Syllabus for the post of Assistant Director
(Civil/Mechanical/Marine/Naval Architecture)

Assistant Director examination will consist of :

TIER I (Test Mode: - Computer Based Test (CBT) (Objective Type)-125 Marks)
Interview : -Personal interview of candidates shortlisted based on Tier-I test and will consist of 25 Marks.

The CBT will be having two sections- Section (1) / Technical Questions & Section (2) / Non-technical Questions: 125 MCQ carrying 125 marks. The detailed break up is as follows: -

Section (1) / Technical Questions & Section (2) / Non-technical Questions : 125 MCQ carrying 125 marks

Test will consist of 125 Multiple Choice Question (MCQs) as per attached syllabus, one (01) mark for each question, 150 minutes' duration. Section (1) / Technical Question (100 MCQ carrying 100 Marks) will be Separate for Each stream (Civil/Mechanical/Marine/Naval Architecture). Section (2) / Non-technical Questions will also consist of objective type – Multiple Choice Questions (MCQs) only. Test will be also Computer Based Test consist of 25 Multiple Choice Question (MCQs). The questions will be set both in English & Hindi except the English Language Test. Each question will be of 01 mark. For each wrong answer 0.25 marks will be deducted. The details are as following: -

Part	Subject (Not in sequence)	No. of Questions/ Maximum Marks
Section (1)	**Technical Part**	
A	**Civil Engineering**	
I	Water and Wastewater Engineering	10/ 10
II	Surveying	10/ 10
III	Geotech	15/ 15
IV	Transportation	15/ 15
V	Structures	20/ 20
VI	Hydraulics, Hydrology, Irrigation & Hydraulic structures	30/ 30
B	**Mechanical Engineering**	
I	Engineering Mathematics	15/ 15
II	Applied Mechanics and Design	25/ 25
III	Fluid Mechanics and Thermal Sciences	30/ 30
IV	Materials, Manufacturing and Industrial Engineering	30/ 30
C	**Marine Engineering**	
I	Introduction to marine machinery	20/ 20
II	Turbines, pumps, their types and characteristics, cavitation etc	20/ 20
III	Marine boilers, Composite boilers	15/ 15
IV	Auxiliary machineries	25/ 25
V	Firefighting, Navigational aids, Steering gear, shafting, stern tubes and transmission system	20/ 20
D	**Naval Architecture**	
I	Basics of ship, submarine and floating systems	15/ 15
II	Hydrostatic stability of ships and submarines	15/ 15

III	Ship resistance	10/ 10
IV	Propulsion of marine vehicles	10/ 10
V	Dynamics of ships in waves	10/ 10
VI	Manoeuvring of ships and submarines	10/ 10
VII	Static structural analysis of a ship subject to weight and buoyancy forces	15/ 15
VIII	Design aspects of a ship	15/ 15
Section (2)	**Non-Technical Part**	
I	Quantitative aptitude (simple maths)	25/25
II	MS Office (Word, Excel and PowerPoint)	
III	Analytical and Logical reasoning	
IV	Simple English	
V	General Knowledge	

Note-I: Merit list will be prepared based on total marks of the candidate in the Test conducted under TIER-I & Interview.

Note-II: In the preparation of the final merit list, the following shall be considered in the case of two (02) or more candidates having equal marks:

(i) Candidate who has secured higher marks in TIER-I of Examination shall be placed higher in the merit list.

(ii) In case, marks in TIER-I of Examination are the same, Candidate who has secured higher marks in CBT/Section-1 Examination of TIER-I shall be placed higher in the merit list.

(iii) In case, marks in CBT/Section-1 Examination of TIER-I and combined marks of Section-1 and Section-2 of more than one (01) candidate is the same, the candidate with higher qualifications will be placed higher in the merit list.

(iv) In case, marks in CBT Section-1 Examination of TIER-I and combined marks of Section-1 and Section-2 and qualification of more than one (01) candidate is the same, the candidate who is elder as per date of birth shall be placed higher in the merit list.

Note-III: Total No. of Marks:

TIER-I	-Section-1 (100 marks) + Section-2 (25 marks) = 125 marks
Personal Interview	= 25 marks
TOTAL	-150 marks

ASSISTANT DIRECTOR
(Civil/Mechanical/Marine/Naval Architecture)

Client Name: IWAI	IRD No. <to be filled by content team>
Initiated By	<……>
Test Date	<Scheduled Test Date>

POC	
Email Id	
Phone/ Mobile No.	<+91 -

Test Duration	For TIER-I: 2 hours 30 minutes
Total Questions	For TIER-I: 125
Total Marks	125 Marks (TIER I) + Personal Interview (25 Marks) = 150 Marks

ADDITIONAL DETAILS

No. of Options	4	<Specify if different> N/A
Negative Marking	Yes	
No. of Languages	02	
Specify Languages	<English/ Hindi> Bilingual	
Section Tabs to be displayed (Default value is 'Yes')	<Yes>	
Question Shuffling (Default value is 'Within Section')	Within Section	
Option Shuffling (Default value is 'Yes')	<Yes>	

QP DIFFICULTY LEVEL

Item Difficulty Level		
Easy	**Medium**	**Difficult**
25%	50%	25%

RECRUITMENT RULES OF ASSISTANT DIRCTOR

Essential Qualification	**Essential:** (i) Degree in Civil/Mechanical/ Marine Engineering/ Naval Architecture from a recognized University/ Institute. **Desirable:** (i) Experience in work connected with Inland waterway, Dredging, river conservancy work, river training, marking of fairway, etc
Age Limit	Not exceeding 35 years.

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Syllabus for the post of Assistant Hydrographic Surveyor

Assistant Hydrographic Surveyor examination will consist of :

TIER I (Test Mode: - Computer Based Test (CBT) (Objective Type)-125 Marks)
Interview : -Personal interview of candidates shortlisted based on Tier-I test and will consist of 25 Marks.

The CBT will be having two sections- Section (1) / Technical Questions & Section (2) / Non-technical Questions: 125 MCQ carrying 125 marks. The detailed break up is as follows: -

Section (1) / Technical Questions & Section (2) / Non-technical Questions : 125 MCQ carrying 125 marks

Test will consist of 125 Multiple Choice Question (MCQs) as per attached syllabus, one (01) mark for each question, 150 minutes' duration. Section (1) / Technical Question (100 MCQ carrying 100 Marks). Section (2) / Non-technical Questions will also consist of objective type – Multiple Choice Questions (MCQs) only. Test will be also Computer Based Test consist of 25 Multiple Choice Question (MCQs). The questions will be set both in English & Hindi except the English Language Test. Each question will be of 01 mark. For each wrong answer 0.25 marks will be deducted. The details are as following: -

Part	Subject (Not in sequence)	No. of Questions/ Maximum Marks
Section (1)	**Technical Part**	
I	Water Engineering	15/ 15
II	Surveying	30/ 30
III	Geotech	15/ 15
IV	Transportation	10/ 10
V	Hydraulics, Hydrology, Irrigation & Hydraulic structures	30/ 30
Section (2)	**Non-Technical Part**	
I	Quantitative aptitude (simple maths)	25/25
II	MS Office (Word, Excel and PowerPoint)	
III	Analytical and Logical reasoning	
IV	Simple English	
V	General Knowledge	

Note-I: Merit list will be prepared based on total marks of the candidate in the Test conducted under TIER-I & Interview.

Note-II: In the preparation of the final merit list, the following shall be considered in the case of two (02) or more candidates having equal marks:

(i) Candidate who has secured higher marks in TIER-I of Examination shall be placed higher in the merit list.

(ii) In case, marks in TIER-I of Examination are the same, Candidate who has secured higher marks in CBT/Section-1 Examination of TIER-I shall be placed higher in the merit list.

(iii) In case, marks in CBT/Section-1 Examination of TIER-I and combined marks of Section-1 and Section-2 of more than one (01) candidate is the same, the candidate with higher qualifications will be placed higher in the merit list.

(iv) In case, marks in CBT Section-1 Examination of TIER-I and combined marks of Section-1 and Section-2 and qualification of more than one (01) candidate is the same, the candidate who is elder as per date of birth shall be placed higher in the merit list.

