



ODISHA PUBLIC SERVICE COMMISSION

ADVERTISEMENT NO. 33 OF 2023/24

Recruitment to the posts of Asst. Executive Engineer (Civil) in Group- 'A' of Odisha Panchayati Raj Engineering Service Cadre under the Panchayati Raj & Drinking Water Department.

WEBSITE –<http://opsc.gov.in>

Online applications are invited from the prospective candidates through proforma application form to be made available on the Website of the Commission (<http://opsc.gov.in>). The link for online application and submission shall be available from 12.03.2024 to 12.04.2024 (Note: 12.04.2024 is the last date for submission of Registered Online Application) for recruitment to 63 (21-W) posts of Assistant Executive Engineer (Civil) under Panchayati Raj & Drinking Water Department in Group-A of Odisha Panchayati Raj Engineering Service cadre carrying the scale of pay in Level-12 of pay matrix provided under Rule-3 of ORSP Rules-2017 corresponding to pre-revised scale of Pay Band-3 (Rs.15,600-Rs.39,100/-) carrying Grade Pay of Rs. 5,400/- with usual dearness allowance and other allowances as may be sanctioned by the Government of Odisha from time to time.

2. Vacancy Position: As per requisition filed by the Panchayati Raj & Drinking Water Department of Government of Odisha, the vacancy positions are given below:

Sl. No.	Category	No of vacancies
1	UR	33 (11-W)
2	SEBC	06 (02-W)
3	SC	11(04-W)
4	ST	13 (04-W)
	Total	63 (21-W)

Out of the total 63 (21-W) number of vacancies mentioned above, the reservation of vacancies in respect of **Sports Person** and **Persons with Disabilities (whose permanent disability is 40% or more)** are given below. Persons with Disabilities and Sports Persons shall be adjusted against the categories to which they belong.

Sl. No.	Sub-Category	No. of Posts
1	2	3
(i)	Sports Person	01
(ii)	Persons with Disabilities	03
	(a) Blindness or Low Vision	01
	(b) Deaf & Hard of Hearing	01
	(c) Locomotors disability including cerebral palsy, leprosy cured, dwarfism, acid attack victims and muscular dystrophy.	01

P.T.O.

NOTE:

- (a) The probation period of the above posts is two years.
- (b) In the event of non-availability or availability of insufficient number of eligible women candidate(s) belonging to any particular category, the remaining vacancies will be filled up by male candidate(s) of that category.
- (c) Exchange of reservation between Scheduled Caste and Scheduled Tribe will not be considered in the event of non-availability of eligible and suitable S.C./S.T. candidates.
- (d) The number of vacancy to be filled up on the basis of this recruitment is subject to change by Government without notice, depending upon the exigencies of public service at the discretion of the State Government.
- (e) Candidates belonging to the categories of Persons With Disabilities and Sports Persons shall be adjusted against the categories to which they belong.

3. AGE: A candidate must have attained the age of 21 (twenty one) years and must not be above the age of 38 (thirty eight) years as on **01.01.2024** i.e. he or she must have been **born not earlier than 02.01.1986 and not later than 01.01.2003**.

Age relaxation for candidates in different categories for availing relaxation and reservation benefits will be as per Government Rules prescribed for the purpose. The upper age limit is relax-able by 5(five) years for candidates belonging to the categories of Scheduled Castes (S.C.), Scheduled Tribes(S.T.), Socially & Educationally Backward Class(S.E.B.C.), Women, Ex-servicemen, and by 10(ten) years for Persons With Disabilities category, whose permanent disability is 40% or more.

Persons with Disabilities belonging to the categories of SC/ST/SEBC shall be entitled to cumulative age relaxation benefit of 15 years.

Provided that a candidate who comes under more than one category mentioned above he/she will be eligible for only one age relaxation benefit.

SAVE AS PROVIDED ABOVE THE AGE LIMITS PRESCRIBED CAN IN NO CASE BE RELAXED.

Date of birth entered in the high school certificate or equivalent certificate issued by the concerned board/council will only be accepted by the Commission.

