
| General/OBC Candidates     | Rs. 600/- plus Taxes as applicable |
| EWS/ SC/ST/ PWD Candidates | Rs. 300/- plus Taxes as applicable |

For any difficulty/ queries regarding fee payment, candidates may contact on following only:

Helpdesk No: 011 – 33557000, Extension Code - 13221

Helpdesk e-mail id: pghelpdesk@hdfcbank.com

**Note:**

- a) Candidates should note that the fee submitted through any other mode except the mode specified, will not be accepted by RITES and such applications will be treated as without fee and will be summarily rejected.
- b) Persons with disabilities are given concession in the fee provided they are otherwise eligible for appointment. A PWDs candidate claiming age relaxation/fee concession will be required to submit along with their Detailed Application Form, certified copy of the PWD certificate as per latest GOI format

#### How to Apply

1. **Before applying candidates should ensure that they satisfy the necessary conditions and requirements of the position.**
2. Interested candidates fulfilling the above laid down eligibility criteria are required to apply online in the registration format available in the Career Section of RITES website, <http://www.rites.com>.
3. While submitting the online application; the system would generate 'Registration No.' on top of online form filled up by the candidate. Note down this "Registration No." and quote it for all further communication with RITES Ltd.
4. While filling up the required details, candidates are advised to carefully and correctly fill the details of "Identity Proof". Candidates are also advised to note the same and ensure the availability of the same Identity Proof as it will be required to be produced in original at later stages of selection (if called).
5. **After filling up the required details under the "Fill/ Modify Application Form", candidate should submit the application.**

6. The candidates are also advised to keep a copy of Application Form submitted with them and to carry the same at the time of the selection (if called).
7. A copy of this online **APPLICATION FORM** containing the registration number is to be printed, signed, and retained. The same is to be submitted at the time of Scrutiny of Documents along with **SELF-ATTESTED SCANNED COPIES** of the following documents strictly in the following order. (if called for document scrutiny):
  - 2 recent passport size colour photographs
  - a. High School certificate for proof of Date of Birth
  - b. Certificates of Academic & Professional qualifications and statements of marks of all the qualifications for all semesters/years (Xth, XIIth, Diploma/ Graduation/ Post-Graduation as applicable)
  - c. EWS/ SC/ST/OBC Certificate in the prescribed format by Govt. of India (if applicable)
  - d. Proof of Identity & Address (Passport, Voter ID, Driving Licence, Aadhaar Card etc)
  - e. PAN Card
  - f. Proof of different periods of experience as claimed in the Application Form (if applicable)
  - g. Any other document in support of your candidature
  - h. PWD Certificate as per latest format (if applicable).

**No documents are to be uploaded at the time of submission of applications.**

7. In respect of claims made by you in your application with regard to experience, copies of experience certificates from your previous employer are to be submitted at the time document verification. In respect of current employment, experience certificate/ joining letter along with last months' salary slips, or, Form 16 and other documents which clearly prove your continuity in the job are to be submitted. In case your claim is not established from the proofs submitted by you; your candidature is liable to be rejected at the time document scrutiny. Please check your claims vis-a-vis the certificates in support thereof establishing your candidature. Incomplete application or insufficient proof at the time of document verification would entail rejection of your candidature. No additional information other than those furnished in the Application shall be allowed to be considered at a later stage.
8. For proof of CTC/ salary, candidates shall have to submit a copy of their last Form No. 16/ Earning Card/ salary slip/ Appraisal letter/ any other suitable document.
9. Community certificate (SC/ST/OBC) should be in the format prescribed by Government of India only. OBC candidates included in the Central List with certificate not more than 12 months old (with clear mention of candidate not belonging to "Creamy Layer") in the GOI prescribed format only will be considered for the posts reserved for OBC. EWS certificate should also be as per Gov. of India format.
10. Hard copies of documents are not to be sent to this office through post/ courier.
11. The original testimonials/documents along with one self-attested copy will have to be produced by the candidate(s) at the time of selection (if called).
12. Mere applying for the post/ submission of documents/ appearing or qualifying in the selection does not confer any right on the candidates for claiming selection. If it is found that a candidate does not fulfill the advertised eligibility criteria, his/her candidature will be summarily rejected.
13. Candidates should submit only one application for one vacancy and application once submitted cannot be altered. A valid e-mail ID is essential for submission of the online application. RITES will not be responsible for bouncing of any e-mail sent to the candidates. However, candidates can apply for any number of vacancies.
14. The candidates must submit all the details pertaining to his candidature viz. personal details, educational qualification details, experience details, category etc. Suppression, in this regard, if any, detected on a future date shall render the candidature liable for forfeiture.