Note-III: Total No. of Marks:

TIER-I	-Section-1 (100 marks) + Section-2 (25 marks) = 125 marks
Personal Interview	= 25 marks
TOTAL	-150 marks

ASSISTANT HYDROGRAPHIC SURVEYOR

Client Name: IWAI	IRD No. <to be filled by content team>
Initiated By	<……>
Test Date	<Scheduled Test Date>

POC	
Email Id	
Phone/ Mobile No.	<+91 -

Test Duration	For TIER-I: 2 hours 30 minutes
Total Questions	For TIER-I: 125
Total Marks	125 Marks (TIER I) + Personal Interview (25 Marks) = 150 Marks

ADDITIONAL DETAILS

No. of Options	4	<Specify if different> N/A
Negative Marking	Yes	
No. of Languages	02	
Specify Languages	<English/ Hindi> Bilingual	
Section Tabs to be displayed (Default value is 'Yes')	<Yes>	
Question Shuffling (Default value is 'Within Section')	Within Section	
Option Shuffling (Default value is 'Yes')	<Yes>	

QP DIFFICULTY LEVEL

Item Difficulty Level		
Easy	**Medium**	**Difficult**
25%	50%	25%

RECRUITMENT RULES OF ASSISTANT HYDROGRAPHIC SURVEYOR

Essential Qualification	**Essential:** (i) Degree in Civil Engineering; or equivalent with 3 years' experience in Hydrographic Survey. OR (ii) Survey Recorder-I of the Indian Navy with 10 years' experience in survey and navigation. **Desirable:** (i) Knowledge of Geographical Information System Software and computer operation. (ii) Knowledge of Nautical Cartography
Age Limit	Not exceeding 35 years.

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Syllabus of Computer Based Test (C.B.T) for Assistant Director of IWAI: (Civil/Mechanical/Marine/Naval Architecture)

Section (1) / Technical Questions: 100 MCQ carrying 100 marks

CE: Civil Engineering

Water and Wastewater Engineering

Water and wastewater quality parameters- physical, chemical, bacteriological; sourcing of water surface and groundwater, types of intakes and wells; water treatment- settling, coagulation flocculation, sedimentation, filtration, hardness removal, disinfection, etc.; water supply engineering- population and forecasting of water demands, reservoirs, networks, its components, etc.; Wastewater collection and conveyance including storm water, sewerage and related components, wastewater treatment - screen, grit chamber, sedimentation, biological treatment process- suspended growth process such as activated sludge process, attached growth process including trickling filter, pond-based treatment process, sludge digestion and dewatering processes, low-cost and onsite sanitation processes

Surveying

Basic principles and Importance of surveying to engineering projects. Type of maps, scales and uses, plotting accuracy, map sheet numbering, coordinate and map projection. Surveying equipment, levels, compass, theodolites, tachometer, EDM, total Stations and other instruments. Measurement of angles, directions and distances. Determination of elevation, spirit leveling, trigonometrical levelling, and tachometric surveying, contouring. Plane table surveys and mapping. Methods of control establishment, traversing, triangulation, adjustment of survey measurements, computation of coordinates.

Geotech

Physical properties of soils: three phase relationships, GSD, Classification; Compaction: clay mineral, compaction tests, field compaction; Capillarity, permeability and seepage: Determination of permeability (laboratory and field tests), permeability in stratified soils, flow nets, confined and unconfined flows, piping; Compressibility and consolidation: concepts related to 1-D consolidation, coefficient of consolidation, 3-D consolidation, vertical sand drains; Shear strength of soils: Principle of effective stress, Mohr-Coulomb failure criterion, direct shear test, unconfined compression test, Triaxial shear test : consolidated drained, consolidated undrained, unconsolidated undrained, vane shear test, shear strength of clays and sands, critical void ratio, stress path, pore-pressure coefficient; Soil exploration; Earth pressure and retaining walls (Rankine and Coulomb's earth pressure theories); Shallow foundations: bearing capacity and settlement, Stresses below foundations; Sheeting and bracing of foundation excavation; Pile foundations: load carrying capacity of individual and group of piles, settlement; Well foundations: methods of construction, tilt and shift, bearing capacity and settlement, lateral stability of well foundation; Stability analysis of slopes: infinite slopes, method of slices and Bishop's simplified method

Transportation

Road and Highway Planning in India; Alignment fixing and surveys; Geometric design of roads and highways - factors affecting, cross-sectional elements, sight distances, horizontal alignment design, vertical alignment design, pedestrian and bicycle facility; Access control; Traffic Engineering - Traffic flow characteristics and their relationships, traffic volume studies, speed studies, delay and travel time studies, parking studies and accident studies and analysis; Traffic control devices - Signs, Markings, Signals, specifications and design process, channelization, types of intersections, types of manoeuvres; Capacity of roads - urban roads and rural highways; Road Materials - Soil, Aggregates and bitumen, tests and specifications; Pavements - Flexible and rigid pavements, design factors and concept, IRC design procedure for flexible and rigid pavements.

Structures

Strength of Material: Analysis of stress and strains, Axially loaded members, Mechanical properties, Stress transformation, Members subjected to torsional loads, Members subjected to flexural loads, Bending moment and shear force in beams, Bending stress and shear stresses in beams, Deflection in beams, Moment area method, Buckling of column, Unsymmetrical bending and shear center.

Design of Concrete elements: Concrete technology, Concepts of working stress and limit state design, Design of beams in flexure, Design for torsion, Design of slabs, Design of compression members, Design of footing, prestressed concrete

Structural Analysis: Degree of indeterminacy, Analysis of statically determinate and indeterminate members, Analysis of three and two hinged arch, Moment distribution method, Slope deflection method, Theorem of three moments, Flexibility method, Matrix displacement method, Moving load analysis, Castigliano's theorem, Conjugate beam method, Unit load method, Plastic analysis.

Design of steel elements: Concepts of limit state design, Bolted connection (ordinary and High strength friction grip), Bracket connection, Design of tension member, Design of compression member, Built of column, Colum base, Design of beams (Laterally supported and unsupported), Design of purlin, Gantry girder, Plate girder.

Building materials and construction: Bricks, Cement, Mortar, Steel

Hydraulics

Fluid Mechanics: Properties of fluids, fluid statics; Continuity, momentum, energy and corresponding equations; Potential flow, applications of momentum and energy

equations; Laminar and turbulent flow; Flow in pipes, pipe networks; Concept of boundary layer and its growth.

Hydraulics: Forces on immersed bodies; Flow measurement in channels and pipes; Dimensional analysis and hydraulic similitude; Kinematics of flow, velocity triangles; Basics of hydraulic machines, specific speed of pumps and turbines; Channel Hydraulics -Energy-depth relationships, specific energy, critical flow, slope profile, hydraulic jump, uniform flow and gradually varied flow

Hydrology: Hydrologic cycle, precipitation, evaporation, evapo-transpiration, watershed, infiltration, unit hydrographs, hydrograph analysis, flood estimation and routing, reservoir capacity, reservoir and channel routing, surface run-off models, ground water hydrology - steady state well hydraulics and aquifers; Application of Darcy's law.

Irrigation & Hydraulic structures: Duty, delta, estimation of evapo-transpiration; Crop water requirements; Design of lined and unlined canals, head works, Design of weirs/barrage on permeable foundation; Types of irrigation systems, irrigation methods; Water logging and drainage; Canal regulatory works, cross-drainage structures, outlets and escapes, gravity and embankment dams, spillways.

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ME - MECHANICAL ENGINEERING

1. Engineering Mathematics

Linear Algebra: Matrix algebra, systems of linear equations, eigenvalues and eigenvectors.

Calculus: Functions of single variable, limit, continuity and differentiability, mean value theorems, indeterminate forms; evaluation of definite and improper integrals; double and triple integrals; partial derivatives, total derivative, Taylor series (in one and two variables), maxima and minima, Fourier series; gradient, divergence and curl, vector identities, directional derivatives, line, surface and volume integrals, applications of Gauss, Stokes and Green's theorems.

Differential equations: First order equations (linear and nonlinear); higher order linear differential equations with constant coefficients; Euler-Cauchy equation; initial and boundary value problems; Laplace transforms; solutions of heat, wave and Laplace's equations.

Complex variables: Analytic functions; Cauchy-Riemann equations; Cauchy's integral theorem and integral formula; Taylor and Laurent series.