4. EDUCATIONAL QUALIFICATION: A candidate must have possessed a **Degree in Engineering (Civil)** from any University or he/she must be an **Associated Member of the Institution of Engineers of India in Civil**.

5. METHOD OF SELECTION: The Competitive examination for recruitment to the posts of Assistant Executive Engineer (Civil) shall comprise of the following successive stages:

(A) Preliminary Examination (Objective type MCQ pattern)

(B) Main Examination (Objective type MCQ pattern)

(C) Viva-Voce Test.

- The Preliminary Examination shall be of **one paper of 100 questions** carrying **100 marks** with duration of **one and half hours** with objective type questions of multiple choice with **negative marking of twenty-five percent for every wrong answer** allotted to that particular question.

- The Main Examination consisting of the following **two papers** of **150 questions in each** paper & having **300 marks each** with duration of **two & half hours for each** paper having objective type questions of multiple choice and **negative marking of 0.5 for every wrong answer** allotted to that particular question in both the papers.

(a) **General Studies** including **Basic Sciences** and **General Awareness / Knowledge**. – 300 marks

(b) **Specialized paper** relating to the stream of **Civil Engineering** – 300 marks

- **Viva Voce Test** shall be of **75 marks**.
- The broad outlines of the syllabi for the aforesaid examination are annexed as **Annexure-A & Annexure-B**.
- The **qualifying marks** fixed by the Commission in the **Preliminary examination** for UR/SEBC/SC/ST /PWD category is **thirty percent (30%)**. The candidates who qualify the preliminary examination shall be called for to appear the main examination.
- The **qualifying marks** fixed by the Commission in the **Main examination** for UR/SEBC/SC/ST/PWD category is **thirty percent (30%)**. The candidates who qualify the Main examination shall be called to appear the Viva Voce Test.
- The Commission shall prepare a list of selected candidates arranged in order of merit equal to the number of advertised vacancy on the basis of the marks secured in the main examination and viva voce test.

NOTE :- Any details relating to this recruitment like cut-off marks, individual marks, etc. shall only be declared on the website of the Commission after publication of the final result and select list.

6. APPLICATION FEE: The candidates are exempted for payment of examination fees as per G.A Deptt. letter No.9897/Gen dated 11.04.2022.

7. PLACE OF EXAMINATION: The written examination will be held at Cuttack. It may also be held at Bhubaneswar, Balasore, Berhampur and Sambalpur depending on the number of candidates applied for from the respective zones as decided by the Commission.

The candidates are to mention their choice of examination zone at appropriate place in the online application form.

8. OTHER ELIGIBILITY CONDITIONS:

- (i) The candidate must be a citizen of India;
- (ii) He/She must be of good mental condition and bodily health and free from any physical defect likely to interfere with the discharge of his/her duties in the service.
- (iii) He/She must be able to read, write and speak Odia and must have -
 - (a) Passed Middle School examination with Odia as a language Subject; or
 - (b) Passed Matriculation or equivalent examination with Odia as medium of examination in non-language subject; or
 - (c) Passed in Odia as language subject in the final examination of Class-VII or above from School or Educational Institution recognized by the Government of Odisha or the Central Government; or
 - (d) Passed a test in Odia in Middle English School Standard conducted by the School and Mass Education Department/Board of Secondary Education, Odisha
- (iv) If married, he/she must not have more than one spouse living: Provided that the State Government may, if satisfied that such marriage is permissible under the personal law applicable to such person or there are other grounds for doing so, exempt any person from the operation of this rule.

- (v) Government servants, whether permanent or temporary or on probation against a vacancy in permanent/temporary posts in any department of Government, are eligible, provided they possess the requisite qualification and are within the prescribed age limit as mentioned under Para-3 and Para-4 of this advertisement. They must inform their respective Heads of the Office in writing regarding submission of their application for this recruitment and furnish "No Objection Certificate" during document verification;
- (vi) If a candidate has at any time, been debarred for a certain period/chance(s) by the Odisha Public Service Commission or by other State Public Service Commission or by U.P.S.C. from appearing at any examination / viva voce test, he/she **will not be eligible** for such recruitment for that specified period / chance(s);
- (vii) **Only those candidates, who possess the requisite qualifications, are within the prescribed age limit and fulfill other eligibility conditions etc. by the closing date for submission of online application form, will be considered eligible;**
- (viii) A candidate who claims change in his/her name after having passed the H.S.C. examination, is required to furnish copy of publication of the changed name in the local leading daily newspaper as well as copy of notification in the Gazette in support of his/her change of name;
- (ix) Every candidate included in the select list shall be examined by a Medical Board and the candidate, who fails to qualify the Medical Board shall not be eligible for appointment.

