RECEIPT NO. ....DATED........../..../2019

APPLICATION FOR RECRUITMENT TO THE POST OF ....UNDER ....MUNICIPAL CORPORATION/MUNICIPAL COUNCIL /NAGAR PANCHAYAT

(APPLICATION FORM FOR FRESH CANDIDATES ONLY)

1. Full Name of the Candidate (*in Capitals*) ....

..

Paste Self Attested Passport Size Photograph

2. Date of Birth: ..../.........../..............Day(DD)/ Month (MM)/ Year (YYYY)

3. Gender: (Write '1' for Male, '2' for Female): ....

4. Marital Status: ....

5. Father's/Husband's Name:..

6. Mailing Address (in block letters) ....

..

...

Pin Code:.................Mobile: +91 - ....E-mail ID (if any): ....

7. Permanent Residential Address (in block letters)..

... Pin Code:..................................

(*Domicile certificate and Permanent Residential Certificate of Manipur should be enclosed*)

8. Nationality: ....

9. Name of the Post applied for :...(name of the post)

under.. (Name of the Municipal Corporation/Municipal Council/ Nagar Panchayat).

10. Whether Person with Disability (PWD)? : (Write '1' for Yes, '2' for No)..................................

If Yes (1), please tick (√) the relevant box (Yes)

(i) Locomotor Palsy (ii) visually impaired (iii) Hearing Impaired

11. Category (SC / ST / OBC (M)/OBC (MP)/GENERAL): ....

12. Employment exchange registration no. …….……..

13. Employment exchange sponsoring serial no. .....……

14. Details of Educational qualifications:

A) Essential Qualification

Name of the Exam passed	Division/Grade/%of Marks	Year of Passing	Name of the Board/ University

B) Desirable Qualification

Name of the Exam passed	Division/Grade/%of Marks	Year of Passing	Name of the Board/ University

15. Work Experience:

Particulars of Work Experience	Name of the Organisation/Institution	Period of Experience	Nature of employment (Temporary/Ad-dhoc /Contract/Regular)

16. No- Objection Certificate from the employer (if applicable)..... (YES/NO)

(In case of employed in any other institution)

17. Any claim for age relaxation as per rules: .....(YES/NO)

a) If Yes, reason for claiming age relaxation:.....

18. List of Documents enclosed:

Sl. No.	Details of self attested copies of documents enclosed (Tick if enclosed)	
i)	Class-X/Matriculation Certificate/Age Proof Certificate	☐
ii)	ST/SC/OBC (if applicable)	☐
iii)	PWD Certificate (if applicable)	☐
iv)	No objection Certificate (NOC) (if applicable)	☐
v)	Employment exchange registration Card	☐
vi)	Work experience certificate (if applicable)	☐
vii)	An additional Self attested Passport photo.	☐
viii)	Duly filled Admit Card with affixed photographs	☐
ix)	Domicile certificate and Permanent Residential Certificate	☐
x)	Any other certificate(s)/ Testimonials.....	

DECLARATION

I, Shri/Smt/Km.....do hereby declare that all the statements made in the application form are true and complete to the best of my knowledge and belief. I understand that legal action under section 177, 193, 197,198, 199 and 200 of Indian Penal Court and other appropriate disciplinary action can be taken against me by the appointing authority, if I am declared by them to be guilty of any type of misconduct or is representation mentioned herein.

***I have informed my Head Office/Department/Institution, in writing that I am applying for this selection Test/ Recruitment process.

Date: **Signature of candidate:**

Place: **Name:**

Address:

*** (*Strike off the last sentence in the declaration in case not relevant*)

OFFICIAL COPY

ADMISSION CARD

COMMON ELIGIBILITY TEST
(EMPLOYMENT IN URBAN LOCAL BODIES OF MANIPUR) - 2019

Paste Self Attested Passport Size Photograph

Full Name of the Candidate (*in Capitals*) ....

...

Father's/Husband's Name:...

Name of the post...

(For Official use only)
HALL TICKET NO.. CENTRE CODE ....
EXAMINATION CENTRE..

Paper	Date	Time	Duration

Signature of the Candidate **Signature of the Examination-in-Charge**

CANDIDATE'S COPY

ADMISSION CARD

COMMON ELIGIBILITY TEST
(EMPLOYMENT IN URBAN LOCAL BODIES OF MANIPUR) - 2019

Paste Self Attested Passport Size Photograph

Full Name of the Candidate (*in Capitals*) ....

...

Father's/Husband's Name:...

Name of the post...