Probability and Statistics: Definitions of probability, sampling theorems, conditional probability; mean, median, mode and standard deviation; random variables, binomial, Poisson and normal distributions.

Numerical Methods: Numerical solutions of linear and non-linear algebraic equations; integration by trapezoidal and Simpson's rules; single and multi-step methods for differential equations.

2. Applied Mechanics and Design

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

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

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

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

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

3. Fluid Mechanics and Thermal Sciences

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

Heat-Transfer: Modes of heat transfer; one dimensional heat conduction, resistance concept and electrical analogy, heat transfer through fins; unsteady heat conduction, lumped parameter system, Heisler's charts; thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, heat transfer correlations for flow over flat plates and through pipes, effect of turbulence; heat exchanger performance, LMTD and NTU methods; radiative heat transfer, Stefan Boltzmann law, Wien's displacement law, black and grey surfaces, view factors, radiation network analysis.

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

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

4. Materials, Manufacturing and Industrial Engineering

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

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.

MARINE ENGINEERING

Introduction to marine machinery -Types of marine power systems-Engine room layout -Marine diesel engines and their cycles, Fuels Super charging, Ignition and combustion problems-Fuel oil, lubricating oil-Compressed air cooling water systems.

Turbines, pumps, their types and characteristics, cavitation etc.

Marine boilers, Composite boilers-Exhaust gas and heat exchangers-Economizers, Super heaters.

Auxiliary machineries-Choice of power systems for ships.

Firefighting, Navigational aids, Steering gear, shafting, stern tubes and transmission system.

NAVAL ARCHITECTURE

(i) Basics of ship, submarine and floating systems
(ii) Hydrostatic stability of ships and submarines
(iii) Ship resistance
(iv) Propulsion of marine vehicles
(v) Dynamics of ships in waves
(vi) Manoeuvring of ships and submarines
(vii) Static structural analysis of a ship subject to weight and buoyancy forces.
(viii) Design aspects of a ship

Section (2) / Non-Technical Part (25 MCQ carrying 25 marks)

The topics for 25 marks will be on the following:

1. Quantitative aptitude (simple maths)
2. MS Office (Word, Excel and PowerPoint)
3. Analytical and Logical reasoning
4. Simple English
5. General Knowledge

Syllabus of Computer Based Test (C.B.T) for Assistant Hydrographic Surveyor of IWAI:

Section (1) / Technical Questions: 100 MCQ carrying 100 marks

Water Engineering

Sourcing of water- surface and groundwater, types of intakes and wells; sedimentation, etc.; water supply engineering- population and forecasting of water demands, reservoirs, networks, its components, Velocity, discharge, etc.

Surveying

Basic principles and Importance of surveying to engineering projects. Type of maps, scales and uses, plotting accuracy, map sheet numbering, coordinate and map projection. Surveying equipment, levels, compass, theodolites, tachometer, EDM, total Stations and other instruments like GPS, Echosounder etc. Measurement of angles, directions, distances and water depths. Determination of elevation, spirit levelling, trigonometrical levelling, and tachometric surveying, contouring. Plane table surveys and mapping. Methods of control establishment, traversing, triangulation, adjustment of survey measurements, computation of coordinates.

Geotech

Physical properties of soils: Classification; Compaction: clay mineral, compaction tests, Compressibility, vertical sand drains; Shear strength of soils: Principle of effective stress, Mohr-Coulomb failure criterion, direct shear test, unconfined compression test, Soil exploration; Earth pressure and retaining walls (Rankine and Coulomb's earth pressure theories); Shallow foundations: bearing capacity and settlement, Stresses below foundations; Sheeting and bracing of foundation excavation; Pile foundations: load carrying capacity of individual and group of piles, settlement; Well foundations: methods of construction, tilt and shift, bearing capacity and settlement, lateral stability of well foundation; Stability analysis of slopes: infinite slopes, method of slices and Bishop's simplified method.

Transportation

Road and Highway Planning in India; Alignment fixing and surveys; Geometric design - factors affecting, cross-sectional elements, sight distances, horizontal alignment design, vertical alignment design; Access control; Traffic flow characteristics and their relationships, traffic volume studies, speed studies, delay and travel time studies, parking studies and accident studies and analysis; Capacity of roads - urban roads and rural highways.

Hydraulics

Hydraulics: Forces on immersed bodies; Flow measurement in channels and pipes;

Dimensional analysis and hydraulic similitude; Kinematics of flow, velocity triangles; Channel Hydraulics - Energy depth relationships, specific energy, critical flow, slope profile, hydraulic jump, uniform flow and gradually varied flow.

Hydrology: Hydrologic cycle, watershed, infiltration, unit hydrographs, hydrograph analysis, flood estimation and routing, reservoir capacity, reservoir and channel routing, surface run-off models, ground water hydrology - steady state well hydraulics and aquifers.

Irrigation & Hydraulic structures: Duty, delta, estimation of evapo-transpiration; Design of lined and unlined canals, head works, Design of weirs/barrage on permeable foundation; Types of irrigation systems, irrigation methods; Canal regulatory works, cross-drainage structures, outlets and escapes, gravity and embankment dams, spillways. River Training works: Permanent and Semi-permanent; Bank Protection.

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Section (2) / Non-Technical Part (25 MCQ carrying 25 marks)

The topics for 25 marks will be on the following:

6. Quantitative aptitude (simple maths)
7. MS Office (Word, Excel and PowerPoint)
8. Analytical and Logical reasoning
9. Simple English
10. General Knowledge

Syllabus for the post of Licence Engine Driver

Licence Engine Driver examination will consist of :

Written Test: Maximum marks: 60

In the Tier I of selection process, there shall be written tests of one hour duration for ascertaining the suitability of post;

Written test (Question Paper to set up bilingual in English and Hindi) shall carrying maximum of 60 marks and shall consist of 60 objective multiple choice questions of one mark each, having two section viz Section 1 & Section 2.

Section	Subject (Not in sequence)	No. of Questions/ Maximum Marks
1	45 question of technical / skill based in nature and some question on experience, covering the topics on the skill based relevant eligibility criteria	45/ 45
2	15 Questions from the General awareness and Arithmetic, of the standard of class-X / High Secondary school examination of CBSE	15/ 15

The Qualifying marks for Written Test for the Candidates for the above-mentioned post shall be as under:

a) For General candidates – 60 % of total marks i.e., 36 marks out 60 marks
b) For OBC candidates - 50% of total marks i.e., 30 marks out 60 marks
c) For SC/ST candidates – 35% of total marks i.e., 21 marks out 60 marks

Candidates qualifying in the Written Test shall only be allowed to appear in the Swimming Test.

Swimming Test: Qualifying & do not carry any marks. Those Candidate who are qualified in the Written Test, securing minimum qualifying marks, shall be allowed to appear in this stage of Selection process.

The Selection process shall involve the conduct of Swimming Test of the following component:
a) Swimming / any stroke- of 50 meter.
b) Floating test – of 10 minutes.
c) Jump – 03 meters
The Swimming test shall be qualifying in nature and those candidates who qualify in the Swimming test shall be allowed in the subsequent selection process viz Job Proficiency trade test.

Job Proficiency Trade test: Maximum marks: 40

Those Candidate who are qualified in the Swimming Test, shall be allowed to appear in this stage of Selection process. The performance of all candidates on the same shall be assessed by Selection Committee.

24/7/2024 (V. MURUGESAN) Director (Tech.)

#	Subject (Not in sequence)	No. of Questions/ Maximum Marks
1.	Job Proficiency Trade test	40/40

Combined performance of candidate in the written test and Trade test shall be ascertained by Selection Committee and based upon the same, merit list shall be prepared and recommended by the Committee for appointment to the post.

24/9/2024
Director (T)

Syllabus for the post of Dredge Control Operator

Dredge Control Operator examination will consist of :

Written Test: Maximum marks: 60

In the Tier I of selection process, there shall be written tests of one hour duration for ascertaining the suitability of post;

Written test (Question Paper to set up bilingual in English and Hindi) shall carrying maximum of 60 marks and shall consist of 60 objective multiple choice questions of one mark each, having two section viz Section 1 & Section 2.