15. If any claim made by a candidate is found to be incorrect, his/her candidature shall be summarily rejected.
16. Candidates should submit only one application for one vacancy and application once submitted cannot be altered. A valid e-mail ID is essential for submission of the online application. RITES will not be responsible for bouncing of any e-mail sent to the candidates. However, candidates can apply for any number of vacancies.
17. The candidates must submit all the details pertaining to his candidature viz. personal details, educational qualification details, experience details, category etc. Suppression, in this regard, if any, detected on a future date shall render the candidature liable for forfeiture.
18. If any claim made by a candidate is found to be incorrect, his/her candidature shall be summarily rejected.

### Venue & Time

Test Centers for Written Test\*:

| S. No. | Date of Written Examination | City          |
|--------|-----------------------------|---------------|
| 1      | 05-05-2024                  | Delhi/Gurgaon |
| 2      |                             | Kolkata       |
| 3      |                             | Guwahati      |
| 4      |                             | Bhubneshwar   |
| 5      |                             | Hyderabad     |
| 6      |                             | Bangalore     |
| 7      |                             | Chennai       |
| 8      |                             | Mumbai        |

### General Instructions

1. Management reserves the right to cancel/ restrict/ enlarge/ modify/ alter the selection/ recruitment process at any stage, without issuing any further notice or assigning any reason thereafter.
2. The number of vacancies may vary.
3. Departmental candidates of RITES and candidates working in Government Departments/ PSU shall be allowed to join RITES only after being properly relieved from their parent organization.
4. Before applying, the Candidates must satisfy themselves about their eligibility for the post applied for.
5. In case it is detected at any stage of recruitment that a candidate does not fulfill the eligibility norms and/or that he/she has furnished any incorrect/false information or has suppressed any material fact (s), his/her candidature s liable for cancellation. If any of these shortcomings is/are detected even after appointment, his/her services are liable to be terminated.
6. **Any corrigendum/addendum to this advertisement will be displayed only on the Company's website [www.rites.com](http://www.rites.com). Therefore, applicants are advised to keep checking the Company's website for any update.**

7. The period of training/internship shall not be counted towards post qualification experience.
8. Legal jurisdiction will be Delhi in case of any dispute
9. No train/bus fare / TA / DA shall be payable.
10. **Age, experience, and all other eligibility criteria shall be reckoned as on the last date of submission of application (cut-off date).**
11. The date of declaration of result / issuance of Marks Sheet shall be deemed to be date of acquiring the qualification and there shall be no relaxation on this account. No further relaxation shall be provided in this regard.
12. Where a specialization is required in the qualifying degree in the educational qualification, candidate is required to submit a certificate from the University/ Institution clearly specifying the specialization in the qualifying degree.

### **Syllabus for Written Test**

#### **Syllabus for Electrical Engineering:**

##### **Unit-1 Electric Circuits and Fields:**

Network graph, KCL, KVL, node and mesh analysis, transient response of Ac and Dc networks, sinusoidal steady-state analysis, resonance, basic filter concept, ideal current and voltage sources, Thevenin's Norton's and Superposition and Maximum Power Transfer theorems, two-port networks, three phase circuits, Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions, Ampere's and Biot-Savart's laws, inductance, dielectrics, capacitance.

##### **Unit-2 Signals and Systems:**

Representation of continuous and discrete-time signals, shifting and scaling operation, linear, time-invariant and causal systems, Fourier series representation of continuous periodic signals, sampling theorem, Fourier, Laplace and Z transforms.

##### **Unit-3 Electrical Machines:**

Single phase transformer – equivalent circuit, phasor diagram, tests, regulation and efficiency, three phase transformers – connections, parallel operation, auto-transformer, energy conversion principles; DC machines – types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors, three phase induction motors – principles, types performance characteristics, starting and speed control, single phase induction motors, synchronous machines – performance, regulation and parallel operation of generators, motor starting characteristics and applications; servo and stepper motors.

##### **Unit-4 Power Systems:**

Basic power generation concepts; transmission line models and performance, cable performance, insulation, corona and radio interference, distribution systems, per-unit quantities, bus impedance and admittance matrices, load flow, voltage control, power factor correction, economic operation, symmetrical components, fault analysis, principles of over-current, differential and distance protection, solid state relays and digital protection, circuit breakers, system stability concepts, swing curves and equal area criterion, HVDC transmission and FACTS concepts.

