

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

Engagement of Multiple Engineering Professionals on contract basis

RITES Ltd., a Navratna 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. Invites application for the following posts and disciplines.

Note: 1. A candidate shall apply for only one post.

2. The remuneration to be paid is based on the minimum years of post-qualification experience applicable for the post.

Post wise vacancies under each discipline along with Minimum Educational Qualification, Domain of experience and Minimum years of experience in the relevant domain are as under:



Discipline	VC Nos.	Posts	@Educational qualification	Domain of experience	#Minimum Post Qualification Experience required in Domain of experience.	UR	EWS	OBC (NCL)	SC	ST	Total
Civil Engineering	M/1/25	Engineer (Civil)	Full time Bachelor's Degree in Civil Engineering	Experience in the field of Construction Supervision.	01 year	6	1	2	1	-	*10
	M/2/25	Assistant Manager (Civil)			02 years	13	2	6	3	1	*25
	M/3/25	Manager (Civil)			05 years	14	2	8	4	2	^30

	M/4/25	Senior Manager (Civil)			08 years	6	1	2	1	-	*10	
Geo-Technical	M/5/25	Engineer (Geo-Technical)	Full time Bachelor's Degree in Civil Engineering AND Master's Degree in Geo-technical engineering/ Rock Engineering & underground structure/Soil Mechanics & Foundation Engineering or equivalent/synonymous/ similar qualification	Experience in the field of Ground Investigation Works, Geological borehole logging, geotechnical investigation and in situ geotechnical testing including analysis of data and preparation of Geo-Technical/ Geological & interpretative reports for bridges & other large infrastructure projects.	01 year	1	-	-	-	-	1	
	M/6/25	Assistant Manager (Geo-Technical)			02 years	1	-	-	-	-	-	1
	M/7/25	Manager (Geo-Technical)			05 years	1	-	-	-	-	-	1
	M/8/25	Senior Manager (Geo-Technical)			08 years	2	-	-	-	-	-	2
Structural Engineering	M/9/25	Engineer (Structural Engineering)	Full time Bachelor's Degree in Civil Engineering AND Master's Degree in Structural Engineering or equivalent/ synonymous/similar qualification	Experience in the field of structural designs and drawings for concrete/ steel works, Rail-Road over bridges (ROBs), pre-stressed concrete bridges, balanced cantilever bridges, steel bridges, foot-over bridges (FOB), elevated segmental structures/ continuous bridges, metro structures i.e. Stations, viaducts, tunnels etc	01 year	3	-	-	-	-	3	
	M/10/25	Assistant Manager (Structural Engineering)			02 years	4	-	1	-	-	-	5
	M/11/25	Manager (Structural Engineering)			05 years	4	-	1	-	-	-	5

	M/12/25	Senior Manager (Structural Engineering)			08 years	5	-	1	1	-	7
Urban Engineering (Environment)	M/13/25	Engineer- Urban Engineering (Environment)	Full time Bachelors' degree in Environmental Engineering / Full time Bachelor's degree in any branch of Engineering with Master's degree in Environmental Engineering/ Environmental Science/Environmental Management / Environmental Planning/Sustainability or equivalent/synonymous/similar qualification	Experience in leading and/ or monitoring/ supervising construction stage Implementation of EIA and EMP requirements of large infrastructure projects.	01 year	1	-	-	-	-	1
	M/14/25	Assistant Manager - Urban Engineering (Environment)			02 years	1	-	-	-	-	1
	M/15/25	Manager - Urban Engineering (Environment)			05 years	1	-	-	-	-	1
	M/16/25	Senior Manager - Urban Engineering (Environment)			08 years	2	-	-	-	-	2
	M/17/25	Engineer (Traffic T & T)			Full time Bachelor's Degree in Civil Engineering / Full time B. Arch – Architecture (5 Years) / Full time B Planning - (4 Years)/ Full time BA/B.Sc. - Mathematics/Statistics AND Master's degree in Transport Engineering/ Transport Planning or	Experience with the Understanding of various concepts and requirements of Comprehensive Mobility Plans, Mass Transit Studies, Traffic Engineering, Transport Planning, Transport	01 year	1	-	-	-
M/18/25	Assistant Manager (Traffic T & T)	02 years	1	-			-	-	-	1	

	M/19/25	Manager (Traffic T & T)	equivalent/synonymous/similar qualification	Demand forecast, multi-modal integration etc as per guidelines.	05 years	1	-	-	-	-	1
	M/20/25	Senior Manager (Traffic T & T)			08 years	2	-	-	-	-	2
Economics & Statistics	M/21/25	Engineer (Economics & Statistics)	Full time Bachelor's Degree in Economics/ Business Economics/ Statistics/ Operational Research/ Transport Planning AND MBA with specialization in Finance	Experience with Understanding of different concepts of economics with respect to transport systems, requirements of Mass/ Rail Transit Studies, Transport Planning, Economic evaluation and financial structuring of mass transport projects Awareness of best practices in and around about urban & regional transport planning. Versed with suitable IT, GIS, database handling and analytical skills using computer software's.	01 year	1	-	-	-	-	1
	M/22/25	Assistant Manager (Economics & Statistics)			02 years	1	-	-	-	-	1
	M/23/25	Manager (Economics & Statistics)			05 years	1	-	-	-	-	1
	M/24/25	Senior Manager (Economics & Statistics)			08 years	2	-	-	-	-	2
Geology	M/25/25	Engineer (Geology)	Full time Master's Degree in Geology/ Applied Geology/	Experience in supervision of drilling work, execution of geological traversing, surface and underground geological mapping, borehole logging, geotechnical investigation and in- situ geotechnical testing including analysis of data and	01 year	1	-	-	-	-	1
	M/26/25	Assistant Manager (Geology)			02 years	2	-	-	-	-	2
	M/27/25	Manager (Geology)			05 years	1	-	-	-	-	1
	M/28/25	Senior Manager (Geology)			08 years	1	-	-	-	-	1

				preparation of factual reports for tunnels and bridges								
Architecture	M/29/25	Engineer (Architecture)	Full time Bachelor's Degree in Architecture / Full time Master's Degree in Architecture/Planning/ Urban Designor equivalent/synonymous/similar qualification	Experience in relevant field of Architectural Design	01 year	2	-	-	-	-	-	2
	M/30/25	Assistant Manager (Architecture)			02 years	3	-	-	-	-	-	3
	M/31/25	Manager (Architecture)			05 years	3	-	-	-	-	-	3
	M/32/25	Senior Manager (Architecture)			08 years	2	-	-	-	-	-	2
Geophysics	M/33/25	Engineer (Geophysics)	Full time Master's Degree in Geophysics	Experience as Geophysicist in ERT, SRT and MASW for Railway/Highway tunnels preferably in Hilly terrain (Himalayan Region)	01 year	1	-	-	-	-	-	1
	M/34/25	Assistant Manager (Geophysics)			02 years	1	-	-	-	-	-	1
	M/35/25	Manager (Geophysics)			05 years	2	-	-	-	-	-	2
	M/36/25	Senior Manager (Geophysics)			08 years	1	-	-	-	-	-	1
SHE Expert	M/37/25	Engineer (SHE Expert)	Full time Bachelor's Degree in any branch of Engineering AND Diploma/Degree in industrial safety/BE/B. Tech in safety/Master's Degree in Environmental Engineering/ Sciences/International Qualifications like CSP (Certified safety professional), NEBOSH Diploma, Grad IOSH, CMIOSH	Experience in supervision of safety works	01 year	2	-	-	-	-	-	2
	M/38/25	Assistant Manager (SHE Expert)			02 years	3	-	-	-	-	-	3
	M/39/25	Manager (SHE Expert)			05 years	3	-	-	-	-	-	3
	M/40/25	Senior Manager (SHE Expert)			08 years	2	-	-	-	-	-	2