Section	Subject (Not in sequence)	No. of Questions/ Maximum Marks
1	45 question of technical / skill based in nature and some question on experience, covering the topics on the skill based relevant eligibility criteria	45/ 45
2	15 Questions from the General awareness and Arithmetic, of the standard of class-X / High Secondary school examination of CBSE	15/ 15

The Qualifying marks for Written Test for the Candidates for the above-mentioned post shall be as under:

a) For General candidates – 60 % of total marks i.e., 36 marks out 60 marks
b) For OBC candidates - 50% of total marks i.e., 30 marks out 60 marks
c) For SC/ST candidates – 35% of total marks i.e., 21 marks out 60 marks

Candidates qualifying in the Written Test shall only be allowed to appear in the Swimming Test.

Swimming Test: Qualifying & do not carry any marks. Those Candidate who are qualified in the Written Test, securing minimum qualifying marks, shall be allowed to appear in this stage of Selection process.

The Selection process shall involve the conduct of Swimming Test of the following component:
a) Swimming / any stroke- of 50 meter.
b) Floating test – of 10 minutes.
c) Jump – 03 meters
The Swimming test shall be qualifying in nature and those candidates who qualify in the Swimming test shall be allowed in the subsequent selection process viz Job Proficiency trade test.

Job Proficiency Trade test: Maximum marks: 40

Those Candidate who are qualified in the Swimming Test, shall be allowed to appear in this stage of Selection process. The performance of all candidates on the same shall be assessed by Selection Committee.

24/7/24 24/7/24 DD(M) 24/7/24 Director (T) 24/7

#	Subject (Not in sequence)	No. of Questions/ Maximum Marks
1.	Job Proficiency Trade test	40/40

Combined performance of candidate in the written test and Trade test shall be ascertained by Selection Committee and based upon the same, merit list shall be prepared and recommended by the Committee for appointment to the post.

24/7/2024

Director (T)

Syllabus for the post of Master 2nd Class

Master 2nd Class examination will consist of :

Written Test: Maximum marks: 60

In the Tier I of selection process, there shall be written tests of one hour duration for ascertaining the suitability of post;

Written test (Question Paper to set up bilingual in English and Hindi) shall carrying maximum of 60 marks and shall consist of 60 objective multiple choice questions of one mark each, having two section viz Section 1 & Section 2.

Section	Subject (Not in sequence)	No. of Questions/ Maximum Marks
1	45 question of technical / skill based in nature and some question on experience, covering the topics on the skill based relevant eligibility criteria	45/ 45
2	15 Questions from the General awareness and Arithmetic, of the standard of class-X / High Secondary school examination of CBSE	15/ 15

The Qualifying marks for Written Test for the Candidates for the above-mentioned post shall be as under:

a) For General candidates – 60 % of total marks i.e., 36 marks out 60 marks
b) For OBC candidates - 50% of total marks i.e., 30 marks out 60 marks
c) For SC/ST candidates – 35% of total marks i.e., 21 marks out 60 marks

Candidates qualifying in the Written Test shall only be allowed to appear in the Swimming Test.

Swimming Test: Qualifying & do not carry any marks. Those Candidate who are qualified in the Written Test, securing minimum qualifying marks, shall be allowed to appear in this stage of Selection process.

The Selection process shall involve the conduct of Swimming Test of the following component:
a) Swimming / any stroke- of 50 meter.
b) Floating test – of 10 minutes.
c) Jump – 03 meters
The Swimming test shall be qualifying in nature and those candidates who qualify in the Swimming test shall be allowed in the subsequent selection process viz Job Proficiency trade test.

Job Proficiency Trade test: Maximum marks: 40

Those Candidate who are qualified in the Swimming Test, shall be allowed to appear in this stage of Selection process. The performance of all candidates on the same shall be assessed by Selection Committee.

24/7/2024 SO(D)

24/7/2024 DD(M)

24/7/2024 Director (T)

24/7

#	Subject (Not in sequence)	No. of Questions/ Maximum Marks
1.	Job Proficiency Trade test	40/40

Combined performance of candidate in the written test and Trade test shall be ascertained by Selection Committee and based upon the same, merit list shall be prepared and recommended by the Committee for appointment to the post.

24/7/2024
Director (T)

Syllabus for the post of Master 3rd Class

Master 3rd Class examination will consist of :

Written Test: Maximum marks: 60

In the Tier I of selection process, there shall be written tests of one hour duration for ascertaining the suitability of post;

Written test (Question Paper to set up bilingual in English and Hindi) shall carrying maximum of 60 marks and shall consist of 60 objective multiple choice questions of one mark each, having two section viz Section 1 & Section 2.

Section	Subject (Not in sequence)	No. of Questions/ Maximum Marks
1	45 question of technical / skill based in nature and some question on experience, covering the topics on the skill based relevant eligibility criteria	45/ 45
2	15 Questions from the General awareness and Arithmetic, of the standard of class-X / High Secondary school examination of CBSE	15/ 15

The Qualifying marks for Written Test for the Candidates for the above-mentioned post shall be as under:

a) For General candidates – 60 % of total marks i.e., 36 marks out 60 marks
b) For OBC candidates - 50% of total marks i.e., 30 marks out 60 marks
c) For SC/ST candidates – 35% of total marks i.e., 21 marks out 60 marks

Candidates qualifying in the Written Test shall only be allowed to appear in the Swimming Test.

Swimming Test: Qualifying & do not carry any marks. Those Candidate who are qualified in the Written Test, securing minimum qualifying marks, shall be allowed to appear in this stage of Selection process.

The Selection process shall involve the conduct of Swimming Test of the following component:
a) Swimming / any stroke- of 50 meter.
b) Floating test – of 10 minutes.
c) Jump – 03 meters
The Swimming test shall be qualifying in nature and those candidates who qualify in the Swimming test shall be allowed in the subsequent selection process viz Job Proficiency trade test.

Job Proficiency Trade test: Maximum marks: 40

Those Candidate who are qualified in the Swimming Test, shall be allowed to appear in this stage of Selection process. The performance of all candidates on the same shall be assessed by Selection Committee.

24/7/2024
Director (T)

#	Subject (Not in sequence)	No. of Questions/ Maximum Marks
1.	Job Proficiency Trade test	40/40

Combined performance of candidate in the written test and Trade test shall be ascertained by Selection Committee and based upon the same, merit list shall be prepared and recommended by the Committee for appointment to the post.

24/7/2024

(V. MURUGESAN)
Director (T)

Syllabus for Dredge Control Operator of IWAI:

Topics for Basic Dredging	
1	Dredge types, Techniques and Constraints
2	Layout of different dredger and their Equipment
3	Introduction to Pumps
4	Introduction to hydraulics
5	Dredging and different types of dredgers
6	Dredger types, techniques and constraints
7	Layout of different dredger and their Equipment
8	Pumps Performance
9	Introduction of hydraulics
10	TSHD introduction & work method
11	Backhoe introduction & work Method
12	CSD introduction & Work Method
13	Transfer / Transportation of Dredge Material
14	Calculation of Output and Dredger Safety
15	Grab Dredge introduction & work method
16	Types of Soil and Dredger Types
17	Safety of Men & Assets.
18	Pollution & Containment of pollution.
19	Documentation and record keeping & reporting.
20	Inland Vessels Act 2021 & Inland Vessels Rules 2022

Syllabus for LICENCE ENGINE DRIVER of IWAI:

ELEMENTARY MATHEMATICS:

(a) Addition, Subtraction, Multiplication, Division, Decimals and Vulgar Fraction.
(b) Power and roots of numbers, Ratio and proportion, Percentages, Direct and Inverse Variation, Averages.
(c) Areas and perimeters of a rectangle, triangle and circle, Volumes and Surface areas of box shaped bodies, cylinders pyramids, cones and spheres, Simpson's first and second rules, practical applications involving use of the above. To find out the area of water planes and displacement of boats at different droughts in sea water and fresh water by Simpson's rules as well as by using area co-efficient and prismatic coefficient. Solutions of simple equation, involving use of given formulae, rearrangement of given formulae.
(d) To calculate the T.P.I. in sea water and fresh water.
(e) Difference of droughts when boat moves from sea water to fresh water or viceversa.
(f) To find out the carrying capacity of the boat

ENGINEERING KNOWLEDGE:
SECTION-A (GENERAL)

(i) Fundamental Units, (ii) Density and specific density, (iii) Parallelogram of forces, (iv) The Triangle of Forces, (v) Moments and levers, (vi) Parallel forces, (vii) Centre of gravity, (viii) Stress and strain, (ix) Friction, (x) Work, (xi) Temperature scales, (xii) Quantity of heat and specific heats (xiii) Quantity of Electricity and Farad's Laws of Electrolysis, (xiv) Resistivity, (xv) a. Ohm's Law, b. The measurement of resistance by the Ammeter/Voltmeter Method.