9. IMPORTANT POINTS:

- (i) **Online applications submitted to OPSC, if found to be incomplete in any respect, are liable for rejection without entertaining any correspondence with the applicants on the score;**
- (ii) A candidate found guilty of seeking support for his/her candidature by offering illegal gratification or applying pressure on any person connected with the conduct of the recruitment process or found indulging in any type of malpractice in course of the selection or otherwise, shall, in addition to rendering himself/herself liable to criminal prosecution, be disqualified not only for the recruitment for which he/she is a candidate, but also may be debarred, either permanently or for a specified period, from any recruitment or selection to be conducted by the Commission;
- (iii) **Admission to recruitment process will be provisional. If on verification at any stage of the recruitment process it is found that a candidate does not fulfil all the eligibility conditions, his/her candidature will be liable to rejection. Decision of the Commission in regard to eligibility or otherwise of candidate shall be final;**
- (iv) This advertisement should not be construed as binding on the Government to make appointment;
- (v) Concession meant for S.E.B.C, S.C & S.T by birth are admissible to the Socially and Educationally Backward Classes, Scheduled Castes & Scheduled Tribe of Odisha only;
- (vi) Any misrepresentation or suppression of information by the candidate in the application form will result in cancellation of his/her candidature or penalty, as decided by the Commission shall be imposed;
- (vii) Mere empanelment in the select list shall not confer any right for appointment unless the Government is satisfied after making such enquiry as may be deemed necessary that the candidate is suitable in all respects for appointment to the service.

10. CERTIFICATES/DOCUMENTS TO BE ATTACHED:

Only those candidates, who are called for document verification are to submit the printout/hard copy of online applications, along with true copies of the following documents duly self attested by the candidates with full signature and date on the same on the day of document verification. They must also produce original certificates, mark-sheets etc. for verification on the date fixed by the Commission.

If a candidate fails to produce any of the original documents in respect of the self attested copies submitted with the application form on the date of document verification fixed by the Commission, his/her candidature will be rejected.

- (i) H.S.C. or equivalent certificate in support of declaration of age issued by the concerned Board/Council.
- (ii) Intermediate/+2 Sc. Pass Certificate issued by the concerned University/Council;
- (iii) Degree (i.e. Engineering in Civil) pass certificate issued by the recognized University or AMIE of India;
- (iv) Mark-lists of all semesters/annual examinations in support of Degree (Engineering in Civil) passed including fail marks, if any, issued by the concerned Board/Council/University;

NOTE 1: (a) Candidates who have not been awarded percentage of marks, but only "grade marks", should, along with their applications, produce the Conversion Certificate from the concerned University indicating the actual equivalent percentage of marks and the conversion formula, failing which, their applications are liable to be rejected.

(b) While filling up the relevant box of the online application form, the candidate has to mention the marks secured (**excepting marks secured in the Extra Optional/4th Optional Subject**) in each examination passed (i.e. H.S.C. to Degree).

- (v) "No Objection Certificate" from the Head of Office/Head of the Department in case of Government servant.
- (vii) Four recent passport size photographs (unsigned and unattested) with the printout/hard copy of online application form which has been uploaded.
- (viii) **Caste Certificate by birth in support of claim as SC/ST/SEBC, wherever applicable;**

NOTE 2: Candidates claiming to be belonging to S.C. /S.T./ S.E.B.C category by birth are required to submit copy of the relevant Caste Certificate issued by the competent authority in the prescribed form. Candidates of SEBC category (other than Creamy Layer) must submit copy of Caste Certificate issued by the competent authority within the last three years from the last/closing date of submission of online application.

a. Women candidates belonging to S.C. /S.T. /S.E.B.C Categories are required to submit Caste Certificates by birth showing "daughter of". Caste Certificates by virtue of marriage (i.e. showing "wife of") is not acceptable.

b. **O.B.C. CERTIFICATE WILL NOT BE ACCEPTED IN LIEU OF SEBC CERTIFICATE AND CANDIDATES SUBMITTING THE OBC CERTIFICATE ARE LIABLE FOR REJECTION.**

c. Community (Caste status) once mentioned by the candidates shall not be changed under any Circumstances.