Social Science	M/41/25	Engineer (Social Science)	Full time Master's Degree in Social Science or Social	Experience Social Development Sector in social survey, analysis, conducting public consultation etc. Preference shall be given a) Experience in Social Impact Assessment in one or combination of following fields: highways, railways, transport terminals, ports, airports, townships/ SEZs, mining and landfills, oils & gas pipelines, and hydel projects b) Experience in bilateral/multilateral agencies funded projects	01 year	1	-	-	-	-	1
	M/42/25	Assistant Manager (Social Science)			02 years	1	-	-	-	-	1
	M/43/25	Manager (Social Science)			05 years	1	-	-	-	-	1
	M/44/25	Senior Manager (Social Science)			08 years	2	-	-	-	-	2
Electrical Engineering	M/45/25	Engineer (Electrical)	Full time Bachelor's degree in Electrical / Electronics /Power Supply/ Instrumentation and Control/ Industrial Electronics/Electronics & Instrumentation/Applied Electronics/ Digital Electronics/Power Electronics Engineering or any of the above combination in part or wholes	Experience in Electrical engineering fields such as railway electrification /general electrical installations / site supervision/ power distribution/ electrical machines and construction/ maintenance of electrical equipment in buildings	01 year	3	1	3	1	-	8
	M/46/25	Assistant Manager (Electrical)			02 years	6	1	2	1	-	*10
	M/47/25	Manager (Electrical)			05 years	7	1	3	1	-	*12
	M/48/25	Senior Manager (Electrical)			08 years	4	-	1	-	-	5
Signal & Telecommunication	M/49/25	Engineer (Signal & Telecommunication)	Full time Bachelor's Degree in Electronics / Electronics & Telecommunication / Electronics & Communication / Electronics & Electrical / Electronics & Instrumentation	Experience in Signal &Telecommunication construction projects dealing with installation / testing and commissioning	01 year	2	-	-	-	-	2

	M/50/25	Assistant Manager (Signal & Telecommunication)	Engineering /Computer Science/ IT/ Computer Engineering or any of the above combination in part or whole	of SSI/ EI/ RRI/ PI of Indoor and Outdoor of Signal & Telecommunication gears for Indian Railways, Metros, Railway sidings/ PSU Railway sidings/ Private sector railway sidings.	02 years	3	-	1	-	-	4
	M/51/25	Manager (Signal & Telecommunication)			05 years	5	-	1	-	-	6
	M/52/25	Senior Manager (Signal & Telecommunication)			08 years	3	-	-	-	-	3
Mechanical Engineering	M/53/25	Engineer (Mechanical)	Full time Bachelor's Degree in Mechanical Engineering/ Technology in Mechanical/ Production/ Production & Industrial/ Manufacturing/ Mechanical/Railways/Mechatronics & Automobile or any of the above combination in part or whole	Experience in outdoor work experience in the field of production or mechanical maintenance or other mechanical engineering areas. The incumbent must have worked at a project site or factory or plant during this period of two years.	01 year	14	2	6	2	1	*25
	M/54/25	Assistant Manager (Mechanical)			02 years	14	2	8	4	2	^30
	M/55/25	Manager (Mechanical)			05 years	10	1	5	3	1	*20
	M/56/25	Senior Manager (Mechanical)			08 years	8	1	3	2	1	*15
Chemical Engineering	M/57/25	Engineer (Chemical)	Full time Bachelor's Degree in Engineering/Technology in Chemical/Petrochemical /Chemical Technology / Petrochemical Technology /Chemical Technology & Polymer Science/ Chemical Technology & Plastic Technology/ Food/Textile/Leather or any of the above combination in part or whole	Experience in the field of Paint testing or relevant field.	01 year	3	-	-	-	-	3
	M/58/25	Assistant Manager (Chemical)			02 years	3	-	-	-	-	3
	M/59/25	Manager (Chemical)			05 years	2	-	-	-	-	2
	M/60/25	Senior Manager (Chemical)			08 years	2	-	-	-	-	2

*** 1 posts reserved for PwBD category on horizontal basis.**

^2 posts reserved for PwBD category on horizontal basis.

Category wise and post wise details of 12 vacancies of reserved for Persons with Benchmark Disabilities (PwBDs) are given below:

VC Nos.	Posts	Reserved for identified categories of Persons with Benchmark Disabilities (PwBDs)		
		Cat-b	Cat-c	Total
M/1/25	Engineer (Civil)	-	1	1
M/2/25	Assistant Manager (Civil)	1	-	1
M/3/25	Manager (Civil)	1	1	2
M/4/25	Senior Manager (Civil)	-	1	1
M/46/25	Assistant Manager (Electrical)	-	1	1
M/47/25	Manager (Electrical)	-	1	1
M/53/25	Engineer (Mechanical)	-	1	1
M/54/25	Assistant Manager (Mechanical)	1	1	2
M/55/25	Manager (Mechanical)	-	1	1
M/56/25	Senior Manager (Mechanical)	-	1	1

Age Limit

Post	Maximum Age Limit
Engineer	31
Assistant Manager	32
Manager	35
Senior Manager	38

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

Educational & Experience

@Candidate belonging to General/ EWS category (and candidates belonging to SC/ST/OBC(NCL)/PWD applying against unreserved posts) should have first class degree/minimum 60% marks in Minimum Qualification for consideration against unreserved posts

Reserved category candidates (SC/ST/OBC(NCL)/PWD as applicable) should have at least 50% marks in Minimum Qualification for consideration against reserved posts

The candidate should possess Degree recognized by AICTE; from a University incorporated by an Act of Central or State legislature in India or other Educational Institutions established by an Act of Parliament or declared to be Deemed as University under Section 3 of the University Grants Commission Act, 1956. Sections A & B examination of the Institution of Engineers (India) which is treated as equivalent to Degree by Govt. of India, and recognized by AICTE shall also be accepted.

If the certificate or marksheet does not indicate the first class/division or percentage, the applicant shall provide the conversion formula for deriving the percentage from the CGPA/DGPA/etc., as issued by the concerned university/institution. In such cases where the university/institution does not have a conversion formula, an undertaking to this effect must be submitted duly signed by an authorized representative of the university/institution, and then minimum 6 on 10 point scale will be considered as 60%.

#The period of training/internship/Teaching/Research Fellowship shall not be counted as a part of experience.

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	
Signal & Telecommunication	Locomotor disability	OA, OL	S, ST, BN, W, SE, MF, C, R, W & RW
Mechanical	Locomotor disability	OA, OL	S, ST, BN, W, SE, MF, C, R, W & RW
Civil, Architecture, Urban Engineering (Environment) and Traffic T & T	Locomotor disability	OA, OL	S, ST, BN, W, SE, MF, C, R, W & RW
	Hearing Impairment	HI	
Geo-Technical	Locomotor disability	OA, OL	S, ST, BN, W, SE, MF, C, R, W & RW
	Hearing Impairment	HI	

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 Classifications		Physical Requirements	
Code	Classification	Code	Physical Requirements
OH	Orthopedically Handicapped	S	Sitting
VH	Visually Handicapped	ST	Standing
HH	Hard of Hearing	W	Walking
OL	One leg	SE	Seeing
OA	One arm	H	Hearing/ Speaking

BA	Both Arms	RW	Reading and Writing
BH	Both Hands	C	Communication
MW	Muscular Weakness	MF	Manipulation by fingers
OAL	One arm one leg	PP	Pulling & Pushing
BLA	Both Legs and Arms	L	Lifting
BLOA	Both Legs one Arm	KC	Kneeling & Crouching
LV	Low Vision	BN	Bending
B	Blind	M	Movement
PD	Partially Deaf	JU	Jumping
FD	Fully Deaf	CL	Climbing
BL	Both legs	CL	Climbing
D	Dwarfism		
CP	Cerebral Palsy		
LC	Leprosy Cured		
AAV	Acid Attack Victims		
MD	Multiple Disabilities		

The above lists are subject to revision.



Selection Process

Based upon the performance in the Written Test and fulfilling the conditions of eligibility; candidates shall be shortlisted for document scrutiny and Interview.

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

Written Test - 60%
Interview - 40%
(Technical & Professional proficiency - 30 %; Personality Communication & Competency – 10%)
Total - 100%

The Syllabus for the written test for all posts are placed are Annexure A

Candidates will be called for interview in the ratio of 1:6 to the number of vacancies.

