

## Syllabus of Civil Engineering Assistant Examination and Departmental examination for Civil Engineering Assistant.

### 1. MATHEMATICS AND MECHANICS

Written test duration: 3 Hours, Total Marks:100, Minimum marks for passing:35

#### Syllabus

#### A) Mathematics:

- i. Laws of Logarithm without proof.
- ii. Use of Logarithm tables and introduction of the same with example. Use of simple calculator.
- iii. Mensuration :- Area of plane figures surfaces, volumes of prism, cones, spheres etc Area by Simpson's formula and prismoidal formula.
- iv. Geometry of triangles and circles, trigonometric ratios, simple cases of solution of right angled triangles, height and distances-trigonometrical ratios of acute angles from table, angle of elevation and depression.
- v. Graphs:- Law of the straight-line graphs.

#### (B) Mechanics

- i. Force:-Concept of force and definition, units, work and Energy-definition and units.
- ii. Centroid and Centre of Gravity of simple regular figures and solids
- iii. Simple machines like pulleys etc- Mechanical advantage etc.

#### General concepts of -

1. Stress and strain-tension, compression and shear,- Ultimate strength and safe stress. Modules of Elasticity.
2. Bending and bending moments, shear force (No diagrams), Simple frames and trusses-sketches and names.

### 2. SURVEYING (THEORY)

Written test: duration: 3 Hours, Total Marks:100, Minimum marks for passing:35

#### Syllabus

- i. Measurements of distances by chain and a tape, ranging, chaining on sloping ground.
- ii. Chain and compass survey-Use of chain tape cross staff, optical square, ranging rods, prismatic compass, entering the survey work in the field book and plotting of the survey work done, conventional symbols of roads, rails bridges, telephone line, marshy lands, cemetery battle fields, rivers, temples, quarries fence, pipe, railing orchard, lake well north direction canal, embankments, curing, villages etc.
- iii. Testing and adjusting chains, errors due to incorrect length of a chain etc.
- iv. Measurement-past obstacles, measurements on sloping ground.
- v. Borings-True and magnetic, fore and back.
- vi. Leveling- Use of leveling instruments and leveling staves, use of level books- taking and plotting of longitudinal and cross section-methods of reducing the levels, applying arithmetical checks contour surveys.
- vii. Permanent, temporary adjustments and use of dumpy and tilting levels-simple leveling, compound leveling fly leveling, with single and double checks-precautions in leveling. Permissible errors and sources of errors.
- viii. Plane tabling-use of plane table, sources of errors and limits of permissible errors.
- ix. Regarding and interpreting toposheets.
- x. Finding out areas by use of planimeter.

### 3. DRAWING AND ESTIMATING

Written test duration: 3 Hours, Total Marks:100, Minimum marks for passing:35

#### Syllabus

#### A) Drawing:

- i. Use of drawing equipment and materials scales-plain and diagonal
- ii. Conventional lines and letters used in engineering drawings.
- iii. Orthographic projections, simple cases.
- iv. Interpretation of orthographic views and drawing of mission views from gives two orthographic views.
- v. Detailed drawings of simple structures buildings with flat and sloped roof and ground floor, culverts, cross section of roads and canals making study of plan, elevation, section, site plan and schedule earthen dams and weirs.

#### (B) Estimating :

- i. Definition and purpose of estimate, types of estimates, Units of measurement and standard modes of measurements.
- ii. Estimation of quantities, Taking out quantities of items of buildings as above culvert, calculating earthwork for roads and canals, entering in measurements sheets, abstracting of quantities.
- iii. Estimation of rates-Rates and estimation of costs. rate analyses of items of such as excavation, masonry concrete etc.
- iv. Materials required per cubic meter of masonry concrete brick work of per unit area of flooring,

vi. Study of working and presentation drawings.

v. Detailed specifications of common items of civil engineering works like a) Excavation b) Masonry c) Concrete d) structural steel work e) plumbing and pipe laying f) wood-work g) dewatering works etc. roofing etc.

#### 4. ENGINEERING DRAWING (PRACTICAL)

Duration: 3 Hours, Total Marks: 100, Minimum marks for passing: 40

##### Syllabus

##### Term work and Practical-

- a. Preparation of detailed drawing of simple structures of buildings, culverts, longitudinal and cross sections of roads, canals.
- b. Preparation of a tracing and taking out ammonia prints of the drawings.
- c. Preparation of typical estimates of building and any two of the following:
  - Road,
  - Community well
  - Piped or slab culvert,
  - Canal earthwork.