### **Unit-5 Control Systems:**

Principles of feedback, transfer function, block diagrams; steady-state errors, Routh and Niquist techniques, Bode plots, root loci, lag, lead and lead-lag compensation, state space model, state transition matrix, controllability and observability.

### **Unit-6 Electrical and Electronic Measurements:**

Bridges and potentiometers, PMMC, moving iron, dynamometer and induction type instruments, measurement of voltage, current, power, energy and power factor, instrument transformers, digital voltmeters and multimeters, phase, time and frequency measurement, Q-meters, oscilloscopes, potentiometric recorders, error analysis.

### **Unit-7 Analog and Digital Electronics:**

Characteristics of diodes, BJT, FET, amplifiers – biasing, equivalent circuit and frequency response, oscillators and feedback amplifiers, operational amplifiers – characteristics and applications, simple active filters, VCOs and timers, combinational and sequential logic circuits, multiplexer, Schmitt trigger, multi-vibrators, sample and hold circuits, A/D and D/A converters, 8-bit microprocessor basics, architecture, programming and interfacing.

### **Unit-8 Power Electronics and Drives:**

Semiconductor power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs – static characteristics and principles of operation, triggering circuits, phase control rectifiers, bridge converters – fully controlled and half controlled, principles of choppers and inverters, basis concepts of adjustable speed Dc and Ac drives.

### **Unit-9 Application/utilization of Electrical Energy**

**Properties of Electrical System:** Characteristics/properties of electrical systems/equipment/devices used in institutional building/commercial complexes/residential complexes/workshops/engineering industry etc. including General Electrification, Area Lighting, Sub-Station, DG Set, Solar system, Air-conditioning, Lifts, fire Alarm, Data Networking, EPBX, CCTV, PA System, Airport Runway lighting works etc.

**Planning & Design of Electrical Works** – Internal & External Works. Estimation, installation, testing and commissioning of such works.

**Inspection and testing** of electrical equipment, components, fittings, types of tests, sampling of components, test methods for different electrical equipment, components, cables, wires, insulators etc.

#### **FICO**

SAP FI – Organization Structure, Financial Accounting Global Settings, General Ledger, Accounts Payable, Accounts Receivable, Bank Accounting, Asset Accounting, Profit Center Accounting, Controlling, Cost Element Accounting, Cost Centre Accounting, Internal Order Accounting, Profitability Analysis.

## **Syllabus for Mechanical Engineering:**

### **Applied Mechanics and Design**

**Engineering Mechanics:** Free-body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion; impulse and momentum (linear and angular) and energy formulations, collisions.



**Mechanics of Materials:** Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain; thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Euler's theory of columns; energy methods; thermal stresses; strain gauges and rosettes; testing of materials with universal testing machine; testing of hardness and impact strength.

**Theory of Machines:** Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; cams; gears and gear trains; flywheels and governors; balancing of reciprocating and rotating masses; gyroscope.

**Vibrations:** Free and forced vibration of single degree of freedom systems, effect of damping; vibration isolation; resonance; critical speeds of shafts.

**Machine Design:** Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; principles of the design of machine elements such as bolted, riveted and welded joints; shafts, gears, rolling and sliding contact bearings, brakes and clutches, springs.

### **Fluid Mechanics and Thermal Sciences**

**Fluid Mechanics:** Fluid properties; fluid statics, manometry, buoyancy, forces on submerged bodies, stability of floating bodies; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; dimensional analysis; viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends and fittings.

**Heat-Transfer:** Modes of heat transfer; one dimensional heat conduction, resistance concept and electrical analogy, heat transfer through fins; unsteady heat conduction, lumped parameter system, Heisler's charts; thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, heat transfer correlations for flow over flat plates and through pipes, effect of turbulence; heat exchanger performance, LMTD and NTU methods; radiative

heat transfer, Stefan-Boltzmann law, Wien's displacement law, black and grey surfaces, view factors, radiation network analysis.

**Thermodynamics:** Thermodynamic systems and processes; properties of pure substances, behaviour of ideal and real gases; zeroth and first laws of thermodynamics, calculation of work and heat in various processes; second law of thermodynamics; thermodynamic property charts and tables, availability and irreversibility; thermodynamic relations.