A minimum of 50% marks for UR/ EWS (45% for SC/ST/OBC (NCL)/PWD against reserved posts) in written test and a minimum of 60% marks for UR/ EWS (50% for SC/ST/OBC (NCL)/ PWD against reserved posts) in interview will be required to enable the candidate to be considered for placement on panel. There will be no minimum qualifying marks required in the aggregate.

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.

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 for the relevant post.

Candidates have the option to appear for interview either in Hindi or English.

Based on the requirement and discretion of RITES, the selection process of written test or document verification or interview may be conducted from RITES' Regional Offices, which shall be intimated upon issuance of respective call letters to applicable candidates.

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.

Please Note that Empanelment does not guarantee selection/right to the job in RITES LTD. Offer will be issued based on the requirement of the project/client/company received from time to time and fulfillment of criteria for deployment in projects.

Remuneration

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

S.No.	Post Name (For all Disciplines)	Basic Pay	Gross Monthly CTC	Annual CTC (Approx.)
01	Engineer	22,660	41,241	4,94,894

02	Assistant Manager	23,340	42,478	5,09,741
03	Manager	25,504	46,417	5,57,008
04	Senior Manager	27,869	50,721	6,08,658

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

The remuneration to be paid is based on the minimum years of post-qualification experience applicable for the post.

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.

8. 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.
9. 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.
10. For availing reservation, SC/ST/OBC-NCL candidates should furnish Caste Certificate from competent authorities as per the format given

at **Annexure I** (for SC/ST candidates) and at **Annexure II** (for OBC-NCL candidates) **valid as on the crucial date i. e. last date stipulated for submission of application.** Further, in case of OBC-NCL candidates, the certificates should specifically indicate that they do not belong to the Persons/Sections (Creamy Layer) mentioned in Column 3 of the Schedule of the Government of India, Department of Personnel and Training O.M.No.36012/22/93-Estt. (SCT) dated 08.09.93 & its subsequent revision through O.M.No.36033/3/2004-Estt. (Res) dated 09.03.2004, 27.05.2013, 13.09.2017 and further revision, if any, received till the closing date for ONLINE Registration of applications for this Advertisement.

The candidates should ensure that they belong to the OBC- Non-Creamy Layer (NCL) category while applying for the posts against this Advertisement. Further, in addition to the community certificate (OBC), a declaration in the prescribed format as per **Annexure III** has to be furnished by the candidates during document verification, that he/she does not belong to the creamy layer on the crucial date i. e. last date stipulated for submission of application in this Advertisement.

The certificate produced shall not be older than one year on the crucial date i. e. last date stipulated for submission of application in this Advertisement. In case of not complying to these stipulations, their claim for reserved status (OBC-NCL) will not be entertained and the candidature / application of such candidates, if fulfilling all the eligibility conditions for General (Unreserved) category, will be considered under General (UR) vacancies only.

EWS Category


The candidates applying against the vacancies reserved for EWS must possess Income and Asset Certificate **as on the crucial date i. e. last date stipulated for submission of application in this Advertisement. EWS certificate should be as per Gov. of India format.** In case of non-compliance to these stipulations, their claim for reserved status under EWS will not be entertained and the candidature / application of such candidates, if fulfilling all the eligibility conditions for General (UR) category, will be considered under General (UR) vacancies only.

As regards OBC NCL & EWS category candidates, candidates will be afforded opportunity of submission of the valid OBC NCL Certificate and EWS Certificate (as applicable) on the date of their joining, **valid as on the crucial date i. e. the last date stipulated for submission of application in this Advertisement.**

11. Hard copies of documents are not to be sent to this office through post/ courier.
12. 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).
13. 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.
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 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.
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 and Time

Date of Written Test	+Venue of Written Test
Will be published on RITES Website. 	Delhi/Gurugram
	Mumbai
	Bengaluru
	Kolkata
	Guwahati
	Bhubaneswar
	Hyderabad

+The above-mentioned venues are tentative except Delhi/Gurugram.

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. Therefore, applicants are advised to keep checking the Company's website for any update.
7. Legal jurisdiction will be Delhi in case of any dispute
8. No train/bus fare / TA / DA shall be payable.
9. Age, experience, and all other eligibility criteria shall be reckoned as on the last date of submission of application (cut-off date).
10. 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.
11. 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.

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 Cont.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.

Important Dates	
Particulars	Date
Commencement of submission of online application and online payment of fees	31.01.2025
Last date of submission of online application and online payment of fees	20.02.2025
Date of issue of admit cards	Will be published on RITES website
Date of written test	Will be published on RITES website
Upload of Provisional Answer Key	Will be published on RITES website
Objection window to submit objections against the provisional answer key	Will be published on RITES website
Upload of Final Answer Key	Will be published on RITES website
Declaration of marks scored in Written test	Will be published on RITES website
Re-evaluation window (Submission of request for rechecking of OMR sheets)	Will be published on RITES website
Interview onwards (Exact schedule will be Uploaded on RITES Website)	Will be published on RITES website



Annexure: A

Syllabus for Written test

Discipline	Syllabus for Written Test
Civil Engineering	Surveying: - 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

	<p>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. Beam:- Types of Supports, Shear Force and Bending Moment, Shear Force and Bending Moment Diagrams, Graphical Method of Plotting S.F. and B.M. Diagrams Beams: - 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 subbase 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</p>
Geo-technical Engineering	<p>Soil Mechanics recThree-phase system and phase relationships, index properties; Unified and Indian standard soil classification system Permeability - one dimensional flow, Seepage through soils - two - dimensional flow, flow nets, uplift pressure, piping, capillarity, seepage force Principle of effective stress and quicksand condition</p>

	<p>Compaction of soils; One- dimensional consolidation, time rate of consolidation Shear Strength, Mohr's circle, effective and total shear strength parameters Stress-Strain characteristics of clays and sand; Stress paths Foundation Engineering</p> <p>Sub-surface investigations - Drilling bore holes, sampling, plate load test, standard penetration and cone penetration tests</p> <p>Earth pressure theories - Rankine and Coulomb; Stability of slopes - Finite and infinite slopes, Bishop's method</p> <p>Stress distribution in soils - Boussinesq's theory; Pressure bulbs, Shallow foundations - Terzaghi's and Meyerhoff's bearing capacity theories, effect of water table</p> <p>Combined footing and raft foundation; Contact pressure</p> <p>Settlement analysis in sands and clays</p> <p>Deep foundations - dynamic and static formulae, Axial load capacity of piles in sands and clays, pile load test, pile under lateral loading, pile group efficiency, negative skin friction</p> <p>Rock Engineering Physio-mechanical properties of rocks; laboratory and field tests, Rock mass classification, Initial stresses in rocks and their measurement Stress-strain behaviour, Failure criteria for intact rock and rock masses, Analysis and design of underground openings, Elastic and elasto-plastic approach, Stress concentration for different shapes of opening, Planes of weakness in rocks, rock fracture and joints. Stability of rock slopes</p> <p>Modes of failure, Foundations on rock, Rock support and reinforcement, tunnel supports. Rock Blasting, Numerical modelling of rocks, rock masses and rock structures. Instrumentation and monitoring Soil Dynamics Study of vibrations; Mathematical modelling; Sources of vibration; Distinction between static and dynamic problems; Nature of different types of dynamic loads; Significance of soil-structure interaction; Basic principles of soil dynamics - An Introduction; Fundamentals of vibration theory</p> <p>Ground Engineering properties of soft, weak and compressible geomaterials; Principles of treatment; Methods of soil improvement-lime stabilization and injection Improvement Techniques Preloading and vertical Drains; Dynamic Consolidation; Granular piles; Soil nailing; Anchors; Deep mixing and Grouting; Electro-osmosis Geosynthetics & Reinforced Soil Structures Different varieties of geosynthetics and their applications; Types of polymers and manufacture of geosynthetics; Testing of geosynthetic properties; Strength mechanisms of reinforced soil. Design of foundation beds using geosynthetics; Application of geosynthetics in flexible pavements Et design using geosynthetics; Design and construction of reinforced soil retaining walls</p>
Structural Engineering	<p>Beam:- Types of Supports, Shear Force and Bending Moment, Shear Force and Bending Moment Diagrams, Graphical Method of Plotting S.F. and B.M. Diagrams. Beams: - Deflections by Moment Area Method and Conjugate Beam Method, Slope and Deflection for Cantilever and Simply Supported Beam, Analysis of Fixed Structural Analysis Beam and Continuous Beams.</p> <p>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</p> <p>Design of 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 Reinforced Concrete Structures Design of Steel Structures</p> <p>Stress strain curve for mild steel, rolled steel section, loads, permissible stresses, working stresses, factor of safety minimum thickness of structural members, Design methods.</p> <p>Compression Members-Effective length, Slenderness ratio, Column design, Types of sections, assumptions, Design of Axially loaded compression members</p> <p>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.</p> <p>PRESTRESSED</p>