SECTION-B: MARINE ENGINEERING:

(i) Principal of working construction operation and maintenance of two stroke and four stroke internal combustion engines (Supercharged and naturally aspirated) used on board ship, with particular reference to starting and reversing arrangements and safety devices.
(ii) General used and application of various materials used in machinery on board of Inland Vessels.
(iii) The construction, use and principles involved in the action of pressure gauge, thermometer, pyrometer and other measuring instruments commonly used on boards ships.
(iv) Construction, operation and maintenance of centrifugal bucket and gear type pumps.
(v) Lay-out and creation of bilge, ballast and fuel systems.
(vi) Construction, operation and maintenance of steering gears.
(vii) Lay out and working of electric light and electric power installation with particular reference to safety devices.
(viii) Construction and care of staring air vessels including mountings.
(ix) Construction and operation of refrigerating plant.
(x)Estimation and fuel, lubricating oil and water consumption for given voyage.
(xi) Work related to dry docking, including propeller, tail, shaft, rudder, sea connections, stern tube, shaft bracket.

(xii) Elements of boat construction.

(xiii) Precautions against fire and explosions due to oil vapour or gas, flash point. The danger of oil leakage precautions while bunkering.

(xiv) Explosion in crank cases and starting air systems.

(xv) Construction, operation and maintenance of firefighting appliances.

(xvi) Knowledge of statutory requirements concerning safety.

(xvii) Candidates will be expected to draw free hand sketches of machine and engine parts.

(xviii) Preparation of defect list and procedure of maintaining engine log book.

(xix) Use and maintenance of life saving appliances.

ENGINEERING DRAWING :

Use of drawing instruments, reading of blue prints, production of working drawing of machine and engine parts.

- Inland Vessels Act 2021 & Inland Vessels Rules 2022.
- Documentation, record keeping and reporting.
- Survey & Dry Dock.

Syllabus for MASTER 2ND CLASS /MASTER 3rd CLASS of IWAI:

CHAPTER 01 LEGISLATION
- The Inland Vessel Act ***2021.*** Prevention and Control of Pollution and Protection of Inland Waters
- Investigation into Causalities
- Suspension and Cancellation of Certification granted under the Act ***Inland Vessels Rules 2022.***

CHAPTER 02 THE INLAND WATERWAYS AUTHORITY OF INDIA (IWAI)
- IWAI – Responsibility and Functions
- National Waterways Act 1985

CHAPTER 03 COMPASS WORK

CHAPTER 04 STEERING INLAND VESSEL

CHAPTER 05 NAVIGATION
- National Waterways Safety of Navigation & Shipping Regulation 2002
- Marking the Waterways
- Specification of Life Saving Appliances
- Storage and Handling of Life Saving Appliances

CHAPTER 06 STORM SIGNALS TIDAL SEMAPHORE
- Storm Signal International code of Signals (Intereo)
- Flag Signaling
- Morse Signaling
- Single Letter Signals

CHAPTER 07 RIVER KNOWLEDGE

CHAPTER 08 TIDES

CHAPTER 09 LIGHTS, SOUND SIGNALS AND PREVENTION OF COLLISON STEERING AND SAILING

CHAPTER 10 PROTECTION OF AND CARRAGE OF PASSENGER INLAND VESSEL

CHAPTER 11 LIFE SAVING APPLIANCES TO BE CARRIED ON BOARD INLAND VESSELS

CHAPTER 12 INLAND VESSELS AND FIREFIGHTING EQUIPMENTS

CHAPTER 13 PASSENGER ACCOMODATION

CHAPTER 14 STABILITY

CHAPTER 15 LEADLINE

CHAPTER 16 CARGO WORK
- Loading of Iron Ore
- Loading of Coal
- Loading of Fly Ash • Loading of Cement
- Loading Over Dimension Cargo
- Loading of Petroleum Products
- Loading of Container

CHAPTER 17 EMERGENCY PROCEDURES ON GROUNDING

CHAPTER 18 BRIDGE EQUIPMENTS
- Echosounder
- Auto Pilot
- Log
- RADAR & ARPA
- GPS & DGPS
- VHF
- Anemometer

- Preparation of deck related defect list and maintenance, survey and dry dock.
- Documentation & record keeping & reporting.

SYLLABUS FOR THE POST OF STAFF CAR DRIVER

The exam will be conducted in two stages – Computer Based Examination and Skill/ Trade Test.

Stage I

Computer Based Examination will be conducted in one session. Paper will consist of objective type - Multiple Choice Questions (MCQs) only. The questions will be set both in English & Hindi. Each question will be of 01 marks. For each wrong answer 0.25 will be deducted.

Computer Based Examination (Objective Type): Total marks – 100.

Part	Subject (Not in Sequence)	No. of Questions/ Maximum Marks	Time Duration
I	General Intelligence	20/20	120 Minutes (2 Hours)
II	Elementary Mathematics	10/10	
III	General Awareness	20/20	
IV	Driving Techniques, Traffic Regulations and basic mechanical knowledge of vehicles.	50/50	

Syllabus for Computer Based Examination (Objective Type):

(i) General intelligence: Direction/distance, Blood relations, missing number, puzzles, series, non-verbal reasoning, verbal reasoning, alphabet/number series.

(iii) Elementary Mathematics: Fundamental arithmetic operations, discount/percentage, profit & loss, simple interest, time & work, LCM & HCF, time & distance, number system, ratio, average, fractions, decimals, etc.

(iii) General Awareness: Current Affairs/Events (National), Culture, Important Days, Science (Inventions & Discoveries), Abbreviations,

Geography, Awards & Honours, History(Indian), Sports & Games, Indian Constitution, Books & Authors, General Politics.

(iv) Driving Techniques, Traffic, Regulations and basic mechanical knowledge of vehicles: Question on Driving Techniques, Traffic Regulations and basic Mechanical knowledge of vehicles shall aim at testing the candidate's knowledge of driving skills and procedures, fuel efficiency and fuel economy, basic maintenance of the vehicle servicing, emergency handling techniques, tools and documents required with the vehicle, types of vehicles, traffic Rules & Regulations, ability to recognize traffic signals, traffic signs, hand signals and road markings, simple queries about the assemblies of vehicle systems, vehicle & environmental pollution, i.e., petrol and diesel vehicle, CNG operated vehicle, Noise pollution, etc

Stage II

Trade Test/ Skill Test of Qualifying nature will be conducted by IWAI or any agency authorized by IWAI.

Note:

Merit list will be prepared on the basis of overall marks obtained in Computer Based Examination.

Client Name: IWAI	**IRD No.<to be filled by content team>**
Initiated By	**<.....>**
Test Date	**<Scheduled Test Date>**
POC	**Neeraj Singh, Assistant Secretary (Admin, Estt & Vig.)**
Email ID	**nsingh@iwai.gov.in**
Phone/Mobile No.	**<0120-2474050>**

STAFF CAR DRIVER

Minimum Qualification	**Essential** **A. Should possess a valid and unendorsed driving licence, should also have good experience of driving for at least 2 years and at least an elementary knowledge of motor mechanism.** **B. Middle School Certificate.**
Test Duration	2 hours
Total Questions	100
Total Marks	100

Section Name	Marks per item	Total Marks
Reasoning Ability and Problem Solving	1 marks each question	20 marks
Numerical and Mathematical Ability	1 mark each question	10 marks
General Awareness	1 mark each question	20 marks
Driving Techniques, Traffic Regulations and basic mechanical knowledge of vehicles	1 mark each question	50 marks

Additional Details

No. of Options	**4**	**<Specify if Different> NA**
Negative Marking	**Yes**	
No. of Languages	**02**	
Specify Languages	**<English/Hindi> Bilingual**	
Section Tabs to be displayed (Default value is 'Yes')	**<Yes>**	
Question Shuffling (Default value is 'Within Section')	**Within Section**	

Ajay Kumar

Option Shuffling (Default value is 'Yes')	**<Yes>**

QP DIFFICULTY LEVEL

QP DIFFICULTY LEVEL	**Item Difficulty Level**			**Select, any One**
	Easy	**Medium**	**Difficult**	
Easy	25%	50%	25%	
Moderate	25%	50%	25%	
Difficult	25%	50%	25%	
Client Defined	**25%**	**50%**	**25%**	

SYLLABUS FOR THE POST OF STORE KEEPER

Computer based examination will be conducted in one session. Paper will consist of objective type- Multiple Choice Questions (MCQs) only. The questions will be set both in English and Hindi except the English Language test. Each question will be of 02 marks. For each wrong answer 0.50 will be deducted.