**Applications:** *Power Engineering:* Air and gas compressors; vapour and gas power cycles, concepts of regeneration and reheat. *I.C. Engines:* Air-standard Otto, Diesel and dual cycles. *Refrigeration and air-conditioning:* Vapour and gas refrigeration and heat pump cycles; properties of moist air, psychrometric chart, basic psychrometric processes. *Turbomachinery:* Impulse and reaction principles, velocity diagrams, Pelton-wheel, Francis and Kaplan turbines.

### **Materials, Manufacturing and Industrial Engineering**

**Engineering Materials:** Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials.

Elasticity, plasticity, fracture and fracture toughness, fatigue, solid solutions, equilibrium diagram, thermal treatment, isothermal transformation of austenite, TTT and CCT diagrams Cooling, curves, austempering, martempering, factors affecting hardenability, function of alloying elements in steel (ferrite former, austenite former, carbide former, stabilizer)

**Casting, Forming and Joining Processes:** Different types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy. Principles of welding, brazing, soldering and adhesive bonding.

**Machining and Machine Tool Operations:** Mechanics of machining; basic machine tools; single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, design of jigs and fixtures.

**Metrology and Inspection:** Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.

**Computer Integrated Manufacturing:** Basic concepts of CAD/CAM and their integration tools.

**Production Planning and Control:** Forecasting models, aggregate production planning, scheduling, materials requirement planning.

**Inventory Control:** Deterministic models; safety stock inventory control systems.

**Operations Research:** Linear programming, simplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.

## **Manufacturing Processes**

Metal casting – patterns and moulds including mould design involving feeding, gating and risering, melting, casting practices in sand casting, permanent mould casting, investment casting and shell moulding, casting defects and repair; Hot, warm and cold working of metals; Metal forming – fundamentals of metal forming processes of rolling, forging, extrusion, wire drawing and sheet metal forming, defects in forming; Metal joining – soldering, brazing and welding, common welding processes of shielded metal arc welding, gas metal arc welding, gas tungsten arc welding and submerged arc welding; Welding metallurgy, problems associated with welding of steels and aluminium alloys, defects in welded joints; Powder metallurgy – production of powders, compaction and sintering; NDT using dye-penetrant, ultrasonic, radiography, eddy current, acoustic emission and magnetic particle methods.

### **Testing of material:**

Nondestructive testing: Ultrasonic testing, radiography, magnetic particle testing, eddy current testing, dye penetration testing.

Physical testing: Tensile test, % elongation, % reduction in area, hardness (Brinell, Rockwell, Vickers), impact test (Izod, Charpy), bend test, shear test, fatigue test, creep test.

Chemical testing ferrous and non ferrous metals Metallography;

micro and macro examination Testing of paints, rubber, textiles, wood, and plastics.

## Syllabus for Civil Engineering:

| Topics   |
|--|
| <b>Surveying:</b> - Types of leveling Instruments, Temporary adjustments, Booking and reducing of levels, Checking the leveling work, longitudinal section, Cross Sections, Error due to curvature and refraction.   |
| Total station/GPS Survey-Features of total station and GPS, Principles of working with GPS, adjustment of errors, Open and closed traverse and their application to engineering problems.  |
| Trigonometrically Leveling-Heights and Distances, Geometrical Observations, Determination of Difference in Elevation.  |
| Triangulation Systems, Base Line Measurement, Calculations of Length of Base, Measurement of Horizontal Angles.  |
| Contours and Contour Interval, Methods of Locating Contours, Interpolation of Contours.  |
| Route Surveying-Elements of Reconnaissance Survey, Preliminary Survey, Final Location Survey, Construction Survey.   |
| Simple, compound, reverse and transition curves, Vertical curves for roads and railways, setting out curve by offset and by method of deflection angles, Length of curves calculation.   |
| Hydrographic survey-sounding, charting, cross section of streams and rivers and gauging of discharges.   |
| Principles and utility of Aerial photogrammetric and remote sensing, satellite data.   |
| Soil as a three phase system water content, density and unit weights, specific gravity, voids ratio porosity and degree of saturation, density index.  |
| Classification of soils, compaction, standard Proctor test, water density relationship, modified proctor test, field compaction methods, field compaction control, calibration curve, factors affecting compaction.  |
| Exploratory boring, depth of exploration, spacing and number of boring, method of sampling and types of samples, bore logs, core recovery, rock quality designation, field vane shear test, standard penetration test and its application, field plate load test and limitation, ultimate bearing capacity of shallow foundation, Plate load test, Elements of combined and raft foundation. |
| Pile foundation – General considerations in pile foundation, types of piles, pile load test and use of relevant IS code.   |
| Stability of slopes, classical theory of earth pressure by Rankine and Coulomb, active and passive pressure against retaining walls.   |
| Differential method of improving soil characteristics at site, element of soil stabilization, sand drain, vibro flotation technique.   |
| Data Required for Preparation of an estimate, Types of an estimates, Items of Work, Description of an Item of work, Measurement of Works, Guidelines for Measurements, I.S. mode or Units of measurements, Plinth Area, Floor Area, Carpet and F.S.I.  |
| General procedure of measurement of works, Methods of taking out Quantities, Various items of works, Prime Costs and Provisional Sums, Provisional Quantities, Contingencies, Work-charged, Establishment, Centage Charges, Building Estimate Methods, Checks over Accuracy of Detailed Estimates.   |
| Analysis of Rates – quantities of Materials and labour Required for different items of Works. Approximate Rates of Equipment/Machinery required for different items of Works. Transportation of Materials and cost. Rates specified for various categories of Laborers in Building Industry. Analysis of Rates of Principal Items of Work in the Building Construction.                      |
| Type of Specifications, Detailed Specifications, Standard Specifications   |

