परीक्षेच्या टप्पे:  
1) पूर्व परीक्षा :-  १०० गुण
2) मुख्य परीक्षा :-  गट अ - ७५० गुण  
    गट ब - ५५० गुण
3) मुलाखत :-  गट अ - १०० गुण  
    गट ब - ७५ गुण

(७) पूर्व परीक्षा  
परीक्षा योजना

<table>
<thead>
<tr>
<th>विषय व संकेतांक</th>
<th>गुण व प्रशस्तसंख्या</th>
<th>कालावधी</th>
<th>दर्जा</th>
<th>माध्यम</th>
<th>प्रश्नपत्रिकेचे स्वरूप</th>
</tr>
</thead>
<tbody>
<tr>
<td>स्थापत्य अभियांत्रिकी (028)</td>
<td>१००</td>
<td>दोन तास</td>
<td>पदवी</td>
<td>इंग्रजी</td>
<td>वस्तुस्पष्ट बहुपर्यायी</td>
</tr>
</tbody>
</table>

अभ्यासक्रम
स्थापत्य अभियांत्रिकी या विषयातील खालील घटक व उपघटकांचा समावेश असेल

**Engineering Mathematics**

**Linear Algebra:**
Matrix algebra, Systems of linear equations, Eigen values and eigenvectors

**Calculus:**
Functions of single variable, Limit, continuity and differentiability, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green’s theorems.

**Differential equations:**
First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy's and Euler's equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation.

**Numerical Methods:**

**Structural Engineering**

**Mechanics:**
Bending moment and shear force in statically determinate beams. Simple stress and strain relationship: Stress and strain in two dimensions, principal stresses, stress transformation, Mohr’s circle. Simple bending theory, flexural and shear stresses, unsymmetrical bending, shear centre. Thin walled pressure vessels, uniform torsion, buckling of column, combined and direct bending stresses.

**Structural Analysis:**
Analysis of statically determinate trusses, arches, beams, cables and frames, displacements in statically determinate structures and analysis of statically indeterminate structures by force/ energy methods, analysis by displacement methods (slope deflection and moment distribution methods), influence lines for determinate and indeterminate structures. Basic concepts of matrix methods of structural analysis.

**Concrete Structures:**
Concrete design- basic working stress and limit state design concepts, analysis of ultimate load capacity and design of members subjected to flexure, shear, compression and torsion by limit state methods. Basic elements of prestressed concrete, analysis of beam sections at transfer and service loads.

**Steel Structures:**
Analysis and design of tension and compression members, beams and beam- columns, column bases. Connections- simple and eccentric, beam'column connections, plate girders and trusses. Plastic analysis of beams and frames. Rivet and Bolted Connections.

**Geotechnical Engineering**

**Soil Mechanics:**
Origin of soils, soil classification, three-phase system, fundamental definitions, relationship and interrelationships, permeability & seepage, effective stress principle, consolidation, compaction, shear strength.
Foundation Engineering:

Water Resources Engineering

Fluid Mechanics and Hydraulics:

Hydrology:
Hydrologic cycle, rainfall, evaporation, infiltration, stage discharge relationships, unit hydrographs, flood estimation, reservoir capacity, reservoir and channel routing. Well hydraulics.

Irrigation:

Environmental Engineering

Water requirements:
Quality standards, basic unit processes and operations for water treatment. Drinking water standards, water requirements, basic unit operations and unit processes for surface water treatment, distribution of water. Sewage and sewerage treatment, quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, sludge disposal, effluent discharge standards. Domestic wastewater treatment, quantity of characteristics of domestic wastewater, primary and secondary treatment. Unit operations and unit processes of domestic wastewater, sludge disposal.

Air Pollution:
Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

Municipal Solid Wastes:
Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

Noise Pollution:
Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

Transportation Engineering

Highway Planning:
Geometric design of highways, testing and specifications of paving materials, design of flexible and rigid pavements.

Traffic Engineering:
Traffic characteristics, theory of traffic flow, intersection design, traffic signs and signal design, highway capacity.

Surveying

Importance of surveying, principles and classifications, mapping concepts, coordinate system, map projections, measurements of distance and directions, leveling, theodolite traversing, plane table surveying, errors and adjustments, curves.

Building Materials & Construction

Construction Materials:
Properties of concrete, basics of mix design, aggregates, admixtures; stones, bricks and flooring tiles; cement; cement mortars; damp-proofing and water proofing materials, termite proofing, paints, epoxy coatings and resins, materials for low cost housing.

Building components and their functions:
Brick masonry, types of floors & roofs, ventilators, introduction to repairs and retrofitting in buildings. Building orientation, circulation, grouping of areas, privacy concept and design of energy efficient building; provisions of National Building Code. building estimates and specifications, cost of works, valuation.
### महाराष्ट्र अभियांत्रिकी सेवा गट - 'अ' व 'ब' परीक्षा योजना

परीक्षेतील टपे :- लेखी परीक्षा - ७५० गुण , मुलाखत - १०० गुण.