#### 5. CONSTRUCTION AND CONSTRUCTION MATERIALS

Written test duration: 3 Hours, Total Marks: 100, Minimum marks for passing: 35

Oral: Total marks: 50, Minimum marks for passing: 20

##### Syllabus

A) **Building Material:**  
Elementary knowledge of sources and physical properties and uses, common building materials like soils, gravel murums, stone-bricks, tiles lime, cement and mortar, timber, metals paints, varnishes, pipes, valves, asphalt steel etc.

##### B) Construction-

- i. Foundations- purpose-safe bearing capacity of different strata-types of foundations like open wells, piles etc, shorting and structuring of foundations trenches.
- ii. Safe load bearing capacities of
  - a. soils and various strata
  - b. different materials and
  - c. different types of masonry and concrete.
- iii. Various types of masonry with their specifications such as stone masonry brick works, concrete, hollow-blocks etc. Bonds in brick work.
- iv. Superstructure-land bearing walls.
- v. Construction of various types of doors, windows and ventilators.
- vi. Fixing of wooden and steel frames in wall
- vii. Various types of staircases and their layouts.

- viii. Floors various type with their specifications and suitability floor finishes like tiles, shahabad, stones mosaic finishes etc.
- ix. Various types of roofs and roof covering with specifications joints in the trusses and at valleys and hips.
- x. Cement concrete plain/reinforced / pre-cast with different mixes along with their properties and suitability for different works constructions, specifications, Admixtures and waterproof, form work and centering curing, removal of forms detailed specifications for concrete works.
- xi. Finishing items like plastering, white washing distemping, painting etc.
- xii. Plumbing items like drainage line and sanitary fittings, water supply lines and fittings and their testing.
- xiii. Construction of earthwork in embankment earthwork in cutting, rolling of bank work.
- xiv. Tests of quality control and their frequency for common items of civil Engineering works.
- xv. Inspection of Buildings.
- xvi. Maintenance of buildings

Terms work and practical-  
Setting out of simple building and small culvert as per Drawings.

#### 6. GENERAL CIVIL ENGINEERING

Written test duration: 3 Hours, Total Marks: 100, Minimum marks for passing: 35

##### Syllabus

### A) Hydraulics

- i. Elementary knowledge of pressure, pressure head discharge energy and units of measurement.
- ii. Flow of water, discharge through orifices notches, pipes and open channels (simple case only)

### B) Geology

- i. General geology of Maharashtra types of rocks and soils, Classification of strata/surface investigations, taking trial pits, trial bores etc and recording the results.

### C) Construction Plant and Equipments

- i. Use of working of Road Rollers, Truck Tippers, Concrete mixers, Asphalt Mixers, stone crushers, Air compressor, Motor Grinders, Shovels, Bull-Dozers, Scrapers, Generators, Pumps, welding sets etc.
- ii. Keeping of log books of the machinery.
- iii. Idea about output of different machines.

### D) Roads

1. Classification of Roads and geometric standard.
2. Road project. Survey and investigation.
3. Road alignment, gradient and curves (Simple and compound) safe sight distance.
4. Roads in plan and hilly area.
5. Road surface different types-Earth road W.B.M. asphalted roads, specification of important items
6. Construction and maintenance of Road (Pot hole filling), culverts, Bridge etc. Road drainage, speed breakers, diversion.
7. Construction of earth work in embankment earth work in cutting, rolling of bank work.
8. Arbor culture
9. Masonry Register.
10. Road charts.
11. Traffic intensity and traffic census.
12. Traffic signs, standard warning signs, prohibitory signs, Mandatory signs, Informative signs, Traffic safety precautions.

### E) Bridges

1. Survey-selection of site preparation of survey data for Major and Minor bridges and culvert.
2. No of spans economic spans, scour depth, afflux right angle and skew crossing.
3. Classification of Bridge, their standers, loading.
4. Types of crossings, natural causeways submersible bridge, High level bridges.
5. Various types of foundations-open pile raft well sinking etc.
6. Sub-structure-Abutment, piers, Wing walls, Returns.

- iii. Rainfall run off and their variation methods of rain and river flow gauging.
- iv. Measurements of hydraulic flows, river gauging, measurements of flow in open channels pipes etc.
- ii. Types and general characteristics of common types of rocks soils met with, their engineering properties and uses.
- iii. Quarrying operations.
- iv. Taking trial pits trial bores etc classifying and logging the strata.