(For Official use only)
HALL TICKET NO.. CENTRE CODE ....
EXAMINATION CENTRE..

Paper	Date	Time	Duration

Signature of the Candidate **Signature of the Examination-in-Charge**

INSTRUCTION TO THE CANDIDATES FOR FILLING UP THE APPLICATION FORMS

1) Candidates intending to apply for more than one post should apply for all types of post for the ULB concerned separately.
2) Candidates should ensure themselves that they are sponsored by the Employment exchange of their respective District.
3) In case of Caste certificates, the certificate should be valid as on the date of submission of the application form.
4) Application fee shall be Rs 600/- (six hundred) for General & OBC Categories; and Rs 400/-(Four hundred) for SC &ST categories for each type of post.
5) Only cash will be accepted on counter at the time of submission of application form.
6) In case of multiple applications for a particular post for different ULBs, the fee shall be paid once for the same post but should be applied separately.
7) Candidates applying for different post should pay fees for each post type.
8) In any case, the Examination fee shall not be refunded.
9) Non-relevant parts of the application form should be strike off while filling the application form
10) Any part of the application should not be left blank at the time of submission of the form.
11) In case of claims for age relaxation, reason for the claim should be indicated in the relevant part of the application.
12) All application forms should be submitted after getting sponsored by the concerned Employment Exchange of the District.
13) Full particulars along with 2(Two) copies of duly self attested latest passport size photograph and attested copies of certificates/testimonials as well as employment exchange registration card should be submitted along with the prescribed application form after getting sponsored by the concerned Employment Exchange of the District.
14) Duly filled in application forms should be submitted in hard copy to the

    "The Directorate of MAHUD,

    2nd Floor, PDA Complex near 2nd MR Gate,

    Imphal East-795001"
15) The last date of submission of form shall be till 4:00 PM of 12.02.2019. Submissions made afterward shall not be entertained at all.
16) Scheme of Common Eligibility test (Employment in ULBs) is available at the Directorate of MAHUD/Notice Board or may be downloaded from the website: www.manipur.gov.in.

SCHEME OF COMMON ELIGIBILITY TEST (EMPLOYMENT IN ULBs)

Assistant Engineer (Civil) - Class-I (Non-Gazetted: non-Ministerial)

Assessment	Total Mark	Remarks
Educational Qualification: a) Desirable Qualification	5 Mark	Common Paper a) General Awareness- 100 Marks b) English- 50 Marks c) Aptitude Test-50 Marks Technical paper- 150 Marks
Work Experience:	5 Marks	
Written Examination: a) Common Paper b) Technical paper	 200 Marks 150 Marks	
Viva-Voice:	40 Marks	
GRAND TOTAL:	**400 Marks**	

Section Officer Grade-I (Civil)/Section Officer Grade – I (Mechanical)
Class-II (Non Gazetted: Non-Ministerial)

Assessment	Total Mark	Remarks
Educational Qualification: a) Desirable Qualification	5 Mark	Common Paper a) General Awareness- 100 Marks b) English- 50 Marks c) Aptitude Test-50 Marks Technical paper- 150 Marks
Work Experience:	5 Marks	
Written Examination: b) Common Paper c) Technical paper	 200 Marks 150 Marks	
Viva-Voice:	40 Marks	
GRAND TOTAL:	**400 Marks**	

Revenue Officer
Class-II (Non Gazetted)

Assessment	Total Mark	Remarks
Educational Qualification: a) Desirable Qualification	5 Mark	Common Paper a) General Awareness- 100 Marks b) English- 50 Marks c) Aptitude Test-50 Marks
Work Experience:	5 Marks	
Written Examination: b) Common Paper	 200 Marks	
Viva-Voice:	40 Marks	
GRAND TOTAL:	**250 Marks**	

Revenue Inspector/Asstt. Revenue Inspector/Sanitary Inspector
Class-III (Non Gazetted: Non-Ministerial)

Assessment	Total Mark	Remarks
Educational Qualification: Desirable Qualification	5 Mark	Common Paper a) General Awareness- 100 Marks b) English- 50 Marks c) Aptitude Test-50 Marks
Work Experience:	5 Marks	
Written Examination: Common Paper	 200 Marks	
Viva-Voice:	40 Marks	
GRAND TOTAL:	**250 Marks**	

Draughtsman Grade II - Class-III (Non Gazetted: Non-Ministerial)