The competent authorities are:-District Magistrate/ Collector or Additional District Magistrate or Sub-divisional Magistrate/Sub-Collectors or Executive Magistrates or Revenue Officers, not below the rank of Tahasildar /Additional Tahasildar of Government of Odisha;

- (ix) Required Odia Test Pass Certificate from the Board of Secondary Education, Odisha indicating Odia as a language subject equivalent to M.E. School Standard or a certificate from the Principal/Headmaster of the recognized school indicating that the candidate has passed Odia upto M.E. standard; if not passed Odia as a subject in the High School certificate examination or equivalent examination;
- (x) Disability Certificate (indicating percentage of permanent disability) issued by the concerned Medical Board, wherever applicable.
- (xi) Sports Identity Card issued by the Director of Sports, Odisha, wherever applicable;
- (xii) Ex-Servicemen are required to submit/upload Release Certificate issued as per Orissa Ex-Servicemen (Recruitment to State Civil Services and Posts) Rules, 1985 vide G.A. Deptt. notification No. 22586-Gen., dt.16.10.1985. Further, Ex-Servicemen candidates must submit an affidavit, undertaking that he/she has not been appointed against a civil post after retirement from military service.

NOTE-3: *Degree Certificate, Caste Certificate, Odia Test Pass Certificate, Permanent Disability certificate of Persons with disabilities(indicating % of Permanent Disability), Release Certificate of Ex-Servicemen [issued as per Orissa Ex-Servicemen (Recruitment to State Civil Services and Posts) Rules, 1985 vide G.A. Deptt. notification No. 22586-Gen., dt.16.10.1985], Sports Identity Card issued by the Director of Sports, Odisha must have been issued by the competent authority within the last date fixed for receipt/submission of application form as indicated above.*

11. "GROUNDS OF REJECTION OF APPLICATIONS"

Applications of candidates will be rejected by the Commission on any of the following grounds:-

- (a) In-complete online application form.
- (b) Non-submission of hard copy of online application form at the time of verification of original documents.
- (c) Not signing Declaration (full signature) in the hard copy of online application form.
- (d) Not passing Odia test (M.E. standard)/not furnishing Odia test pass evidence as required under para – 8(iii) and para -10(ix) of the advertisement.
- (e) Not coming within the age limit as mentioned in Para - 3 of Advertisement.
- (f) Not having requisite qualification as provided under Para - 4 of Advertisement.
- (g) Not furnishing copies of certificates/documents as provided under Para- 10 of advertisement.
- (h) Submission of wrong information/ false information about qualification/ Age /Odia test pass evidence/category status (SEBC/SC/ST/Ex-Servicemen /Sports Person/PWD/Women etc).
- (i) Suppression of facts / information about eligibility, if any.
- (j) Any other ground as per the decision of the Commission.

NB: Application /candidature of a candidate shall be rejected at any stage of recruitment process, whenever discrepancy is noticed/ detected.