	<p>Specification of materials, methods of prestressing, losses, analysis, and design of members for moment and shear, stresses in anchorage zones of pretensioned and post tensioned members, design of end block, prestressed concrete compression members, partial prestressing, composite construction with prestressed concrete and reinforced concrete, two-way prestressing, Short term deflections of uncracked members, Prediction of longterm deflections, Review of Indian code.</p> <p>CONCRETE STRUCTURES DESIGN OF BRIDGES Introduction and Type of Bridges, Introduction to bridge codes. Site investigation and planning- Factors affecting scour and its evaluation. Analysis and Design of Bridge foundations - open, pile, and well. Analysis and Design of Piers, abutments, and approach structures; Superstructure - analysis and design of right, skew, and curved slabs. Steel, RCC and PSC Girder bridges - types, load distribution, design. Steel - Concrete composite bridges: load distribution, design philosophy, shear connectors with relevant Indian Codes such as IS, IRC and IRS etc. Detailing with relevant Indian Codes. Introduction to long span bridges - cantilever, arch, cable stayed and suspension bridges, etc.</p> <p>STRUCTURAL DYNAMICS ft EARTHQUAKE ENGINEERING Introduction - Single and multi-degree freedom systems, undamped and damped systems, numerical integration scheme, modal analysis for undamped and damped systems. Characteristics of earthquake, Earthquake response of structures, Concept of earthquake resistant design. Codal provision for design of buildings, masonry structures and bridges etc, liquefaction, Detailing earthquake resistant structures with relevant Indian Codes.</p> <p>DESIGN OF TALL AND INDUSTRIAL STRUCTURES Design philosophy, loading, and materials and design mixes. Loading and Movement: Gravity loading: Dead and live load, methods of live load reduction, Impact, Gravity loading, Construction loads. Wind loading: static and dynamic approach. Earthquake loading: Equivalent lateral force, modal analysis, combinations of loading, Limit state design. Analysis and Design: Modelling for approximate analysis, accurate analysis and reduction techniques, analysis of building as total structural system considering overall integrity and major subsystem interaction, analysis for member forces; drift and twist, Yield line method of design of slabs. Design of flat slabs and Design of continuous beams with redistribution of moments.</p> <p>Analysis of industrial building for Gravity and Wind load. Analysis and design of framing components namely, girders, trusses, gable frames. Analysis and design of gantry column (stepped column / column with bracket), purlins, girts, bracings including all connections. Analysis and Design of foundations - Isolated, Raft and Pile. Concept of pre-engineered buildings.</p> <p>REPAIR AND REHABILITATION OF STRUCTURES Introduction, Cause of deterioration of concrete structures, Diagnostic methods ft analysis, preliminary investigations, experimental investigations using NOT, load testing, corrosion mapping, core drilling and other instrumental methods, Quality assurance for concrete construction, as built concrete properties strength, permeability, thermal properties, and cracking. Assessment procedure for evaluating a damaged structure, causes of deterioration, testing techniques</p>
<p>Urban Engineering (Environment)</p>	<p>Environmental Studies Ecosystems, Natural Resources, Biodiversity and its conservations Environmental Pollution Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Solid waste management, composting and vermiculture, Urban and industrial wastes, recycling and re-use. Environmental Acts and International Conventions</p> <ul style="list-style-type: none"> • Water (Prevention and Control of pollution) act, Air (Prevention and Control of pollution) act, Environmental protection act, Wild life protection act, Forest Conservation act • Stockholm Conference, Earth Summit, Kyoto Protocol, Paris Agreement and COP meetings <p>Environmental Impact Assessment Screening, IEE and EIA</p> <ul style="list-style-type: none"> • Need of EIA and Type of EIAs • EIA process and project cycle

	<ul style="list-style-type: none"> • Acts and Legislations, EIA Components and process • EIA Methodology • Baseline, Environmental Impacts, Management Plans, Monitoring plans Air Pollution • Emission and Dispersion • Ambient Air quality standards for residential, commercial, industrial and sensitive areas, • Photochemical reactions • Greenhouse gases and effects • Global Warming • Decarbonization/NetZero Solid Waste Management • Collection, segregation, transportation, treatment and disposal techniques • Population forecast; Estimation of Solid Waste • Selection of Dumping site • Concept of 4 "R" Water Supply Engineering • Water demands: Factors affecting water demands, Population forecast, • Identification of Water sources • Water treatment Methods: treatment Methodology indicating various flow diagrams as per the characteristics of raw water, slow sand filter, rapid sand filter and disinfections • Transmission of water: Conveyance mains, water hammer, air valves • Water supply networks: Residual pressure, water hammer, air valves, staging height, • Selection of pipe materials and valves Sewerage System And Sewer System • Estimation of waste water flow: source and per capita waste water, Peak factor • Sewerage network: design concept • Sewage characteristics and various treatment methods and flow diagrams • Sewage treatment methods: activated sludge process, oxidation pond, oxidation ditch and USBR • Sludge drying beds • Disposal of Treated Water: In-Land disposal, stream/river Storm Water Design • Estimation of Runoff • Infiltration: Impervious factors, • Peak Factors • Type of Drains: Rectangular, Trapezoidal and Circular • Outfall Points
Traffic T & T	<p>Concepts & Theory of Transport Planning and Traffic Engineering, Design, Planning, Mapping and Analysis of Primary Traffic & Travel Surveys. Urban transport planning process – stages, study area, zoning, data base, concept of trip generation</p> <p>Role of transport, types of transport systems, evolution of transport modes, transport problems and mobility issues. Urban form and Transport patterns, land use – transport cycle, concept of accessibility.</p> <p>Hierarchy, capacity and geometric design elements of roads, intersections and various Public transit systems. Basic principles of Transport infrastructure design</p>
Economics & Statistics	<p>Economic Theory and Applications, Theory of Economic Development & Finance, Fundamentals of economic growth and development, Concept & Quantitative Methods for Economic and Financial Analysis, Research methodology for economics, Economic statistics and applications, Descriptive Statistics, Probability theory, Distribution Theory, Sampling Theory, Operations research, International economics, Transport Economics</p>
Architecture	<p>1. Building construction</p> <p>A-Masonry Methods by which walls are built in stone brick in combination of stone and brick. Method of bonding brick and stone arches, lintels, chhajjas brick and stone Footing.</p> <p>B-Doors windows & Partitions Design consideration TW and pressed metal frames, method of fixing, Various types of shutters such as ledged and battened, paneled, glazed and flush etc. Fixtures & Fastenings TW windows, glazing louvered type, ventilators etc. Simple TW partitions. Partitions & variations such as flush, glazed, paneled type.</p> <p>C-Staircases Design principles, Types of staircases, finishes, railings, parapets RCC staircase. General idea of wooden and stone staircases.</p> <p>D-Flooring and Roofing General idea of Timber roofing & flooring. Various spans and timber trusses slopping roof in RCC with various finishes and covering, waterproofing for terraces.</p> <p>2. Surveying & Estimation</p>