Assessment	Total Mark	Remarks
Educational Qualification: Desirable Qualification	5 Mark	Common Paper a) General Awareness- 100 Marks b) English- 50 Marks c) Aptitude Test-50 Marks Technical paper- 150 Marks
Work Experience:	5 Marks	
Written Examination: b) Common Paper c) Technical paper	 200 Marks 150 Marks	
Viva-Voice:	40 Marks	
GRAND TOTAL:	**400 Marks**	

Lower Divisional Clerk/ Computer Operator - Class-III (Non Gazetted: Non- Ministerial)

Assessment	Total Mark	Remarks
Educational Qualification: a) Desirable Qualification	5 Mark	Common Paper a) General Awareness - 100 Marks b) English - 50 Marks c) Aptitude Test - 50 Marks
Work Experience:	5 Marks	
Written Examination: b) Common Paper c) Essay + Précis Writing	 200 Marks 100 Marks	
Typing Test + Computer Proficiency Test	50 Marks	
Viva-Voice:	40 Marks	
GRAND TOTAL:	**400 Marks**	

Driver - Class-III (Non- Gazetted: Non-Ministerial)

Assessment	Total Mark	Remarks
Educational Qualification: a) Desirable Qualification	5 Mark	
Work Experience:	5 Marks	
Viva-Voice:	40 Marks	
Driving Test	50 Marks	
GRAND TOTAL:	**100 Marks**	

Jamadar/Chowkidaar cum Sweeper/Peon (MTS)
Class-IV (Non Gazetted: Non-Ministerial)

Assessment	Total Mark	Remarks
Educational Qualification: a) Desirable Qualification	5 Mark	
Work Experience:	5 Marks	
Viva-Voice:	40 Marks	
Practical Test	50 Marks	
GRAND TOTAL:	**100 Marks**	

WRITTEN TEST

A) Type of Questions: Questions will be of objective type for Common paper and a combination of subjective and objective type in case of Technical paper.

B) Marking principle: There won't be negative marking for wrong answers.

16th Feb 2019

Morning: 09:30 AM to 11:30 AM – Common Paper for all Class I
Evening: 13:00 PM to 3:30 PM – Common Paper for all Class II

17th Feb 2019

Morning: 09:30 AM to 11:30 AM – Common Paper for all Class III
Evening: 13:00 PM to 3:30 PM – Technical Paper for Class I (Assistant Engineer)

18th Feb 2019

Morning: 09:30 AM to 11:30 AM – Technical Paper for Class II
(Section Officer Grade-I –Civil/mechanical)
Evening: 13:00 PM to 3:30 PM – Technical Paper for Class II (Sanitary Inspector)

19th Feb 2019

Morning: 09:30 AM to 11:30 AM – Essay + Précis Writing for LDC
11:00 AM to 12 Noon – Typing Test & Computer Proficiency Test for LDC & Computer Operator

Evening: 13:30 PM to 3:30 PM – Technical Paper for Class III (Draughtsman)
And
From 13:30 PM onwards – Practical Test for Class III & IV

VIVA VOCE: From 21st February, 2019 onwards.

SYLLABUS FOR WRITTEN EXAMINATION

A) GENERAL ENGLISH

The question paper in General English will be designed to test the candidate's understanding of English and workmanlike use of words.

B) GENERAL AWARENESS:

The paper in General Awareness will include knowledge of current events and of such matters as of everyday observation and experience in their scientific aspects as may be expected of an educated person. The paper will also include questions on History and Geography of India & Manipur of a nature which candidates should be able to answer without special study.

C) GENERAL APTITUDE:

The question paper in General Aptitude will be designed to test the candidate's understanding of quantitative, verbal & non verbal reasoning.

D) TECHNICAL PAPERS:

This paper will be designed to test the candidate's knowledge of his/her particular subject

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CIVIL ENGINEERING

1. BUILDING MATERIALS

Timber : Different types and species of structural timber, density-moisture relationships, strength in different directions, defects, influence of defects on permissible stress, preservation, dry and wet rots, codal provisions for design, plywood.

Bricks: Types, Indian Standard classification, absorption, saturation factor, strength in masonry, influence of mortar strength on masonry strength.

Cement: Compositions, different types, setting times, strength.

Cement Mortar: Ingredients, proportions, water demand, mortars for plastering and masonry.

Concrete: Importance of water cement ratio, Strength, ingredients including admixtures, workability, testing for strength, elasticity, non-destructive testing, mix design methods.