12. HOW TO APPLY:

- (a) Candidates must go through the details of this Advertisement available in the Website of OPSC before filling up online application form.
- (b) Candidates must apply online through the concerned Website of the OPSC <http://opsc.gov.in>. Applications received through **any other mode** would not be accepted and summarily rejected.
- (c) Before filling up the online application form, the candidates must go through detailed instructions available at OPSC portal.
- (d) The online application form is automated and system driven & will guide the candidate seamlessly in filling the application. The requisite options shall be enabled and information shall be asked as per data furnished by the candidate. Before filling up the information, ensure that accurate information is fed, for edit option is limited & on confirmation there is no scope for further edit even if wrongful entry has been made while filling up application.
- (e) Candidates are requested to upload the scanned image of latest passport size photograph along with scanned image of his/her full signature and scanned image of Left-hand Thumb Impression (LTI) in the online application form. Uploaded photograph, Specimen (full) signature and LTI must be clearly identifiable / visible, otherwise the application of the candidate is liable to be rejected by the Commission and no representation from the candidate will be entertained.
- (f) Candidates should keep at least four copies of latest passport size photograph which is uploaded to the online application form for future use.
- (g) *On successful submission of the online Registration, a unique "Permanent Public Service Account Number (PPSAN)" will be assigned to the applicant. Candidates are required to take a printout of the finally submitted online Registration/Re-registration and finally submitted Online Application forms and put his/her signature under the declaration for submission to OPSC along with copies of requisite certificate & documents as and when asked.*
- (h) The candidates are advised to submit the Online Application Form well in advance without waiting for the closing date to avoid last hour rush.
- (i) Admission Letter for the eligible candidates to appear in the Preliminary and Main Examination shall be uploaded in the Website of the OPSC prior to the date of examination which will be published in the Website and Newspapers. The candidates are required to download their Admission Letter from the Website of the Commission and produce the same at the Examination centre for admission to the examination. No separate correspondence will be made on this score.
- (j) "Intimation letters" to candidates for document verification & interview and "Attestation form" & "Bio-data form" shall be uploaded in the website of OPSC prior to the date of Document Verification/Interview.
- (k) Any complaint on the conduct of examination must be sent to the Grievance Wing of the Commission by e-Mail (opsc@nic.in) within 07 (Seven) days of completion of the examination.

13. FACILITATION COUNTER :-

To resolve any Technical problem faced in filling up of online Registration/ Re-registration and Application forms, candidate may contact OPSC Technical Support **over Telephone No. 0671-2304707** between 10.30 A.M. to 1.30 P.M. & 2.00 P.M. to 5.30 P.M. on any Odisha Government working days.

In case of any guidance/information on this advertisement & recruitment, candidates may go through the **FAQ** available in the website of the Commission or contact the O.P.S.C. Facilitation Counter over Telephone No. 0671-2304141/2305611 & Extn.- 227 on any working day between 10.30 A.M. to 1.30 P.M. & 2.00 P.M. to 5.30 P.M.


The candidates are required to visit the website of the Commission at <http://opsc.gov.in> for detailed information about important notices, rejection of applications/the date & time of Preliminary and Main Written Examination/ Document verification / Interview and also keep track of publication of various notices to the effect in the leading Odia local dailies for information.

Closing Dates

- 1. THE LINK FOR ONLINE APPLICATION AND SUBMISSION SHALL BE AVAILABLE IN THE WEBSITE FROM 12.03.2024 TO 12.04.2024 (11.59 P.M).**
- 2. ONLY ONLINE APPLICATIONS RECEIVED WITHIN THE DEADLINE i.e. 12.04.2024 SHALL BE ACCEPTED.**

NB: - THE ONLINE APPLICATION FORMS IF FOUND DEFECTIVE IN ANY RESPECT, ARE LIABLE TO BE SUMMARILY REJECTED.

CUTTACK
DATE : 06.03.2024


SECRETARY
ODISHA PUBLIC SERVICE COMMISSION,
CUTTACK.

Annexure – A

Syllabus of Preliminary Examination

The syllabus of Preliminary Examination for recruitment to the post of Assistant Executive Engineer (Civil) under Odisha Panchayati Raj Engineering Service shall consist of following topics:

1. Engineering Mechanics
2. Soil Mechanics
3. Structural Analysis
4. Concrete Structure
5. Steel Structure
6. Solid Mechanics
7. Fluid Mechanics
8. Irrigation
9. Transportation Engineering
10. Survey

Total -

100 Marks

- Questions shall be set covering all topics from the syllabus as far as possible.
- The questions shall be of objective type of MCQ consisting of 100 nos. of questions carrying 01 mark each with negative marking of twenty-five percent for every wrong answer allotted to that particular question and duration shall be one & half hour.