	<p>A-Surveying & Leveling Different types of surveying methods, chain & compass survey, plotting methods, methods of leveling, reduction levels and checks, types of levels, temporary adjustments, contours, theodolite and its use.</p> <p>B-Estimating Taking out quantities from foundation to roof of a simple building or a part of building and preparing bill of quantities.</p> <p>3. Building Materials & A - Building Materials Specifications</p> <p>I. Bricks : Different types, properties and essential qualities II. Stone : Different types, suitability and properties III. Timber : Classification, method of cutting, defects, seasoning, Preservation, protection against termite IV. Iron : Cast iron, wrought iron, mild steel, stainless steel their properties and use in buildings V. Glass : Types of glass, ingredients, and forms, properties use in buildings VI. Cement & Lime : Types of cement its properties and use in buildings Types of lime mortars, types of concretes, various mixes and properties VII. Finishing Materials: Various cladding and paving materials, various types of Paints, varnishes, application, various materials for ceiling, partitions, Roof coverings, fittings & fixtures</p> <p>B - Specifications</p> <p>I. Specifications for Materials Importance of specification in the building activities, method of writing in correct order and sequence, Indian standard Specifications. Specification for materials such as bricks, stone, timber, flooring, cladding and roofing materials, glass, cement, sand and lime, fixtures and fastenings. II. Specification for Construction Specification for steel and concrete structures, ceilings, partitions, demolition work temporary structures such as stalls, sheds, gateways etc.</p> <p>4. Building Services A- Ventilation Natural & Mechanical ventilation, condition of comfort, Central air conditioning system, AC Duct & distribution, AHU split air- conditioning, packages units windows unit etc. B -Vertical Transportations Electrical passenger lifts, elevators, Provision of National Building Code & design Consideration, escalators, working & space requirements C – Fire hazards & regulations: Fire alarms, fire escape staircase & other provisions of National Building Code D – Sewage & Refuse disposal General ideas of sewage disposal methods. Recycling of waste. Disposal methods of city refuse etc.</p> <p>5. Architecture Design</p>
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	<p>Simple problems of site planning requiring study of entrance, exit, parking etc. on a level of ground/contour, Building interior layout of various rooms e.g. Executive cabin, Board/Conference Rooms, Work stations, Drawing/Dining rooms, Master Bed Rooms etc. showing various facilities like attach toilet, computer, OHP etc. (where required)</p> <p>6. History of Architecture</p> <p>i) Indus Valley Civilization, Timber architecture of Vedic and early Mauryan period. Buddhist rock cut caves and temples, Hindus Chanakya, Indo Aryan and Dravidian, Jain temples.</p> <p>ii) Islamic Architecture in Indian from 1000 A.D up to Moghul period in 18th century</p> <p>iii) British colonial and modern Indian architecture</p> <p>iv) General idea only of the developments in the west, mainly in Europe</p> <p>v) Egyptian, West Asiatic, Greek, and Roman architecture</p> <p>vi) Mediaeval, Renaissance, and premodern architecture</p> <p>7. Climatology</p> <p>Elements of Climate</p> <p>i) Effect of weather on human body, heat gain- and loss. Micro and Macro climate</p> <p>ii) Study of sun path, wind & rain etc. & their effect to building surfaces</p> <p>iii) Design of louvers, fins, chhajjas, grills, courtyard, Orientation of Buildings</p> <p>iv) Use of solar energy for heating, solar panels, evaporative cooling</p> <p>v) Study of well-known examples in Indian Context with reference to Climatic Regions such as hot & dry, hot & humid coastal, hilly situations etc.</p> <p>8. Professional Practice</p> <p>i) Conditioning of engagement, charging of fees, professional ethics, competitions arbitration etc.</p> <p>ii) The Architect and his work</p> <p>iii) Conditions of engagement and scale of professional fees and charges</p> <p>iv) Regulations governing the promotion and conduct of Architectural Competitions</p> <p>v) Code of Conduct</p> <p>vi) Building Bye laws & Code</p>
Geology	<p>Petrology: Igneous Rocks - Modes of occurrence, Textures and structures, Consolidation of Magmas, Origin, Classification; Sedimentary Rocks - Modes of formation, Textures and structures, Classification; Metamorphic Rocks - Agents, Processes, Depth zones, Zones of Progressive Metamorphism, Facies, Textures, Structures.</p> <p>Physical Geology: Geological work of natural agencies - weathering of rocks and engineering considerations; Geological work of wind; Geological work of Running Water; The Concept of Isostasy; Geomorphic Processes and associated Landforms: Fluvial, Glacial, Aeolian, Coastal and Karstic landforms.</p> <p>Structural Geology: Concept of dip and strike, folds, fractures, faults, Shear zones, unconformity, bedding/foliation and lineation. Geologic/geomorphic criteria for recognition of faults. Lithological, Geomorphological and Structural maps. Preparation of Geological plan & section. Concept of rock deformation. Stress and Strain in rocks.</p> <p>Physiographic Features: Mountains and Mountain Building; Volcanoes.</p> <p>Engineering Geology: Geology of Dam Sites and Reservoirs; Geology of Bridge Sites; Geology of Tunnel Sites; Geological considerations and problems in Road and Railway Construction; Stability of Hill Slopes and Cuttings; Improvement of Sites: Rock Grouting, Back filling; Study of Geological Maps; Geological logging, In-situ & lab test of rock & soil including analysis of data; Preparation of geotechnical report of bridges & tunnels.</p>

	<p>Geological Investigation: Objects of geological investigation; Method of investigations; Surface and Subsurface methods; Geophysical methods: Electrical methods & Seismic methods.</p> <p>Stratigraphy: Stratigraphic principles and correlation; Evolution of Geological Time Scale.</p> <p>Remote Sensing and GIS: Fundamental concepts of remote sensing; Visual interpretation of satellite imageries; Preparation of thematic map using Remote Sensing & GIS techniques.</p> <p>Ground Water Hydrology Occurrence of Groundwater: Origin and Age of Groundwater, Rock Properties Affecting Groundwater, Zone of Aeration, Zone of Saturation, Geologic Formations as Aquifers, Types of Aquifers.</p>
Geophysics	<p>a) Basic Principle of Geophysics, Application and choice of different Geophysical method.</p> <p>b) Classification of different Geophysical exploration method.</p> <p>c) Geophysical method of prospecting for Civil Engineering application</p> <p>d) Utility and importance of the techniques</p> <p>e) Gravity & Magnetic methods and its application</p> <p>f) Electrical and Electromagnetic prospecting and its applications, use and benefits</p> <p>g) Seismic Survey for shallow and deep exploration its use applications and benefits</p> <p>h) Application of borehole Geophysics for subsurface investigations.</p> <p>i) Airborne Geophysics and its applications</p> <p>2. Gravitational Method Fundamental principle and Phenomenon ; gravitational Constant; weight of the earth; factors causing variation in Gravity, Bouger Correction; Isostasy; density of material; Quantities measured in Gravity survey Theory & Interpretation. Different types of Gravimeter used for gravity prospecting.</p> <p>3. Magnetic Method Physical concept of Magnetic method; Law of Forces; Unit field strength and Magnetic fields; Permeability and susceptibility; magnetic field strength; terrestrial Magnetism; Magnetic gradients; distribution of Earth's Magnetic field; Horizontal and Vertical magnetic field; Latitude and longitudinal correction in magnetic data. Field procedure and interpretation of magnetic data. Susceptibility of Rocks and mineral ; Different types of magnetometer used for magnetic prospecting.</p> <p>4. Electrical Method Current flow in a homogeneous earth; Resistivity measurement; Resistivity and apparent resistivity; Principle of equivalence; Anisotropy in rocks; Current flow in a horizontally stratified earth; Schlumberger apparent resistivity; type curves; Two layer curves; Three- layer curves; Four- layer curves; Asymptotic values of Schlumberger curves; Principle of reduction; Schlumberger curve matching with Ebert Charts; Inversion of resistivity data; Resistivity sounding case study; Resistivity Profiling; 2D Electrical Resistivity Tomography; data processing and interpretation; Application of electrical methods for ground water and engineering Investigation. Different methods of Electrical Sounding and profiling. Different types of Resistivity meter for subsurface investigation & interpretation of Electrical sounding and profiling data.</p> <p>5. Seismic Method Basic theories of Seismic prospecting; Wave propagation, velocities of elastic waves and elastic constant; Velocities of different earth's material; propagations of Seismic waves; refraction and Reflection Phenomenon; Refraction and Reflection method in seismic survey; Travel time curve;</p>