Computer Based Examination (Objective Type): Total marks - 200

Part	Subject (Not in Sequence)	No. of questions/Maximum Marks	Time Duration
I	General Intelligence & Reasoning	15/30	120 Minutes (2 Hours)
II	Quantitative Aptitude	15/30	
III	English Language	15/30	
IV	Computer Knowledge	15/30	
V	Domain Knowledge Test	40/80	

Syllabus for Computer Based Examination (Objective Type):

General Intelligence & Reasoning: It would include questions of non-verbal type. The test will include questions on similarities and differences, space visualization, problem solving, analysis, judgement, decision making, visual memory, discriminating observation, relationship concepts, figure classification, arithmetical number series, non-verbal series etc. The test will also include questions designed to test the candidate's abilities to deal with abstract ideas and symbols and their relationship, arithmetical computation and other analytical functions.

Quantitative Aptitude: This paper will include questions on problem relating to number systems, Computation of whole numbers, decimals and fractions and relationships between numbers, fundamental, arithmetical operations, percentages, ratio and proportion, averages, interest, profit and loss, discount, use of tables and graph, mensuration, time & distance, ratio & time, time & work etc.

English Language: Spot the error. Fill in the blanks, Synonyms/Homonyms, Antonyms, Spelling/Detecting mis-spelt words, idioms & phrases, one word substitution, improvement of Sentences, Active/Passive Voice of Verbs, Conversation into Direct/ Indirect narration, shuffling of sentence parts, Shuffling of sentences in a passage, Cloze passage, Comprehension passage.

Computer knowledge: Candidates' understanding of the Basics of Computer knowledge, its parts, functions, emails, MS office, etc.

Domain Knowledge Test:

Introduction to Materials Management: Objective and Advantages of Materials Management. Supply Chain Management: Concept, objectives of supply – production and distribution system. Material Management linkage: Linkages with other functional areas of Management i.e. Production, Accounting and Finance, marketing, HRM, IT, TQM. Storekeeping: Objectives and functions of storekeeping. Receipt of Materials: Receipt procedure, inspection and testing of materials, Rejection and Returns of

materials. Issues of Materials: issue procedure and documents used, store records like pan card and store ledger.

Pricing of material issues: Different methods like FIFO, LIFO, Simple average, weighted average, standard price, Replacement/ market price etc. Material loses: Meaning, accounting treatment and control different type of material losses (waste, scrap, spoilage, defectives, obsolescence etc.). Store Handling Equipment: Advantages of using stores handling equipment, Types of handling equipment, manual and mechanical devices.

Purchase Procedure: Pre-purchase considerations, standard purchase procedure, post-purchase issues. Special Purchase Systems, Forward Purchase, Tender Purchase, Blanket order, Zero Stock, Rate contract etc. Public Buying: Gem, GFR Online Purchasing: Concept, advantages, procedure of online purchasing and current online purchase practices.

Business Correspondence: Letter Writing, presentation, inviting quotations, sending quotations, placing orders, inviting tenders, Sales letters, claim & adjustment letters and social correspondence, memorandum, inter-office Memo, Notices, Agenda, Minutes, Job application letter, preparing the Resume.

Logistic Planning: Major Aspects and Factors, Transportation. A Brief Study of different modes of transport used for movement of materials, their relative advantages, disadvantages and suitability. Road Transport: Consignment Note. Rail transport Consignment Note. Air Transport: Air Waybill, Contract of Affreightment. Warehousing: Concept of Warehousing (Warehouse, Depositor and Warehouseman), Elements and Functions of Warehousing, Types of Warehousing, Costs Associated with Warehousing

Quality Management Concepts: ISO Certification. Methods of Control: Product, Process, Risk, Evaluation, Management Approaches, Quality management Support System. R Chart, P Chart and X Charts: Acceptance Sampling & OC Curve in Production Control Enabling Concepts in Supply: ERP Systems, Negotiation and Bidding. Information sharing.

Computers in Material Management: Use of Computers in Material Planning. Purchase, Store, Issue and Inventory Control Integrated Information System for Material Management.

Note 1: Visually handicapped candidates with 40% disability and above will be allowed extra 20 minutes.

Note 2: Merit list will be prepared on the basis of overall marks obtained in Computer Based Examination.

Client Name: IWAI	**IRD No.<to be filled by content team>**
Initiated By	**<.....>**
Test Date	**<Scheduled Test Date>**
POC	**Neeraj Singh, Assistant Secretary (Admin, Estt & Vig.)**
Email ID	**nsingh@iwai.gov.in**
Phone/Mobile No.	**<0120-2474050>**

STORE KEEPER

Minimum Qualification	**Essential** **Matriculate or Equivalent with 05 years' experience in store, handling, spares/equipments etc.** **Desirable** **1. Degree of Recognized University or its Equivalent** **2. Knowledge Accountancy Work, book keeping and type writing.**
Test Duration	2 hours
Total Questions	100
Total Marks	200

Section Name	Marks per item	Total Marks
General Intelligence & Reasoning	2 marks each question	30 marks
Quantitative Aptitude	2 marks each question	30 marks
English Language	2 marks each question	30 marks
Computer Knowledge	2 marks each question	30 marks
Domain Knowledge Test	2 marks each question	80 marks

Ajay Kumar

ADDITIONAL DETAILS

No. of Options	**4**	**<Specify if Different> NA**
Negative Marking	**Yes**	
No. of Languages	**02**	
Specify Languages	**<English/Hindi> Bilingual**	
Section Tabs to be displayed (Default value is 'Yes')	**<Yes>**	
Question Shuffling (Default value is 'Within Section')	**Within Section**	
Option Shuffling (Default value is 'Yes')	**<Yes>**	

QP DIFFICULTY LEVEL

QP Difficulty	**Item Difficulty Level**			**Select, any One**
	Easy	**Medium**	**Difficult**	
Easy	25%	50%	25%	
Moderate	25%	50%	25%	
Difficult	25%	50%	25%	
Client Defined	**25%**	**50%**	**25%**	

SYLLABUS FOR THE POST OF MTS

Computer Based Examination will be conducted in one session.

Paper will consist of objective type-Multiple Choice Questions (MCQs) only. The questions will be set both in English & Hindi except the English Language test. Each question will be of 02 marks. For each wrong answer 0.50 will be deducted.

Computer Based Examination (Objective Type):

Part	Subject (Not in Sequence)	No. of Questions/ Maximum Marks	Time Duration (For all Four Parts)
I	English Language and Comprehension	25/50	120 Minutes (2 Hours)
II	Reasoning Ability and Problem Solving	25/50	
III	Numerical and Mathematical Ability	25/50	
IV	General Awareness	25/50	

Note-1

Visually handicapped candidates with 40% disability and above will be allowed extra 20 minutes.

Note-2

Merit list will be prepared on the basis of the performance of the candidates.

Syllabus:

English Language and Comprehension: Candidates' understanding of the basics of English Language, its vocabulary, grammar, sentence structure, synonyms, antonyms and its correct usage, etc. and to test comprehension, a simple paragraph may be given and question based on the paragraph to be asked.

Reasoning ability and Problem Solving: The questions in this part intend to measure the candidates' general learning ability. The questions will be broadly based on Alph-Numeric Series, Coding and Decoding, Analogy, Following Directions, Similarities and Differences, Jumbling, Problem solving and Analysis, Nonverbal Reasoning based on diagrams, age Calculations, Calendar and Clock, etc.