Annexure - B

Syllabus of Main Written Examination

The syllabus of Main Examination for recruitment to the posts of Assistant Executive Engineer(Civil) under Odisha Panchayat Raj Engineering Service shall consist of the following:

PAPER – I - GENERAL STUDIES - 300 MARKS

A. Part – I - General Science - 200 marks

1. Physics
2. Chemistry
3. Biology
4. Information Technology
5. Nuclear Science
6. Computer Technology
7. Defence Technology
8. Space Technology
9. Geology
10. Agriculture

Total - 200 marks

B. Part – II - General Awareness / Knowledge - 100 marks

(a) History of Modern India and Indian Culture

(1) The History of Modern India will cover the following :

- History of India since 1857
- Important personalities who shaped the Freedom Movements in Odisha and India.
- Social Reform Movements.

(2) Indian culture will cover the following :-

- Indian Culture from ancient times to modern times.
- Temple architecture of Odisha
- Socio-cultural developments in Odisha

Contd.....

(b) Geography of India will cover the following :-

- Physical, economic and social geography of India
- Odisha's Physiography and Drainage system
- Odisha's Natural Resources – Water, forest and minerals, climates, natural Calamity (Flood, Tsunami, Super Cyclone, Global warming etc.)

(c) Indian Polity will include the following :-

- Constitution of India
- Political system of India
- Government and politics in Odisha
- Panchayat Raj Institutions (PRIs) in Odisha.

(d) **India and the World :**

This part is intended to test candidate's awareness of India's relationship with the world in various spheres, such as the following;

1. Foreign Affairs
2. External security and related matters
3. Nuclear policy
4. Indians abroad

(e) **Indian Economy :**

1. This part will include the following;

- I. Planning, economic development, economic reforms and development of the Corporate Sector in India.
- II. Economic and Trade issues
- III. Role and functions of IMF, World Bank and WTO V Reserve Bank of India – its role and functions.
- IV. Odishan Eccnomy : Development during the post Reform Period.

Contd.....

The number of questions shall be 150 of objective type (MCQ) carrying 2 marks each and with negative marking of 0.5 for every wrong answer with duration of two and half hours.

PAPER -II - SPECIALIZED PAPER (CIVIL ENGINEERING) - 300 MARKS

1. SOLID MECHANICS:- Elastic constants, plane stress, plane strain, Mohr's circle, combined stress; Elastic theories of failure; Simple bending, Shear; Torsion of circular and rectangular sections and simple members. Bending Moment and Shear Force in statically determinate beams.

2. STRUCTURAL ANALYSIS:- Analysis of determinate structures - different methods including graphical methods. Analysis of indeterminate skeletal frames - moment distribution, slope deflection, stiffness and force methods, energy methods, Muller-Breslau principle and application. Plastic analysis of indeterminate beams and simple frames - shape factors. Basic concepts of matrix method of structural analysis.

3. DESIGN OF CONCRETE STRUCTURES:- Limit state design for bending, shear, axial compression and combined forces. Codal provisions for slabs, beams, walls and footings.

Principles of prestressed concrete design, materials, methods of prestressing, losses. Design of simple members.

4. DESIGN OF STEEL STRUCTURES (Based on Limit State Method):- Analysis and design of tension and compression members, Column bases, Connections- simple and eccentric beam-column connections. Plate girders and trusses.

5. BUILDING MATERIALS AND BUILDING CONSTRUCTION:-

(a) Building Materials:- **Cement:** Components, different types, setting times, strength. *Cement Mortar*: Ingredients, proportions, water demand, mortars for plastering and masonry.

Concrete: Importance of W/C Ratio, Strength, ingredients including admixtures, workability, testing for strength, non-destructive testing, mix design methods. **Bricks:** Types, Indian Standard classification, absorption, saturation factor, strength in masonry.

(b) Building Construction:- Types of Foundations, Brick masonry, Stone masonry, Floorings, Causes and prevention of cracks in buildings, Damp proofing, Special maintenance of buildings.