|  |
|--|
| Type of tenders, components of tender document, preparation of tender document.  |
| <b>Beam:-</b> Types of Supports, Shear Force and Bending Moment, Shear Force and Bending Moment Diagrams, Graphical Method of Plotting S.F. and B.M. Diagrams.   |
| <b>Beams:</b> - Deflections by Moment Area Method and Conjugate Beam Method, Slope and Deflection for Cantilever and Simply Supported Beam, Analysis of Fixed Beam and Continuous Beams.   |
| Column analysis with different support condition, column carrying eccentric load, laterally loaded column, effective height, short column, slender column.   |
| Deflection of framed structures Moving loads on beam/frames, influence lines for bending moment and shear force in members of framed structure. Moment distribution and slope deflection methods.  |
| Method of Design – Working Stress Method, Ultimate Load Method, Limit State Method   |
| Singly and Doubly Reinforced Beams and slabs, columns  |
| Shear Stress, Diagonal Tension, Shear Reinforcement, Development Length, Anchorage Bond, Flexural Bond   |
| Basic Concepts of Prestressed Concrete   |
| Stress strain curve for mild steel, rolled steel section, loads, permissible stresses, working stresses, factor of safety minimum thickness of structural members, Design methods.   |
| Compression Members-Effective length, Slenderness ratio, Column design , Types of sections, assumptions, Design of Axially loaded compression members  |
| Tension Members-Net sectional area, Permissible stress, Design of axially loaded tension member  |
| Design of Plate girder – bending, shear, economical depth.   |
| Welded joints, types of welds, design of fillet weld, design of butt weld.   |
| Classification of highways, types of surveys, cross-section and profiles, soil investigation   |
| Elements of right of way and standards, gradient, speed, sight distances, curves.  |
| Testing of aggregate, bitumen and cement, Field quality test for earthwork, concrete work, brick & stone masonry, Road work.   |
| California bearing ratio method for design of flexible pavement  |
| Design of concrete pavement, pavement joints, preparation of the sub-grade and sub-base  |
| Types of alignment survey, parameters of speed, loading and permanent way for various classes of railway line, schedule of dimensions.   |
| Curves, gradient, earthwork and permanent way-rails, sleepers, ballast, fastenings and fixtures, points and crossings, level crossing.   |
| Daily maintenance, periodical maintenance, maintenance of track alignment, maintenance of drainage, maintenance of track components, maintenance of points and crossings, maintenance of level crossing.   |
| Airport Site Selection, Estimation of Future Air Traffic Needs, Runway Orientation, Runway Configuration, Basic Runway Length, Correction for Elevation, Temperature and Gradient, Airport Classification, Airport Capacity, Runway Capacity, Gate Capacity, Taxiway Capacity, Airport layout. |

## Syllabus for Chemical Engineering

CHEMICAL ENGINEERING

Process Calculations and Thermodynamics: Laws of conservation of mass and energy; use of tie components; recycle, bypass and purge calculations; degree of freedom analysis. First and Second laws of thermodynamics. First law application to close and open systems. Second law and Entropy. Thermodynamic properties of pure substances: equation of state and departure function, properties of mixtures: partial molar properties, fugacity, excess properties and activity coefficients; phase equilibria: predicting VLE of systems; chemical reaction equilibria.