Numerical and Mathematical Ability: It will include questions on problems relating to Integers and Whole Numbers, LCM and HCF, Decimals and Fractions, Relationship between numbers, Fundamental Arithmetic Operations and BODMAS, Percentage, Ratio and Proportions, Work and Time, Direct and Inverse Proportions, Averages, Simple Interest, Profit and Loss, Discount, Area and Perimeter of Basic Geometric Figures, Distance and Time, Lines and Angles, Interpretation of Simple Graphs and Data, Square and Square Roots etc.

General Awareness: The broad coverage of the test will be on Social Studies (History, Geography, Art and Culture, Civics, Economics). General Science and Environmental studies up to 10th Standard.

Ajay Kumar

Client Name: IWAI	**IRD No.<to be filled by content team>**
Initiated by	**<.....>**
Test Date	**<.....>**

POC	**Neeraj Singh, Assistant Secretary (Admn, Estt & Vig.)**
Email Id	**nsingh@iwai.gov.in**
Phone/Mobile No.	**<0120-2474050>**

MULTI TASKING STAFF (MTS)

Minimum Qualification	Matriculation or Equivalent pass from recognized board (10^{th})
Test Duration	2 hours
Total Questions	100
Total Marks	200

Sections	**Section Name**	**Marks per item**	**Total Marks**
	English Language and Comprehension	02 Marks each question	50 Marks
	Reasoning ability and Problem Solving	02 Marks each question	50 Marks
	Numerical and Mathematical Ability	02 Marks each question	50 Marks
	General Awareness	02 Marks each question	50 Marks

ADDITIONAL DETAILS

No. of Options	**4**	**<Specify if Different> NA**
Negative marking	**Yes**	
No. of Languages	**02**	
Specify Languages	**<English/Hindi> Bilingual**	
Section Tabs to be displayed (Default value is 'Yes')	**<Yes>**	
Question Shuffling (Default value is 'Within Section')	**Within Section**	
Option Shuffling (Default value is 'Yes')	**<Yes>**	

QP DIFFICULTY LEVEL

QP Difficulty	Item Difficulty Level			Select, any One
	Easy	**Medium**	**Difficult**	
Easy	25%	50%	25%	
Moderate	25%	50%	25%	
Difficult	25%	50%	25%	
Client Defined	**25%**	**50%**	**25%**	

SYLLABUS FOR THE POST OF JUNIOR ACCOUNTS OFFICER

Computer Based Examination will be conducted in one session. Paper will consist of objective type – Multiple Choice Questions (MCQs) only. The questions will be set both in English & Hindi except the English Language test. Each question will be of 02 marks. For each wrong answer 0.50 will be deducted.

Computer Based Examination (Objective Type): Total marks – 200.

Part	Subject (Not in Sequence)	No. of Questions/ Maximum Marks	Time Duration
I	English language and Comprehension	15/30	180 Minutes (3 Hours)
II	Reasoning ability and Problem Solving	15/30	
III	Numerical and Mathematical Ability	15/30	
IV	General Awareness	15/30	
V	Domain Knowledge Test	60/120	

Syllabus for Computer Based Examination (Objective Type):

I. <u>English Language and Comprehension</u>: Candidates' understanding of the basics of English Language, its vocabulary, grammar, sentence structure, synonyms, antonyms and its correct usage, etc. and to test comprehension, a simple paragraph may be given and question based on the paragraph to be asked.

II. <u>Reasoning ability and Problem Solving</u>: The questions in this part intend to measure the candidates' general learning ability. The questions will be broadly based on Alph-Numeric Series, Coding and Decoding, Analogy, Following Directions, Similarities and Differences, Jumbling, Problem solving and Analysis, Nonverbal Reasoning based on diagrams, age Calculations, Calendar and Clock, etc.

III. <u>Numerical and Mathematical Ability</u>: It will include questions on problems relating to Integers and Whole Numbers, LCM and HCF, Decimals and Fractions, Fundamental Arithmetic Operations and BODMAS, Percentage, Ratio and Proportions, Work and Time, Direct and Invers Proportions, Averages, Simple Interest, Profit and Loss, Discount, Area and Perimeter of Basic Geometric Figures, Distance and Time, Lines and Angles, Interpretation of Simple Graphs and Data, Square and Square Roots etc.

IV. <u>General Awareness</u>: The broad coverage of the test will be on Social Studies (History, Geography, Art and Culture, Civics, Economics). General Science and Environmental studies up to 10th Standard.

V. <u>Domain Knowledge Test</u>

(a) Accounting Standards (1 to 5,10,15,16,26,28), Capital & Revenue, Receipt & Payments, Income & Expenditure Accounts, Depreciation, Reserve & Provisions, Double Accounts System, Bank Reconciliation Statement, Balance-Sheet formats &

classification. Financial Management, Ratio Analysis, Cost Volume Profit analysis, Funds Flow management, General Financial Rules, Tally Software Shortcuts etc.

(b) Audit & Taxation: Techniques of auditing, Audit process, valuation of internal controls; Goods and Services tax, Input Tax Credit, Place of supply, Time of Supply, TDS/TCS, Reverse Charge Mechanism, Exemption under GST, Basic concepts of income tax, Income under the salary head, Exemption under Income tax, assessment year, previous year, scope of total income, residence and tax liability, income which does not form part of total income, computation of tax, Tax Returns etc.

Note-1

Visually handicapped candidates with 40% disability and above will be allowed extra 20 minutes.

Note-2

Merit list will be prepared on the basis of the performance of the candidates in Computer Based Examination.

Client Name: IWAI	**IRD No.<to be filled by content team>**
Initiated By	**<.....>**
Test Date	**<Scheduled Test Date>**

POC	**Neeraj Singh, Assistant Secretary (Admin,Estt & Vig.)**
Email ID	**nsingh@iwai.gov.in**
Phone/Mobile No.	**<0120-2474050>**

JUNIOR ACCOUNTS OFFICER

Minimum Qualification	**Essential** **A Commerce Graduate with at least 3 years' experience in audit and accounts in Central/ StateGovt/PSU/Autonomous/Statutory Organizations/Other Reputed Organization or Degree from recognized University with Inter CA/Inter ICWA**
Test Duration	3 hours
Total Questions	120
Total Marks	240 marks

Section Name	Marks per item	Total Marks
English and Comprehension	2 marks each question	30 marks
Reasoning Ability and Problem Solving	2 marks each question	30 marks
Numerical and Mathematical Ability	2 marks each question	30 marks
General Awareness	2 marks each question	30 marks
Domain Knowledge Test	2 marks each question	120 marks

ADDITIONAL DETAILS

No. of Options	**4**	**<Specify if Different> NA**
Negative Marking	**Yes**	
No. of Languages	**02**	
Specify Languages	**<English/Hindi> Bilingual**	
Section Tabs to be displayed (Default value is 'Yes')	**<Yes>**	
Question Shuffling (Default value is 'Within Section')	**Within Section**	
Option Shuffling (Default value is 'Yes')	**<Yes>**	

QP DIFFICULTY LEVEL

QP Difficulty	**Item Difficulty Level**			**Select, any One**
	Easy	**Medium**	**Difficult**	
Easy	25%	50%	25%	
Moderate	25%	50%	25%	
Difficult	25%	50%	25%	
Client Defined	**25%**	**50%**	**25%**	

Client Name: IWAI	IRD No.<to be filled by content team>

Initiated By	<.....>
Test Date	<Scheduled Test Date>

POC	A Selvakumar, Director (Admn & Vig)
Email id	aselvakumar@iwai.gov.in
Phone/Mobile no.	<+91- 9711898939

Technical Assistant	
Min. Qualification	Essential Qualification: Degree in Civil/Mechanical /Marine Engineering /Naval Architecture or equivalent OR Diploma in Civil /Mechanical /Marine Engineering /Naval Architecture from a recognised institute with 3 years' experience in an organisation for carrying out works in the relevant field . Desirable : Experience in design of Civil structure /experience in dredging Inland vessels /experience in Marine workshop/experience in design inland vessels
Test Duration	120 Minutes (2 Hours)
Total Question	< Total 120 Questions> Objective Type Multiple Choice Questions
Total Marks	< Total Marks: 120