	<p>Dip calculations; Velocity – depth function; Type of seismic spread and shooting method; Continuous refraction profile; Raypath and depth relationship; Correlation of refraction ; Multiple refraction.</p> <p>Seismic instrumentation recording & Storage system; Sampling; record length; Gain control; filters (high cut, low cut, band pass, Notch filter); phase effect; Phase analyzer; frequency analysis and wave propagation; Signal – Noise ratio.</p> <p>Seismic refraction data acquisition, processing and interpretations; Data acquisition method ; Identification of Refracted waves; Picking of first arrivals; Data editing; Filtering ; T-D plot of refracted data; analysis of seismic data through critical distance (X_c) and time intercept (t_i) method; Velocity and depth analysis for two layer and three layer earth model; Application of Raypath theory in seismic refraction data processing; Inversion of Seismic refraction model and generation of 2D Seismic Tomogram; generation of layered earth model from the seismic tomogram.</p> <p>Interpretation of Seismic sections in terms of Geology with identification of subsurface strata and its characteristics. Assessment of 'Q', RMR, Rock mass Strength (σ_c) , Dynamic Elastic properties of soil and rock.</p> <p>Fundamentals of Cross hole; uphole and downhole seismic survey and its application in Engineering geophysics. Fundamentals of shear wave analysis through Multi Channel Analysis of Surface Waves (MASW). Benefits of seismic survey in geotechnical investigations.</p> <p>6. Well logging</p> <p>Application of Borehole Geophysics in Engineering Geophysical Investigation; Geophysical logging Instrumentation devices and probes/Sonde. Use of different types of well logging probes to evaluate Lithology & stratigraphic correlation; aquifers and associated rock conditions; Effective porosity; Bulk density; true resistivity; Specific yield of Unconfined Aquifer;</p> <p>Type of well logging probes</p> <ul style="list-style-type: none"> <input type="checkbox"/> Electrical Probe (SP, Point resistance; Short normal 16"; Long normal 64" Lateral resistivity 18' 18") <input type="checkbox"/> Natural Gamma probe <input type="checkbox"/> Temperature and Caliper probe <input type="checkbox"/> Gamma-gamma density probe <input type="checkbox"/> Neutron logging <input type="checkbox"/> Acoustic & Optical televiwer Logging <input type="checkbox"/> Hydrofracturing and Insitu stress measurement <input type="checkbox"/> Sonic logging (Vp & Vs) probe <p>Methodology and borehole preparation of for Well logging , Logging associated risk analysis precautionary measures prior to start the logging operation; Borehole Fluid resistivity/conductivity for carrying out different logging operation. Interpretation of Logging data, correlation of different logs and calculation of different parameters through different logs and its application in Engineering Geophysics.</p> <p>7. Knowledge about the recent development of new applications in Geophysics for site explorations:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Air borne Time domain Electromagnetic (TEM) Method for exploration <input type="checkbox"/> Application of GPR (Ground Penetrating RADAR) for utility and other surface mapping. <input type="checkbox"/> Underwater shallow refraction survey using Air gun for underwater construction of tunnels and other infrastructures. <input type="checkbox"/> Ultrasonic Test for detection of cracks, voids in piers and abutment of old bridge structure. <input type="checkbox"/> Refraction Microtremor(ReMi) to obtain site-specific NEHRP/IBC Vs30 site classification for earthquake response study.
SHE Expert	<p>General Aptitude / General Knowledge / General Awareness/Latest events etc.</p> <ul style="list-style-type: none"> o General workers amenities for Construction sites.

	<ul style="list-style-type: none"> o Housekeeping [Stacking of materials], P&M (Plants & Machineries), Various safety trainings, Audits & Safety Inspections o while working in Urban Areas, Barricading, Utilities etc. o Working at height, fall protection, platform, temporary structures, Access. o Mobile Elevated working platform (MEWP). o Lifting Appliances and Gear, means crane hoist machinery, derrick, winch, Hoist drum, Pulley block. Test and periodical examination of lifting appliances & Gears, ASLI (Automatic safe load Indication). o Electricity, Assessment & Power Strength and capability of electrical equipment. o Distribution Systems: 3 Phase and Single Phase and low voltage of 110 Volt for lighting Electrical protection System ELCB/RCCBs earthing of Electrical Equipment. o Industrial Cables:- Working near H.T. Lines, Site illumination Near o Welding, Gauging and Cuttings. o Deep Excavations (More than 1.5 mtr) o Works permit system, for Hot work heavy lifting permit. o Entry to confined spaces, tendons lifting- Traffic Diversion / Traffic management PPEs (Personal Protective Equipment). o Requirements of ISO 45001:2018
Social Science	<p>Nature and Scope of Sociology & Social Work Sociological concepts and methods, man and environment relationships, socio-cultural profile of Indian society and urban transformation, traditions and modernity in the context of urban and rural settlements, Issues related to caste, age, sex, gender, health safety, marginalized group, un/underemployed, disabled population. History and development of Social Work, Indian social structure and social problems, Human behaviour in society, Integrated methods of Social Work practice, Social Work with persons with disability, women, children, vulnerable groups, tribal people, rural and urban community development, social policy, social development, social change, social legislation and social security. Unit-2 Development-induced Displacement Development and Displacement: A Historical Perspective; Process of Development-induced Displacement and Rehabilitation; Impact of Displacement; Minimisation of Displacement; Experience of Displacement by Tribal, Dalit, Women and other Vulnerable group in India; Overview of the history of land acquisition under the now-repealed Land Acquisition Act,1894;Its impact on affected population; Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act,2013(RFCTLARR, Act 2013): Initial steps and Basic Definitions; Award and Compensation; Provisions of The RFCTLARR Act,2013;Challenges to its implementation and Future Prospects. Unit-3 Social Impact Assessment Evolution of Social Impact Assessment (SIA); Concept and Definitions; Need and Significance of SIA; SIA Policy in Indian Context; Provision of SIA in RFCTLARR Act,2013; Steps in Conducting SIA Process; Principles of Good Practice in SIA; Approach and Method of Conducting SIA; Community Involvement in SIA; Identification of Alternatives; Identification and Assessment of social risks/impacts, Social Management Plan: Resettlement Action Plan, Gender Action Plan, Stakeholder Engagement Plan, Income Restoration Plan, Tribal Development Plan; Monitoring and Evaluation of Resettlement Plan; Preparation of R&R Cost Estimates; Preparation of SIA Report Rehabilitation and Resettlement Basic Concepts of Rehabilitation and Resettlement: R & R – A National Scenario, Types of displacements – A Case Analysis: Transport projects (Railways, metro rail, Highway, Airport & Ropeway), Irrigation projects, Industrial projects, Hydro-electric project, Mining project; Displacement and R&R theories and Recovery Strategy: Four Stage Model developed by Scudder and Colson, 1982; Impoverishment Risks and Reconstruction Model by Cernea, 1997; Action oriented model proposed by Agarwal, Rao and Reddy in 1985 while working with the Yanadi tribe in Sriharikota of Andhra Pradesh, India. Planning for R&R: Identification of PAPs; Baseline Data Collection & Analysis; Minimization of Displacement; Resettlement Issues; Process of Planning R & R; R&R Plan Content; Database Management; Valuation of Assets through Market Determined Process; Assessment of Non-quantifiable Values; Institutional Arrangements: Issues of Livelihood Restoration; Role of NGOs/CBOs and other Local, State, National and International Organisations in resettlement and rehabilitation of affected families/persons; Monitoring and Evaluation of R & R interventions; Preparation of R&R Action Plan;</p>

