

Syllabus for Departmental Examination for AE & AAEs (Civil) of GWSSB - 2020

PAPER-I

Sub. : General (Civil Engineering)

(1) Engineering Material:

- (A) Cement: Composition and manufacture-storing, varieties and uses. Normal and rapid hardening cements, Properties and I.S.S. tests.
- (B) Cement Mortar: Composition, preparation and uses, properties, strength and tests. Gauged mortars - proportioning of materials in mortars. Effect of water content
- (C) Aggregates: Coarse aggregates and fine aggregates
Cement and water. Proportioning and mixing. Real, nominal and field mixes, bulking of sand. Grading of aggregates, water cement ratio, placing and curing

(2) Concrete Technology:

Strength of various mixes and uses. Ready Mix Concrete and Admixtureing. Damp Proofing/ Water Proofing

- (3) Steel:** Characteristics and uses of mild steel, torque steel

(4) Foundation:

General principles of designing foundations, types of soils and safe bearing pressure on the various types of soils. Various types of foundations suitable for various circumstances e.g. open foundations, black soil foundations, raft foundations, pile foundations, well foundations, grillage foundation etc.

(5) Construction Technology:

Masonry (various types): Brick masonry/Stone masonry.

Scaffolding, centering and form works different types, steel and wooden moving forms - Design for centering for arches and domes tunnel lining and reservoir etc., removal of forms, periods and methods.

(6) Estimating, Costing & Drawing Details:

Estimate & Specification of Sump, ESR, Pump Room, Pipe line
Analysis of rates and schedule of rates

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PAPER-II

ACCOUNTS: SUB - DIVISIONAL WORKS ACCOUNTS

1. Internal records of accounts

- i) B1-B2 Tenders
- ii) Measurement books, taking of measurements, use and maintenance of measurement books
- iii) Schedule of Rate
- iv) Delegation of powers
- v) Various Types of Approvals for Projects (WS & Drainage)
- vi) Importance of action plan & Elements.

2. Stores

- 1) Initial records, receipts and issues including issues to contractors
- 2) Stores forms Nos.7,8,9 and 10,13,14 and 15
- 3) Material at site accounts

3. Contractors

- 1) Rules regarding contracts as embodied in the different forms of agreements
- 2) Contractor's bills
- 3) Piece work and contract work
- 4) Aid and advances to contractors
- 5) B1-B2 Tender
- 6) PPP Models
- 7) Standard Tender Documents
- 8) DTPs

NOTE: The relevant chapters or paragraphs of the Bombay Public Works Department Manual, Volumes I and II, Public Works Accounts Code and Book of Forms should be studied.

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Sub.: Water Supply & Sanitary Engineering

PAPER III

Water Supply Engineering:

Planning:

- Objective of public protected water supply
- Basic Design Considerations:
 - Design Period
 - Population forecast
 - Per capita water supply - Criteria
 - Peak factors.
 - Quality standards considerations.

Project Feasibility Report:

- Background
- The proposed project - Long term plan for water supply
- Project Report
 - Google Earth & Google Map for the Survey Work of RWS
 - Various types of approval for regional water supply & drainage projects
- Institutional and Financial aspects
- Conclusions and recommendations for the project

Measurement of Flow:

- Flow measurement in open channels:
 - Notches
 - Weirs
 - Flumes
 - Drops

Measurement in closed conduits:

- Differential pressure devices:
- Venturimeters.
- Orifice plates and nozzles
- Pilot tubes
- Water meters

Sources of Supply:

- Kinds of Water Sources and their characteristics:
 - Water from precipitation
 - Surface Waters
 - Ground waters
 - Salinity ingress
 - Sanitary survey

Transmission & Distribution of water

Free-flow and pressure conduits

Hydraulics of conduits

- Formula
- Coefficient of roughness
- Manning's / Hazen William's formula.
- Experimental estimation of C value.
- Cost effective design of pipeline (Rising as well as Gravity main) (Manual & Software based)
- Resistance due to special sand appurtenances

Types of pipes:

- Specifications for manufacture, supply, laying, jointing, commissioning the following pipes
- CI Pipes
- MS pipes
- AC pipes
- Pre stressed concrete pipes
- PVC pipes
- GRP pipes

Appurtenances:

- Line Valves
 - Sluice valves
 - Butterfly valves
 - Globe Valves
- Scour Valves
- Air valves

- Pressure relief valves
- Check valves
- Surge tanks
- Pressure releasing and sustaining valves
- Ball valves or float valves
- Automatic shut-off valves etc.