### Terms work and Practical-

- i. River gauging and subsurface investigations Gauge bore registers.
- ii. Measurement of hydraulic flows, and classification of strata from trial pits and bores measuring devices used.

13. Machinery required for road construction, Roller asphalt boiler, vibrators, asphalt mixer, paver finisher, Hot mix plant etc. trucks tippers, stone crusher, Air compressor, shovel bull dozers, pumps, welding set etc. keeping log book of the machinery, Idea about output of different machines.
14. Quality Control and Testing of road material, Design of road crust C.B.R.
15. Earthwork-Banking and cutting C/s, L/s or E/w lining out banks and giving profiles, centre line and reference stone in cutting.
16. Acquisition of land.
17. Prevention of Ribbon Development and Bombay Highway Act.
18. Foot paths, guard rails, pedestrian crossing, subways pedestrian bridges etc.
19. Indian Road Congress specification in general IRC 10 of 1961
20. Accident reporting maintenance of data in prescribed form

7. Superstructure-different types, Arches, Concrete deck, solid slab pier cap, bearings, wearing coat, parapet, water spots, approach slab pitching.
8. Specification of important items for Bridge,
9. Maintenance and repairs of bridges: Pre-monsoon and post-monsoon inspection, various problems in maintenance under mining, outflanking etc
10. Keeping records of H.P.L. O.F.L., L.W.K. and duration of obstruction to traffic due to floods.

## 7. CONSTRUCTION MANAGEMENT AND STORE ACCOUNTS

Written test duration: 3 Hours, Total Marks:100,. Minimum marks for passing:35

Oral: Total marks:50, Minimum marks for passing:20

### A) Management of works.

- i. Organisation of any work type of agency departmental or through a contractor watch materials economically. Ordering of quantities and inspecting quality of materials prior stocking and protection, avoiding misuse and wastage and pilferage of materials, timely arrangement of labour and materials as well as equipment check on consumption of materials.
- ii. Labour welfare and Labour laws.
- iii. Outlines of the Civil Engineering contractor for works document of contracts, kinds of contracts, conditions of contracts earnest money, security deposit time limit of compensation, termination of contract, extra items, Preparation of bills, supply of materials in schedule 'A' ( To be supplied by the Department)

### B) Accounts of works & stores

- i. Rules for maintenance and use, of muster rolls and measurement books taking measurement of work done on muster roll-submission of daily labour reports and output of work.
- ii. Knowledge of store accounts and their maintenance and periodic checking e.g. (a) Stock, (b) Materials at site, (c) Road Metal Return, (d) Tools and plants, (e) History sheet and-log Books of machines, (f) Consumption account of material such as cement, steel etc.
- iii. Rate lists.
- iv. Models of payments to the contractors.
- v. Accounting-use of materials on works entrusted to contractor or done departmentally tallying actual use with the requirement according to output.
- vi. Introducing to EGS; maintenance of EGS, muster roll and rules and regulations.

### Term work based on theory:

- i. To enter daily labour report and complete N.M.R.
- ii. To take measurements of work done and enter in Measurement Book for various work.
- iii. To fill forms of materials at site account, output of work.
- iv. To enter cement consumption statement (Daily and weekly)
- v. To enter logbook of vehicles.
- vi. To enter bin cards and all types filed registers.

## 8. SURVEYING ( PRACTICAL)

Duration: 3 Hours, Total Marks:100,. Minimum marks for passing:35

### Syllabus

#### Term

work-  
Practical exercise in surveying leveling, entering them in field books, level books plotting of Longitudinal compass survey, Exercises in chain and compass survey, plain table survey, use of planimeter, Road alignment survey with 1 C.D. work- 1 Km. and drawings.

#### Practical:

1. Study of 20 m/30 m chain, metallic and steel tapes, ranging roads.
2. Direct and Reciprocal ranging, Measurements of distance on plain and sloping ground.
3. Study of open cross staff, optical square and line ranger.
4. Chain and cross staff surveying and finding the area of a plot.
5. Study of prismatic compass.
6. Use of compass observing fore and back bearing, calculation of included angles.
7. Traverse survey - a simple compass survey of a closed traverse, calculations of included angles with the bearing and locating details by offsetting.
8. Study of dumpy-and tilting level.
9. Temporary adjustments of dumpy and tilting level and practice of simple leveling
10. Use of dumpy-and tilting levels compound leveling.
11. Profiles leveling with single and double leveling. Taking cross sections of dam embankment and canal excavations etc.
12. Computations of quantities of embankments and cuttings by plotting cross sections and using prismoidal formula