2. CONSTRUCTION TECHNOLOGY AND EQUIPMENTS:

Concept of foundations, types of foundations: Brick masonry, Types of brick bonds: Doors and windows, types and uses: Damp proofing – its effect on bricks, plaster, wood fixtures; Roofs – Types: Stairs-Planning and layout, types of stairs.

Concreting Equipment:

Weight Batcher, Mixer, vibrator, batching plant, concrete pump. Cranes, hoists, lifting equipment.

Earthwork Equipment:

Power shovel, hoe, dozer, dumper, trail waves and tractor, roller, sheep foot rollers, pumps.

3. ESTIMATING

Units of measurements, method of calculating quantity of earth. Lead and lift, types of estimates: Specification of earth work in excavation, first class brick work, wood work in doors and windows, construction of cement concrete floor, white washing, and RCC work: Calculation of quantities of cement concrete work.

4. HYDRAULICS AND HYDRAULIC MACHINES

Fluid Properties, Pressure, Buoyancy, Flow Kinematics, Integration of flow equations, Flow measurement, Viscosity, Hydraulic Jump, pipe flow, losses in pipe flows, water hammer. Pumps – Centrifugal pumps, Reciprocating pumps. Hydraulics Ram, Hydraulic turbines and its types.

5. SOIL MECHANICS

Properties of soil, classification and interrelationship; Compaction, methods of compaction and their choice; Permeability and Seepage, Flow nets, Compressibility and consolidations, Shearing resistance, stresses and failure; Soil testing in laboratory and in-situ; Stress path and applications, Earth pressure theories, stress distribution in soil; soil exploration, samplers, load test, penetration test.

6. SURVEYING

Classification of surveys, Scales, Accuracy, Measurement of distances – direct and indirect method; Measurement of direction, Prismatic compass, Local Attraction, Theodolites – types, Measurement of elevation – levelling; Contours; tacheometry Surveying, plane table surveying. Definition of curves, relation between degree of curves and its radius, types of curves, elements of circular curve.

7. SOLID MECHANICS

Elastic constants, stress, plane stress, Mohr's circle of stress, strains, plane strain, Mohr's circle of strain, combined stress; Elastic theories of failure; simple bending, shear; Torsion of circular and rectangular sections and simple members.

Shear force and bending moment diagrams, Direct and bending stresses, determinate framed Structures, Deflection of beams.

8. DESIGN OF STEEL STRUCTURES

Design of riveted and welded connections, tension and compressive members.

9. DESIGN OF REINFORCED CONCRETE AND MASONRY STRUCTURES

Limit state design for bending, shear, axial compression and simple column footing. Codal provisions for slabs, beams, walls and floorings. Working stress method of design of R.C. members. Merit and Demerit of limit state and working stress method of design.

10. IRRIGATION ENGINEERING:

Hydrology, Hydrological cycle, precipitation and related data analyses, Unit hydrograph; Evaporation and transpiration; Floods and their management; Streams and their gauging; Capacity of Reservoirs.

Water resources of the globe, Multipurpose uses of Water: Soil-Plant-Water relationships, irrigation systems, water demand assessment; Storages and their yields, ground water yield and well hydraulics; Water logging; lining of canals; Sediment transport in canals, Non Overflow and overflow sections of gravity dam and their design concept, Energy dissipaters, distribution works, falls, cross drainage works, outlets; River training.

11. ENVIRONMENTAL ENGINEERING:

(A) WATER SUPPLY ENGINEERING:

Sources of water supply, yields; Estimation of demand; Water quality standards; Control of Water-borne diseases; Primary and secondary treatment, detailing and maintenance of treatment units; Conveyance and distribution systems of treated water, Leakages and control; rural water supply; Institutional and industrial water supply.

(B) WASTE WATER ENGINEERING

Urban water disposal; Systems of sewage collection and disposal; pumping; Characteristics of sewage and its treatment, Disposal of products of sewage treatment, stream flow rejuvenation, Institutional and industrial sewage management; Plumbing systems; Rural and semi-urban sanitation.

(C) SOLID WASTE MANAGEMENT

Sources, classification collection and disposal; Design and maintenance of landfills.

(D) AIR AND NOISE POLLUTION AND ECOLOGY

Sources and effects of air pollution; monitoring of air pollution; Noise pollution and standards; Ecological chain and balance, Environmental assessment.

12. TRANSPORTATION ENGINEERING

Planning of highways systems, alignment and geometric design, horizontal and vertical curves, grade separation, materials and construction methods for different surfaces and maintenance: Principles of pavement design: Drainage.

Traffic surveys, intersection, signalling, tunnelling, alignment, method of construction, drainage, lightning and ventilation.