Water hammer

- Occurrence
- Control measures - Special devices for controlling water hammer

Water Treatment:

Water Quality parameters

- Physical characteristics
- Chemical properties
- Biological properties.
- Methods of Treatment and flow designs
- **Conventional Water treatment**
 - Aeration
 - Flash mixing and alum handling
 - Clariflocculator
 - Filtration (SSF & RSF)
 - Dual media filters
 - Pressure filters
 - Disinfection
 - Chlorination
 - Ozonization
 - UV treatment
 - Application of chlorine, chlorine demand, residual chlorine, chlorine dose, handling chlorinators etc.
- **Specific Treatment processes:**
 - Reverse Osmosis
 - Deflouridation plants
 - Water softening plants

- **Service Reservoir**
- **Pumping stations and pumping machinery - Selection and type of pumping machinery**

WASTE WATER ENGINEERING:

- Aim and Objective of Sewage disposal
- Definitions of common terms used in Waste Water Engineering
- Systems of Sanitation : Conservancy system and Water Carriage system
- Sewer appurtenances
- Pumping of sewage
- Characteristics' of sewage (BOD,COD etc)
- Sewage treatment processes
 - Conventional treatment
 - Biological treatment
 - Activated sludge process
 - Oxidation ponds and ditches
 - Anaerobic processes like UASB etc.
- Tertiary treatment and recycling of sewage
- PPP model

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PAPER-IV

Sub.: Practical and VIVA-VOCE TEST- ONE PAPER

1. Practical and oral test in surveying and setting out

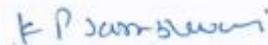
- (A) Care and adjustment of levels
- (B) Levelling and reduction of levels
- (C) Setting out angles
- (D) Setting out a plan on the ground
- (E) Google Earth & Google Map for the Survey Work of RWSS
- (F) MIS Software
- (G) Application of Branch & Excel
- (H) Survey & leveling
- (I) Power point presentation skill
- (J) WS-WMS Software (Practical Test)

The candidate may be required to carry out any of the above.

2. Practical drawing

A pencil drawing to be made from data or a drawing of any one structure from given dimensions of following structure.

- a) RCC ESR likes (1) Conical (2) Intake (3) Cylindrical on Shaft or column
- b) RCC U/G Sump
- c) Pump Room



(Kusum Sambhwani)

Chairman

Departmental Examination Committee

for AE/AAE & Director, GJTI

GWSSB, Gandhinagar

Syllabus for Departmental Examination for AEs & AAEs of GWSSB (Mechanical) - 2020

PAPER – I

Sub: General Engineering (Mechanical)

- (1) Standard weights and measurements of engineering materials required in mechanical field with their fundamental properties. Special attention should be given to metric system.
- (2) Types of various drives and their application.
- (3) Lifting equipment like tackles, cranes, pulley blocks, etc
- (4) Welding, brazing and soldering.
- (5) Tool-room and application of tools.
- (6) Use of precision instruments like micrometers, alignment indicators etc.
- (7) Foundation of structures - specially engine foundation and foundation of electric poles transformers.
- (8) Various types of pumps and its use – General selection, Design and layout diagram of large size machineries calculation of BHP, KW
- (9) Fuel oil and lubricants - general knowledge of various types of fuel oils, fundamentals of efficient lubrication. Different types of lubricating oils and their uses - methods of reclaiming used lubricating oils.
- (10) Estimation of works including M&R estimates of machineries.
- (11) General knowledge of the working of workshop. Movement of a job from shop to shop and its accounting etc including mobile workshop van .
- (12) Use of air for machinery - Air compressors and machines run on compressed air.
- (13) Geological survey, Geophysical instruments, Electro loggers.
- (14) Operation M&R of Hand pumps in general.
- (15) Write-off and disposal of machineries and vehicles.
- (16) Transformer and generating set. .
- (17) MS pipes, manufacturing process, specification, laying and jointing.
- (18) Corrosion, control and in devices.
- (19) Remote Sensing

PAPER – III

Special Subject: Mechanical Engineering and bore drilling technology

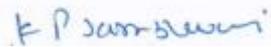
- (1) Fundamental principles of boring.
- (2) Types of boring machines and their application including various types and rigs etc.
- (3) Types of bores.
- (4) Geological Survey & Strata.
- (5) How to obtain and record the underground strata.
- (6) What are the methods test the yield of bore.
- (7) How to test the vertical of the bore.
- (8) How to prepare the estimate.
- (9) Selection of boring mechanics.
- (10) Developing a bore & hydra fracturing process.
- (11) Various types of pumps used in Water supply & Sewerage projects with design finalization of electrical and mechanical drawing.
- (12) Reciprocating pumps & Hand pump types and its M&R.
- (13) Borehole pumps.
- (14) Air Lift pumping.
- (15) Methods used for cleaning the bores etc.
- (16) Mass awareness in drinking water, involvements of uses in water supply.
- (17) Fishing
- (18) MIS Software
- (19) Solar & Non-Conventional Energy
- (20) Procurement of Material
- (21) SITC and O&M of Pumping Machineries

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PAPER – IV

Sub: Practical Drawing (Mechanical)

- (1) Isometric Orthographic, Elevation, Plan, Side-End views of an object of Mechanical Engineering.
- (2) Various types of bolts, nuts, rivets, threads.
- (3) Various types of joints.
- (4) Various types of gauges.
- (5) Sketches of Various parts of mechanical engineering.
- (6) WS-WMS Software (Practical Test)



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