Sections	Section name	Marks per item	Total Marks
Part-1	Quantitative Aptitude(Simple Maths)	1 mark each	4 Marks
Part 2	Data Interpretation	1 mark each	4 Marks
Part-3	Analytical Reasoning	1 mark each	4 Marks
Part-4	Logical reasoning	1 mark each	4 Marks
Part-5	Simple English	1 mark each	4 Marks
Part-6	Domain Knowledge	1 mark each	100 Marks
Total		**120**	**120 Marks**

Additional Details		
No. of Options	4	<Specify if different> N/A
Negative Marking	Yes	
No. of Languages	02	
Specify Languages	<English/Hindi> Bilingual	
Section Tabs to be displayed (Default value is 'Yes')	<Yes>	
Question Shuffling *(Default value is 'Within Section')*	Within Section	
Option Shuffling (Default value is 'Yes')	<Yes>	

QP Difficulty Level

QP Difficulty	Item Difficulty Level			Select, any one
	Easy	Medium	Difficult	
Easy	25%	50%	25%	
Moderate	25%	50%	25%	
Difficult	50%	35%	40%	
Client Defined	25%	50%	25%	✓

Syllabus: The detailed syllabus of the Exam also enclosed at Annexure-2

Name

Date

Place

Annexure-2

Scheme and Syllabus of Computer Based Test (C.B.T) for Technical Assistant Exam

The standard of the Question paper in online CBT examination shall be in consonance with that of J.E level examination of various Departments/ Organizations in the Government of India, being conducted by Staff Selection Commission.

Section (A) / Technical Questions (100 M.C.Q carrying 100 marks)

(I) CIVIL ENGINEERING

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

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

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

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

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

Irrigation Engineering: Definition, necessity, benefits, 2II effects of irrigation,

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

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

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

Structural Engineering

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

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

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

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

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II) M.E - MECHANICAL ENGINEERING

Theory of Machines and Machine Design

Concept of simple machine, Four bar linkage and link motion, Flywheels and fluctuation of energy, Power transmission by belts – V-belts and Flat belts, Clutches – Plate and Conical clutch, Gears – Type of gears, gear profile and gear ratio calculation, Governors – Principles and classification, Riveted joint, Cams, Bearings, Friction in collars and pivots.

Engineering Mechanics and Strength of Materials

Equilibrium of Forces, Law of motion, Friction, Concepts of stress and strain, Elastic limit and elastic constants, Bending moments and shear force diagram, Stress in composite bars, Torsion of circular shafts, Bucking of columns – Euler's and Rankin's theories, Thin walled pressure vessels.

Thermal Engineering

Properties of Pure Substances : p-v & P-T diagrams of pure substance like H2O, Introduction of steam table with respect to steam generation process; definition of saturation, wet & superheated status. Definition of dryness fraction of steam, degree of superheat of steam. H-s chart of steam (Mollier's Chart).

1st Law of Thermodynamics : Definition of stored energy & internal energy, 1st Law of Thermodynamics of cyclic process, Non Flow Energy Equation, Flow Energy & Definition of Enthalpy, Conditions for Steady State Steady Flow; Steady State Steady Flow Energy Equation.

2nd Law of Thermodynamics : Definition of Sink, Source Reservoir of Heat, Heat Engine, Heat Pump & Refrigerator; Thermal Efficiency of Heat Engines & co-efficient of performance of Refrigerators, Kelvin – Planck & Clausius Statements of 2nd Law of Thermodynamics, Absolute or Thermodynamic Scale of temperature, Clausius Integral, Entropy, Entropy change calculation of ideal gas processes. Carnot Cycle & Carnot Efficiency, PMM-2; definition & its impossibility.

Air standard Cycles for IC engines : Otto cycle; plot on P-V, T-S Planes; Thermal Efficiency, Diesel Cycle; Plot on P-V, T-S planes;

Thermal efficiency. IC Engine Performance, IC Engine Combustion, IC Engine Cooling & Lubrication.

Rankine cycle of steam : Simple Rankine cycle plot on P-V, T-S, h-s planes, Rankine cycle efficiency with & without pump work. Boilers; Classification; Specification; Fittings & Accessories : Fire Tube & Water Tube Boilers.

Air Compressors & their cycles; Refrigeration cycles; Principle of a Refrigeraton Plant; Nozzles & Steam Turbines Fluid Mechanics & Machinery.

Properties & Classification of Fluid : ideal & real fluids, Newton's law of viscosity, Newtonian and Non-Newtonian fluids, compressible and incompressible fluids.

Fluid Statics: Pressure at a point. Measurement of Fluid Pressure: Manometers, U-tube, Inclined tube.

Fluid Kinematics: Stream line, laminar & turbulent flow, external & internal flow, continuity equation.

Dynamics of ideal fluids : Bernoulli's equation, Total head; Velocity head; Pressure head; Application of Bernoulli's equitation.

Measurement of Flow rate Basic Principles: Venturimeter, Pilot tube, Orifice meter.

Hydraulic Turbines: Classifications, Principles.

Centrifugal Pumps: Classifications, Principles, Performance.

Production Engineering

Classification of Steels : mild steal & alloy steel, Heat treatment of steel, Welding – Arc Welding, Gas Welding, Resistance Welding, Special Welding Techniques i.e. TIG, MIG, etc. (Brazing & Soldering), Welding Defects & Testing; NDT, Foundry & Casting – methods, defects, different casting processes, Forging, Extrusion, etc, Metal cutting principles, cutting tools, Basic Principles of machining with (i) Lathe (ii) Milling (iii) Drilling (iv) Shaping (v) Grinding, Machines, tools & manufacturing processes.

III. MARINE ENGINEERING

Introduction to marine machinery -Types of marine power systems-Engine room layout -Marine diesel engines and their cycles, Fuels Super charging, Ignition and combustion problems-Fuel oil, lubricating oil-Compressed air cooling water systems. Turbines, pumps, their types and characteristics, cavitation etc.

Marine boilers, Composite boilers-Exhaust gas and heat exchangers-Economizers, Super heaters. Auxiliary machineries-Choice of power systems for ships.

Firefighting, Navigational aids, Steering gear, shafting, stern tubes and transmission system.

Refrigeration and Air Conditioning

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IV. MARINE /NAVAL ARCHITECTURE

(i) Basics of ship, submarine and floating systems
(ii) Hydrostatic stability of ships and submarines
(iii) Ship resistance
(iv) Propulsion of marine vehicles

(v) Dynamics of ships in waves

(vi) Manoeuvring of ships and submarines

(vii) Static structural analysis of a ship subject to weight and buoyancy forces. (viii) Design aspects of a ship

Section (B) / Non Technical Part. (20 MCQ carrying 20 marks)

The topics for 20 marks (common for all streams including Civil Engg.), will be on the following :

1. Quantitative aptitude (simple maths)
2. Data interpretation
3. Analytical reasoning
4. Logical reasoning
5. Simple English

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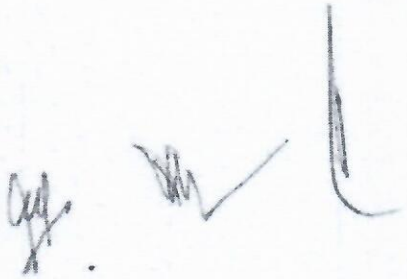

Annexure-2
(continued)

Technical Assistant Syllabus

1. Quantitative Aptitude
    a. Number System
    b. Time and Work
    c. Averages
    d. Percentages
    e. Profit and loss
    f. Ratio and Proportions
    g. Simple and Compound Interest
    h. Time and Distance
2. Data Interpretation
    a. Pie Charts
    b. Line Charts
    c. Bar Graphs
    d. Tabular Charts
    e. Mixed Graphs

3. Analytical Reasoning
    a. Analogies - Semantic Analogy
    b. Symbolic/Number Analogy
    c. Figural Analogy
    d. Similarities and differences
    e. Word building
    f. Relationship concepts
    g. Arithmetic number series - Semantic Series, Number Series
    h. Coding and decoding - Small & Capital letters/numbers coding, decoding and classification
4. Logical Reasoning
    a. Matching definitions
    b. Cause and effect
    c. Letter and Symbol series
    d. Verbal reasoning
    e. Making judgements
5. Simple English
    a. Verbal Aptitude
    b. English Comprehension