MECHANICAL ENGINEERING

1. 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.

2. 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.

3. 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 Refrigeration Plant; Nozzles & Steam Turbines

4. 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.
5. 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.

SANITATION PAPER

Sanitary Inspector Domain Knowledge : Science of food, Nutrient, Family Assessment, Balanced Diet, nutrition Education, Water Sanitation, Air Sanitation, Noise, Refuse Disposal, Night Soil Disposal, Solid waste disposal, Construction and maintenance of sanitary latrines, maintenance of trenching ground, sewage disposal, liquid waste disposal, night soil disposal, burial of funeral ground, burial and cremation ground and mass casualty disposal, soil sanitation, control of biological environment, housing, inspection and preparation of fair and festival, industry and trade, occupational health, industrial hygiene, communicable diseases, immunity and immunization, disinfection and sterilization, non-communicable diseases, personal hygiene, first aid, health statistics, demography and health survey, public health acts, public health administration, primary care, behavioural science, health education and communication etc.

TECHNICAL PAPER (DRAUGHTSMAN)

1. Importance of B.I.S. Introduction of Code of Practice for Architectural and Building Drawings (IS: 962-1989).Layout of drawing. Lines, Lettering, Dimensioning, Scales and Projection

2. Building materials:- Rocks–.classification, types, uses, Stones –,classification, types, uses, Bricks –. Manufacturing classification, types, uses, Lime–classification, types, uses, Pozzolanic, classification, types, uses, Cement –Manufacturing, classification, types, uses, Clay Products – earthenware, stoneware,porcelain, terracotta, glazing, types, Mortar –. Preparation classification, types, uses Concrete –.Preparation classification, types, uses, Timber - Structure, defect classification, seasoning, uses. Admixtures - for cement mortar & cement concrete, classification, types, uses

3. Protective materials:- Paints, classification, types, uses, varnishes –.classification, types, uses, Metal– classification, types, uses, Plastics –.Classification ,types, uses **4. Building Construction:-** Masonry. Stone masonry Terms used -. Classification –Tools –Brick masonry – Technical terms –-bonds, type's junctions, and Hollow block construction —types, admixtures added advantages. Composite masonry: - types

5. Foundation: - Soil - bearing capacity, Foundation - objectives, Requirement, types-shallow - spread, isolated or column footing, stepped, combined, continuous, inverted arch, cantilever, grillage, & raft or mat foundation. Deep foundations- piles –Well foundations, Machine foundation-general requirements-types-Cofferdam and caisson

6. Permanent & temporary structures:-life of structures, sub structure, super structure, load bearing structure, cavity wall, framed structure,

7. Scaffolding-: Parts, types- Shoring- types. Underpinning. Purpose, types. Partition – requirements, types. Frame work

8. Treatments for building structure:- DPC-Sources and effects of dampness, method. Damp proofing materials – properties, functions, types, Anti-termite treatment objectives &uses, method. Weathering course- purpose, materials required-Fire-proofing. Effect, rules

9. Arches - Technical terms-.types ,centering

10. Lintel- types-wooden, brick, stone, steel & RCC.

11. Carpentry: joints terms, classification of joints, Uses &types of fixtures & fastenings

12. Doors –Parts, Location, standard sizes, types, Windows-types, Ventilators- purpose-types, Floors – Ground floor & upper floor-Types. Flooring- materials used, types, Stairs- Terms. Requirements. headroom, .Types-(Turning. Materials)- Planning, Lift, Escalator, Roofs & Roof coverings –Purposes -Elements-. Types:- Flat & pitched, Truss-king post, queen post, mansard, bel-fast, steel, composite. Shell-types-north-light &double curved. Dome. Components parts. Roof coverings – objectives, types & uses,

13. Building rules & bye laws:- Objectives & importance, Function & responsibility, lay out plan & key plan- composition of submission ,drawing. Provision for safety. Requirement of green belt and land

14. Computer aided drafting:- Operating system ,Hardware & software, Introduction of CAD, Its Graphical User Interface. Method of Installation. Basic commands of CAD.

15. Reinforced cement concrete structure: introduction, Bar bending, details as per IS Code. chejjas ,Beams and columns, Stairs, One-way slab & two-way slab, Innovative construction, Safety against earthquake, grade of cement , steel-behaviour &test bar-bending schedule, Retaining wall, R.C.C. Framed structure.