	<p>Learning from International Best Practices in social impacts and R&R. Resettlement Policies and Legal Framework: National Policy and Acts on Resettlement and Rehabilitation and State Policies on R & R and Sector Specific Policies in large projects such as Mining projects, Multi-Purpose Dam Projects, Highway projects, Railways, Urban transport projects, SEZ, etc. Policies of multilateral/bilateral funding institutions: World Bank, Asian Development Bank, Japan International Cooperation Agency (JICA), New Development Bank (NDB), Asian Infrastructure Development Bank (AIIB), European Investment Bank (EIB) etc. Unit-5 Implementation, Monitoring and Evaluation of R&R Site Preparation; Dismantling Process; Transportation and Reconstruction; Legal Provisions for Conflict Resolution in LA and R&R; Livelihood Restoration; Land Based and Non-Land Based Rehabilitation of Affected Families; Training and capacity Building for Rehabilitation; Access to Credit and Employment; Project Management Techniques; Resource Planning for Sustainable Rehabilitation of affected Families/Persons; Grievance Redressal Process; Evaluation of Land Acquisition and R&R, Gender Action Plan (GAP), Resettlement / Rehabilitation Plan (RAP), Stake Holder Plan (SAP)</p>
Electrical Engineering	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

	<p>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.</p> <p>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.</p> <p>Planning & Design of Electrical Works – Internal & External Works. Estimation, installation, testing and commissioning of such works.</p> <p>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.</p>
Signal & Telecommunication Engineering	<p>Basic Electrical & Electronics DC Circuit Voltage & Current sources, Fundamentals of AC- Average value, RMS value, form factor, crest factor, AC power and power factor, phasor representation of sinusoidal quantities. Simple series, parallel & series-parallel circuits containing R-L. R-C. R-L-C parameters, Resonance in series & parallel circuits. Star Delta transformations.</p> <p>Power Supply – Solar photovoltaic cell, primary and secondary cells, battery chargers, DG sets, voltage stabilizers, DC-DC converters, inverters, rectifiers.</p> <p>Earthing and Surge protection- Maintenance free earth, single earth, ring earth, Class A, B & C type surge protection devices. protecting against electrical surges and spikes including those caused by lightning.</p> <p>Protection to staff: Acid, fire, safety requirements, proximity, precautions in AC electrified area, tools, gloves, belts, helmets, guards, covers, live circuit working, handling electrical equipment, radio equipment, safety first manual, first aid.</p> <p>Basic Electronics – Characteristics of diodes, diode parameters, equivalent circuits, rectifiers, derivation for rectifier efficiency, ripple factor, filter circuits, power supplies. Principle of operation of transistors, Transistor Circuits and Integrated circuits.</p> <p>Introduction to common measuring equipment: Ammeter, voltmeter, clamp on meter, Cathode Ray Oscilloscope, Multimeter, frequency meter</p> <p>System of Block Working Absolute Block System, APB System, Automatic Block Section</p> <p>Track Circuits DC Track Circuits, Single and Double rail, Laying at Glued joints, importance of traction bonds, Cross Bonding, Earthing arrangement, Relay and feed end arrangement. Ballast Resistance, seasonal adjustments of DC track circuit, Excitation voltage on relay terminals of DC track circuits and preventive steps. Maintenance features of track circuits. Track relay shelf type and plug in type, its parameters, cutting in features.</p> <p>Signalling & Power supply system Signalling arrangement and power supply systems in AC electrified areas. Protection measures to the operating and maintenance staff. Earthing and its importance, Visibility of signal aspects. Double pole Triple pole lamps, signal screening, Ball token and token less block working. Mast implantation for clear visibility of signal aspects, Solar Power supply, Load calculation for PI, RRI station, IPS for typical PI/RRI/EI station. Cables</p>

Type of signalling cables, cable insulation resistance, Meggering of cables, Earth leakage detectors, Maintenance Free Earth Clamp meter, Cable fault route locator & Electro Magnetic Interface Shielding. Earthing of signalling cables and equipment. Steps to improve Localization of faults and repair. Laying of signalling cables. Burning of cables in AC traction areas, causes precautionary measures to prevent equipment. Steps to improve Localization of faults and repair

RRI/Panel RRI and Panel Interlocking systems.

Route Control Chart (R.C.C), Aspect Control Chart

Signal Interlocking Plan (SIP)

Electrical Signalling

Point Motors, In built features, Control and Operation Circuits, Signal machines, Signal reversers, Track locking, Back locking, Indication locking, Approach and Dead approach locking etc. Lever lock and its functions. EKT/RKT and its functions, Circuit Breakers.

Modern Signalling

Basic Concepts of Electronic Interlocking, Data logger and its utility, Analog and Digital axle counters, AFTC, Electronic track circuits, IBS Systems, Block proving axle counter and LED Signals. Neal's A type Ball Tablet token instrument, Diado/HWH makes TLBI, SGE Double line block instrument (Lock and Block), Token less Push button instrument. UFSBI Block Signalling.

Block Signalling-

Diado/HWH makes Token Less Block Instrument (TLBI), SGE Double line block instrument (Lock and Block), Token less Push button instrument.

Universal Failsafe Block Instrument (UFSBI)

Drawing office practice

Preparation of SIP, RCC, FPD, contact analysis, cable core age plan, cable route plan, As made (as at site) drawings. CRS application, Sighting committee report. Station working rule diagram

TELECOMMUNICATION

Land Line communications

Parameters, trenching, laying, jointing, termination of quad cables, testing, Faults, Localization and remedies in 4 quad/6quad cables, block working, LC gate communication & emergency communication, maintenance schedules and periodical tests.

Optic Fibre Communication system

OFC system, Principles of working (PDH & SDH), OFC Channel testing, Ring protection and NMS. Construction details of Fibres and OFC, OFC laying details, Splicing.

Cable

Tele cabling, characteristics of Tele cables, Cable laying, Parameters, loading coils, Condenser joints, Balancing of cables, Testing, Cable faults localization, Rectification, Annual maintenance of cables in RE & Non-RE Area.

Train Traffic Control

Control office setup at Division, different controls like TC, Dy. TC, TPC, TLC, SM's office at way side station, communication at LC gates, Emergency control communication, set up at telecom test room, earthing Lightning protection.

VHF/Satellite Mobile

25 Watts & 5 Watts VHF sets including power supply. Uses, installation, programming, testing & maintenance of VHF sets, limitations of VHF. VSAT, Hub earth station, space link, remote earth station, interface equipment, network control centre, bandwidth management, satellite block diagram, network component details- hub configuration, remote configuration, remote indoor unit, Mobile communication. Power Plant Practice

Types of batteries, FCBC, SMPS chargers, Battery charging, Installation, Maintenance practices.

Electronic Telephone Exchange & IPABX

	<p>Stored Program Control (SPC), PCM-TDM principles Electronic Telephone Exchanges, speech, voice, data communications, signalling types, ISDN, WLL, Trunk Boards, Telephone traffic and dealing with telephone traffic at peak and slack hour working, system requirements, MDF/IDF wiring, cabling, power plant and protections, maintenance and repairs.</p> <p>Computer basics</p> <p>Basic computer concepts, notebook computers (laptop computer), Personal Digital Assistant (PDA) also known as Palmtop computer, desktop computers (PCs), Work Stations, Servers and Supercomputers Memory, Peripherals including mouse, printers, interfaces, disks, drives, controllers, USB ports, power supply, operating system concepts- single user/multi user, GUI & application software. Web page concept internet, worldwide web, e-mail and multimedia.</p> <p>Data Networks</p> <p>Types of networks, Network topologies, IP & non-IP based networks, NIC, hubs, nodes, clients, gateways, Routers, switches, modems, ISDN, DSLs, connectors adapters, data cables. Installation, commissioning and maintenance of datacom equipment in various LAN, WAN networks like internet (TCP-IP), data loggers, PRS, UTS etc., bandwidth requirements, broadband, path protections, standards, scalability, IP addressing. IP planning, network/sub- network masking, data security & encryption levels, software, firewall, intrusion detection & protection convergence, traffic monitoring, BER, jitter, wander measurements, testing of data channels of 2Mbps & 64 kbps speed, telnet, HTTP, FTP, maintenance using NMS and Do's & Don'ts.</p>
<p>Mechanical Engineering</p>	<p>Applied Mechanics and Design</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Fluid Mechanics and Thermal Sciences</p> <p>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.</p> <p>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.</p> <p>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.</p>

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.