6. ESTIMATION, CONSTRUCTION PLANNING AND MANAGEMENT:- Preliminary estimate, Detailed estimate, Specifications and cost analysis. Bar chart, Linked bar chart, Work-breakdown structures, Activity- on - arrow diagrams, critical path, probabilistic activity durations, Event- based networks, PERT networks: Time- cost study, Resource allocation.

Contd.....

7. WATER RESOURCES AND HYDRAULIC ENGINEERING:-

(a) Irrigation Engineering:- Consumptive use of water, irrigation systems, water demand assessment; Storages and their yields, ground water and well hydraulics; Waterlogging, drainage design; Design of rigid boundary canals, Lacey's and Tractive force concepts in canal design, lining of canals; Sediment transport in canals; Forces acting on gravity dams and their design, Design of headworks, distribution works, falls, Cross-drainage works, outlets; River training

(b) Hydrology:- Hydrological cycle, precipitation and related data analyses, Probable maximum precipitation, unit hydrograph and synthetic unit hydrographs; Evaporation and transpiration; Floods and their management, Design Flood, Streams and their gauging; Routing of floods; Capacity of Reservoirs.

(c) Fluid Mechanics:- Fluid Properties, Pressure, Thrust, Buoyancy; Flow Kinematics; Integration of flow equations; Flow measurement; Relative motion; Moment of momentum; Viscosity, Boundary layer and Control, Dimensional Analysis, Flow development, losses in pipe flows, Pipe networks, Flow measuring equipment and structures.

(d) Open Channel Flow:- Momentum and Energy principles in Open channel flow, Types of flow, Flow sections and properties; Normal flow, Gradually varied flow, Hydraulic jump.

8. ENVIRONMENTAL ENGINEERING

(a) Water Supply Engineering:- Sources of supply, design of intakes, Estimation of demand; Water quality standards; Primary and secondary treatment, detailing and maintenance of treatment units; Conveyance of treatment units; distribution systems of treated water, leakages and control; Institutional and industrial water supply.

(b) Waste Water Engineering:- Urban rain water disposal; Quantity and characteristics of waste water, Collection of waste water, Primary, Secondary and tertiary treatment of waste water, Sludge disposal, effluent discharge standards, Institutional and industrial sewage management.

(c) Solid Waste Management:- Characteristics, Generation, Collection and Transportation, Engineered systems of solid waste management (reuse, recycle, recovery, treatment and disposal). Design and Management of landfills.

(d) Air and Noise Pollution:- *Air pollution:* sources and impacts, air pollution controls, standards and limits. *Noise pollution-* impacts of noise, permissible limits, measurements and control of noise pollution.

9. GEOTECHNICAL ENGINEERING:-

(a) Soil Mechanics:- Fundamental definitions and interrelationships; Properties and Classification of soils, Permeability and seepage, Effective stress principles, Shear strength, Consolidation, Compaction, stress distribution in soils.

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(b) **Foundation Engineering:-** Types of foundations, Foundation design requirements, Shallow foundations - bearing capacity, settlement analysis in sands and clays, Deep foundations- pile types, dynamic and static formulae, load carrying capacity of piles in sands and clays, group action, negative skin friction , Earth pressure theories, effect of water table, layered soils, Stability of slopes, Sub-surface investigations- scope, drilling bore holes, sampling, penetration tests, plate load tests, geophysical tests.

10. TRANSPORTATION ENGINEERING:-

(a) **Highway Engineering:-** Geometric design of highways, Testing and specifications of paving materials, design of flexible and rigid pavements

(b) **Traffic Engineering:-** Traffic characteristics, theory of traffic flow, intersection design, traffic signs and signal design, highway capacity.

11. SURVEYING:- Principles and classification of surveys, mapping concepts, Coordinate systems, Measurement of distance and directions, Leveling, Theodolite traversing, Contours, Plane table surveying, Errors and adjustments, Curves, Total station, Concept of Global Positioning System; Photogrammetry and Remote Sensing concepts.

- Questions shall be set covering all topics from the syllabus as far as possible.
- The number of questions shall be 150 of objective type (MCQ) carrying 2 marks each and with negative marking of 0.5 for every wrong answer with duration of two and half hours.