16. Steel structures: - Common forms of steel sections, Structural fasteners, Joints, tension & compression member-classification, fabrication Construction details

17. House drainage of building:- Introduction ,Terms used in PHE, Systems of sanitation, System of house drainage, plumbing, sanitary fittings etc, Purification of water. Types of sewer appurtenance, Systems of plumbing, Manholes & Septic tank, new technology of Plumbing, System.

18. Road:- Introduction, History of highway development. General principles of alignment. Classification and construction of different types of roads-Component parts, road curves & gradient, Curves-types, designation of

curves, setting out simple curve by successive bisection from long chords, simple curve by offsets from long chords.

19. Bridge: - Component parts. IRC loading, Selection of type and location, Factors governing the ideal site Alignment of bridge-Foundation -selection-caisson. Coffer dam- types .Types of super structure, Substructure-piers, abutments, wing walls- Classification of bridge

20. Railways :- Rail gauges, Functions, Requirements, Types, Sections, Length of rail, Welding of rail, wear of rail, Coning of wheels, hogged rail, bending of rail, creep of rail, Causes and prevention of creep. Sleeper and ballast-function-types requirement-materials-rail Fixtures, Fastenings and plate laying- rail Joints-types- fish plate-fish bolt spikes-chairs and keys-bearing plate-block-elastic, base plate Anchors and anti-creepers, Construction of permanent ways.

21. Irrigation Engineering:- Terms used in irrigation. Hydrology like duty, delta, base period, intensity of irrigation, hydrograph , peak flow, run off, catchment area, CCA, corps like, rabi, kharif etc.. Storage/ diversion head work definition: types. Reservoir –types of reservoirs, area, and capacity of reservoir, Dams, weir & barrage- types purposes Hydro electric project Canals: -, classification and distribution system, canal structures. Types of cross drainage works

22. Estimating and Costing :- Introduction, Purpose and common techniques, Construction drawing Measurement techniques, Estimate-necessity, importance, types-approximate and detailed estimate-main and sub estimates, revised, supplementary, maintenance / repair estimate taking, off quantities- method, Rate analysis and Specifications, Labour and materials, Schedule of rate, Estimating of irregular boundaries, by trapezoidal and Simpsons formulae

23. Wiring Electrical :- Safety precaution and elementary first aid. Artificial respiration and treatment of electrical shock Elementary electricity. General ideas of supply system. Wireman's tools kit. Wiring materials. Electrical fittings. System of wirings. Wiring installation for domestic lightings.

24. Surveying:- Introduction, History and principle, Objectives. and uses common terms used and definitions, classification, accuracy, types Main divisions (plane & geodetic),Chaining, bearing & meridian. Speed in field and office work, Plani meter and pantograph

25. Leveling- auto level introduction, definition, Principle of leveling, Leveling staffs, its graduation & Types, Minimum equipment required, Types, Component part and function Temporary and permanent adjustment, procedure in setting up. Level & horizontal surface. Datum Benchmark, Focussing & parallax ,Deduction of levels, types leveling, Contouring ;-Definition –-Characteristics Methods .Direct and Indirect methods, Interpolation of Contour – Contour gradient – Uses of Contour plan and Map.

26. Theodolite survey:- Introduction to Theodolite, identification & understanding of parts, Types, technical terms. Temporary and permanent adjustments, procedure in setting up, Fundamental lines and relation Method of measurement of horizontal& vertical angles ,Repetition & reiteration systems. Types of field book, adjustment of Errors while laying a given angle by repetition ,method of setting out straight lines, establishing, Latitude and departure, Consecutive co-ordinates and independent co-ordinates. Instrumental errors, their elimination, permanent adjustment, care &maintenance of Theodolite. ,Method of running a traverse, different methods of measuring angles & bearings. Method of plotting traverses- Gales, traverse system, checking of measurements of closed & open traverse, use of traverse tables, closing errors and its adjustment. Technical terms in connection with simple triangulation-base line

27. Total Station:- Introduction, components parts, accessories used, characteristics, features, advantages and disadvantages principle of EMD Working and need Setting and measurement, Electronic, display & Data reading, Rectangular and polar co- ordinate system Terminology of open and closed traverse

28. GPS:- Introduction of GPS system. Co- ordinate and time system. Satellite and conversional geodetic system. GPS. Signal, code, and biases Role of TRANSIT in GPS development. GPS segment organisation.GPS survey methods. Basic geodetic co-ordinate Ground support equipment, signals Tracking devises & system Time measurement and GPS timing Definition and application of Remote sensing, Photogrammetric, Arial photography, satellite Images, Pattern recognition and digital signal