Material Science :

Thermal, chemical, electrical, magnetic and mechanical properties of material. Structure of metals (arrangement of atoms, crystalline & amorphous structure, crystal imperfections), solid solution, diffusion in metals and alloys, transformation during cooling of metals and alloys, deformation and metal, impact of cold and hot working on metal, corrosion, forms, causes and prevention.

Heat transfer, conduction, convection, radiation and heat exchangers.

Air compressors, types of air compressors, compressors performance. Reciprocating and rotary air compressors, air receivers, intercoolers and after coolers.

	<p>Air conditioning, air conditioning units and plants, air conditioner types, selection of plants.</p>
<p>Chemical Engineering</p>	<p>ENGINEERING MATHEMATICS Linear Algebra: Matrix algebra, Systems of linear equations, Eigen values and eigenvectors. Calculus: Functions of single variable, Limit, continuity and differentiability, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems. Differential equations: First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy's and Euler's equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation. Complex variables: Analytic functions, Cauchy's integral theorem, Taylor and Laurent series, Residue theorem. Probability and Statistics: Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Poisson, Normal and Binomial distributions. Numerical Methods: Numerical solutions of linear and non-linear algebraic equations Integration by trapezoidal and Simpson's rule, single and multi-step methods for differential equations. 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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

FORM OF CASTE CERTIFICATE FOR SC/ST

This is to certify that Shri*/ Srimati/ Kumari*
 son/daughter* of Village/Town
 District/Division* of
 the State/Union Territory* belongs to the
Caste*/Tribe which is recognised as a Scheduled Caste /
 Scheduled Tribe under:-

- *The Constitution Scheduled Castes Order 1950.
- *The Constitution Scheduled Tribes Order 1950.
- *The Constitution (Scheduled Castes) (Union Territories) (Part C States) Order 1951;
- *The Constitution (Scheduled Tribes) (Union Territories) (Part C States) Order 1951;
- [As amended by the Scheduled Castes and Scheduled Tribes Lists (Modification Order 1956, the Bombay Re-organisation Act 1960, the Punjab Re- organisation Act 1966, the State of Himachal Pradesh Act 1970, the North Eastern Areas (Re-organisation) Act 1971 and the Scheduled Castes and Scheduled Tribes Orders, (Amendment) Act 1976]
- *The Constitution (Jammu and Kashmir)* Scheduled Castes Orders, 1956
- *The Constitution (Andaman and Nicobar Islands)* Scheduled Tribes Order, 1959 as amended by the Scheduled Castes and Scheduled *Tribes Orders (Amendment) Act, 1976
- *The Constitution (Dadra and Nagar Haveli)* Scheduled Castes Order, 1962.
- *The Constitution (Dadra and Nagar Haveli) Scheduled Tribes, Order, 1962
- *The Constitution (Pondicherry) Scheduled Castes Orders, 1964
- *The Constitution (Uttar Pradesh) Scheduled Tribes Order, 1967
- *The Constitution (Goa, Daman and Diu) Scheduled Castes Order, 1968
- *The Constitution (Goa, Daman and Diu) Scheduled Tribes Order, 1968
- *The Constitution (Nagaland) Scheduled Tribes Order, 1970.
- *The Constitution (Sikkim) Scheduled Castes Order, 1978
- *The Constitution (Sikkim) Scheduled Tribes Order, 1978
- *The Constitution (Jammu & Kashmir) Scheduled Tribes Order, 1989.
- *The Constitution (SC) Orders (Amendment) Act, 1990
- *The Constitution (ST) Orders (Amendment) Ordinance Act, 1991
- *The Constitution (ST) Orders (Amendment) Ordinance Act, 1996
- *The Constitution (Scheduled Castes) Orders (Amendment) Act, 2002
- *The Constitution (Scheduled Castes) Orders (Second Amendment) Act, 2002.
- *The Scheduled Castes and Scheduled Tribes Orders (Amendment) Act, 2002.

2. Applicable in the case of Scheduled Castes/Scheduled Tribes persons who have migrated from one State/Union Territory Administration.

This certificate is issued on the basis of the Scheduled Castes/ Scheduled Tribes Certificate issued to Shri / Srimati *father / mother* of Shri / Srimati / Kumari of Village / Town* in District / Division * of the State / Union Territory * who belongs to theCaste*/Tribe which is recognised as a Scheduled Caste / Scheduled Tribe in the Station/ Union Territory* issued by the dated

3. Shri / Srimati / Kumari* and /or* his/her* family
ordinarily resides in Village / Town* District / Division*
..... of the State/ Union Territory* of

Place.....

Signature.....

Date.....

Designation.....

(with seal of Office)

State/ Union

Territory.....

* Please delete the words which are not applicable.

@ Please quote the specific presidential order.

% Delete the Paragraph, which is not applicable

Note: (a) The term "ordinarily reside(s)" used here will have the same meaning as in Section 20 of the Representation of the People Act, 1950. Officers competent to issue Caste/Tribe certificates.

1. District Magistrate / Additional District Magistrate / Collector / Deputy Commissioner / Additional Deputy Commissioner / Deputy Collector / 1st Class Stipendiary Magistrate / Sub-Divisional Magistrate / Taluka Magistrate / Executive Magistrate / Extra Assistant Commissioner. 2. Chief Presidency Magistrate / Additional Chief Presidency Magistrate / Presidency Magistrate. 3. Revenue Officers not below the rank of Tehsildar. 4. Sub-Divisional Officer of the area where the candidate and / or his / her family normally reside(s). 5. Certificates issued by Gazetted Officers of the Central or of a State Government Countersigned by the District Magistrate concerned. 6. Administrator/ Secretary to Administrator (Laccadive, Minicoy and Admindivi Islands).

OBC CERTIFICATE FORMAT**FORM OF CERTIFICATE TO BE PRODUCED BY OTHER BACKWARD CLASSES
APPLYING FOR APPOINTMENT TO POST UNDER THE GOVERNMENT OF INDIA**

This is to certify that Shri / Smt. / Kumari.....
son / daughter of of Village/Town in
District/ Division in the State / Union Territory belongs to the
..... community which is recognised as a Backward Class
under the Government of India, Ministry of Social Justice and Empowerment's
Resolution No. Dated.....* .

Shri/Smt./Kum.* and /or his/her family ordinarily
reside(s) in the District / Division of the
..... State / Union Territory. This is also to certify that he/she
does not belong to the persons / sections (Creamy layer) mentioned in column 3 (of the
Schedule to the Government of India, Department of Personnel & Training OM No.
36012/22/93-Estt(SCT), dated 8.9.1993 and modified vide Government of India,
Department of Personnel and Training O.M.No.36033/1/2013-Estt. (Res) dated
27.05.2013 and 13.09.2017**.

Date:

**DISTRICT MAGISTRATE /
DY. COMMISSIONER ETC.**

(Seal)

*** The authority issuing the certificate may have to mention the details of
Resolution of Government of India, in which the caste of the candidate as OBC.**

**** As amended from time to time.**

**Note: The term "Ordinarily" used here will have the same meaning as in Section
20 of the Representation of the People Act, 1950.**

DECLARATION**Annexure III**

**Proforma for declaration to be submitted by Other Backward Class
Candidates at the time of document verification, who had applied for the post
against VC No. _____**

"I, son/daughter of
Shri resident of Village/Town/City
....., district State
..... hereby declare that I belong to the
(indicate your sub caste) community which is recognized as a backward class by the
Government of India for the purpose of reservation in services as per orders contained
in Department of Personnel and Training Office Memorandum No. 36012/22/93-
Estt.(SCT) dated 08.09.1993. It is also declared that I do not belong to
persons/sections (Creamy Layer) mentioned in column 3 of the Schedule to the above
referred Office Memorandum dated 08.03.1993 and its subsequent revision through
O.M.No.36033/1/2013-Estt. (Res) dated 27.05.2013 and 13.09.2017.

Place:

Signature of the Candidate

Date:

Name of the candidate