Fluid Mechanics and Mechanical Operations: Fluid statics, Newtonian and non-Newtonian fluids, Bernoulli equation, Macroscopic friction factors, energy balance, dimensional analysis, shell balances, flow through pipeline systems, flow meters, pumps and compressors, packed and fluidized beds, elementary boundary layer theory, size reduction and size separation; free and hindered settling; centrifuge and cyclones; thickening and classification, filtration, mixing and agitation; conveying of solids.

Heat Transfer: Conduction, convection and radiation, heat transfer coefficients, steady and unsteady heat conduction, boiling, condensation and evaporation; types of heat exchangers and evaporators and their design. Mass Transfer: Fick's laws, molecular diffusion in fluids, mass transfer coefficients, film, penetration and surface renewal theories; momentum, heat and mass transfer analogies; stagewise and continuous contacting and stage efficiencies; HTU & NTU concepts design and operation of equipment for distillation, absorption, leaching, liquid-liquid extraction, drying, humidification, dehumidification and adsorption.

Chemical Reaction Engineering: Theories of reaction rates; kinetics of homogeneous reactions, interpretation of kinetic data, single and multiple reactions in ideal reactors, non-ideal reactors; residence time distribution, single parameter model; non-isothermal reactors; kinetics of heterogeneous catalytic reactions; diffusion effects in catalysis.

Instrumentation and Process Control: Measurement of process variables; sensors, transducers and their dynamics, transfer functions and dynamic responses of simple systems, process reaction curve, controller modes (P, PI, and PID); control valves; analysis of closed loop systems including stability, frequency response and controller tuning, cascade, feed forward control.

Plant Design and Economics: Process design and sizing of chemical engineering equipment such as compressors, heat exchangers, multistage contactors; principles of process economics and cost estimation including total annualized cost, cost indexes, rate of return, payback period, discounted cash flow, optimization in design.

Chemical Technology: Inorganic chemical industries; sulfuric acid, NaOH, fertilizers (Ammonia, Urea, SSP and TSP); natural products industries (Pulp and Paper, Sugar, Oil, and Fats); petroleum refining and petrochemicals; polymerization industries; polyethylene, polypropylene, PVC and polyester synthetic fibers.

**Note: One common question paper consisting questions from all disciplines will be given to candidates.**

#### **Communication with RITES**

Any information regarding this recruitment process would be made available on the email address provided by the candidate at the time of registration and/or shall be uploaded on RITES website. Candidates are advised to periodically check the site for further updates.

Candidates are encouraged to go through the detailed advertisement and read the "Frequently Asked Questions (FAQs)" uploaded on RITES website under Career section to solve their queries.

Queries if remaining should be sent to [rectt@rites.com](mailto:rectt@rites.com) only and contain the following particulars:

- i. **VC No.**
- ii. **REGISTRATION/ROLL NO.**
- iii. **NAME OF CANDIDATE IN FULL AND IN BLOCK LETTERS.**
- iv. **Valid email address as given in the application Communications not containing above particulars shall NOT BE ATTENDED TO.**

Communications not containing above particulars shall NOT BE ATTENDED TO. Any query/ issue should be

brought to notice of RITES well in advance of the due date.

RITES will not be responsible for non-submission of application due to issues brought to notice at the last moment. Queries related to information already provided in the advertisement may not be attended to.

| <b>Important Dates</b> |   |   |
|------------------------|---|---|
| <b>S. No.</b>          | <b>Particular</b>   | <b>Date</b>                                       |
| 1                      | Commencement of submission of online application and online payment of fees | 20.04.2024  |
| 2                      | Last date of submission of online application and online payment of fees    | 30.04.2024 (12:00 PM)                             |
| 3                      | Date of issue of admit cards  | 30.04.2024 (5:00 PM)                              |
| 4                      | Date of written test  | 05.05.2024  |
| 5                      | Upload of Provisional Answer Key  | 05.05.2024 10:00 PM                               |
| 6                      | Objection window to submit objections against the provisional answer key    | 05.05.2024 (10:00 PM) to<br>06.05.2024            |
| 7                      | Upload of Final Answer Key  | 08.05.2024 (12:00 PM)                             |
| 8                      | Declaration of marks scored in Written test                                 | 08.05.2024 (12:00 PM)                             |
| 9                      | Re-evaluation window (Submission of request for rechecking of OMR sheets)   | 08.05.2024 (12:00 PM) to<br>09.05.2024 (12:00 PM) |