प्रश्नपत्रिकांची संख्या:- चार

<table>
<thead>
<tr>
<th>पेपर क्र. व संकेतांक</th>
<th>विषय</th>
<th>प्रश्न संख्या</th>
<th>गुण</th>
<th>माध्यम</th>
<th>कालांक</th>
<th>दर्जा</th>
<th>प्रश्नपत्रिकेचे स्वरूप</th>
</tr>
</thead>
<tbody>
<tr>
<td>१ (अनिवार्य)</td>
<td>मराठी</td>
<td>१६०</td>
<td>७५०</td>
<td>मराठी</td>
<td>दीर्घ तास</td>
<td>वारांवो</td>
<td>वस्तुनिष्ठ बहुपत्रीय</td>
</tr>
<tr>
<td>(संकेतांक ०१४)</td>
<td>इंग्रजी</td>
<td>सामान्य अध्ययन</td>
<td></td>
<td>इंग्रजी</td>
<td>पदवी</td>
<td></td>
<td>पारंपारिक</td>
</tr>
<tr>
<td>२ (अनिवार्य)</td>
<td>स्थापत्य अभियांत्रिकी (पेपर १)</td>
<td>-</td>
<td>२००</td>
<td>इंग्रजी</td>
<td>तीन तास</td>
<td>बी.ई</td>
<td>पारंपारिक</td>
</tr>
<tr>
<td>(संकेतांक ०१८)</td>
<td>संकेतांक ०१८</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>३ (अनिवार्य)</td>
<td>स्थापत्य अभियांत्रिकी (पेपर - २)</td>
<td>-</td>
<td>२००</td>
<td>इंग्रजी</td>
<td>तीन तास</td>
<td>बी.ई</td>
<td>पारंपारिक</td>
</tr>
<tr>
<td>(संकेतांक ०१९)</td>
<td>संकेतांक ०१९</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>४ (अनिवार्य)</td>
<td>स्थापत्य अभियांत्रिकी (पेपर - ३)</td>
<td>-</td>
<td>२००</td>
<td>इंग्रजी</td>
<td>तीन तास</td>
<td>बी.ई</td>
<td>पारंपारिक</td>
</tr>
<tr>
<td>(संकेतांक ०२०)</td>
<td>संकेतांक ०२०</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### अभ्यासक्रम

मराठी, इंग्रजी, सामान्य अध्ययन या विषयामध्ये खालील घटक व उपघटकांचा समावेश असेल:

- मराठी :- (५० गुण) - सर्व सामान्य शब्दसमूह, वाक्यरचना, वाक्यरचनाचा प्रयोग, विविध वाचकांकांच्या अभ्यास
- इंग्रजी :- (५० गुण) - Common Vocabulary, Sentence structure, Grammar, Use of Idioms and phrases & their meaning and comprehension of passage.
- सामान्य अध्ययन:

1. भारताचा विवरण: महाराष्ट्राचा इतिहास (१८५७ ते १९९०)
2. भारतीय अर्थव्यवस्था
   1. भारतीय आयात - नियंत्रण
   2. राज्यांचा विकास, सरकार, समाज, अर्थसंरचना व वार्ता.
   3. आर्थिक अर्थव्यवस्था - आर्थिक संकेत, वित्त, वित्तीय संघटना.
4. पंचवतीतीय योजना
5. किंमती संरक्षण कारणे व उपाय.

(३) भारताचा विवरण: महाराष्ट्राचा भूमीय

(४) पर्यावरण:- मानवी, वित्तीय, विकास, पर्यावरण, पर्यावरण - पृथक विकास, नैसर्गिक साधनसंपत्तीचे संरक्षण, विवरण विविध प्रकारीने प्रदूषण व पर्यावरणीय आपत्ती, पर्यावरण संरक्षण कार्यांच्या असराची तारीख/ राष्ट्रीय/ पात्रीतील संघटना/ संस्था.

(५) भारतीय राज्यव्यवस्था

(६) जागरूकता तसेच भारतातील चालू घडामोडी:- राजकीय, औद्योगिक, आर्थिक, सामाजिक, शेषकृत, भौगोलिक, खेळेल्हासी, सांस्कृतिक, पेडारीक, इत्यादी.
Civil Engineering, Paper – I (Code No. 018)

Standard: Degree in Civil Engineering
Medium: English
Nature of paper: Conventional

Max. Marks : 200
Duration : 3 hrs

Section A (40 Marks)


Section B (40 Marks)
1. Structural analysis: Analysis of arches and suspension cables, influence lines, stiffness and flexibility matrix methods.

2. Steel structures: Design of bolted and welded connections, columns, footings, trusses, steel beams, plate girders.

Section C (40 Marks)


Section D (40 Marks)

2. Prestressed Concrete: Principles of prestressing, materials used and their properties, permissible stresses as per I.S. codes, systems of prestressing, losses in prestress, design of pre-tensioned and post-tensioned beams- simply supported, rectangular and T- beams, cable profile, end block design, bridge girder.

Section E (40 Marks)
Computer-aided analysis and design of structures, application of computer programming to structures. numerical methods such as-

i. Finding area by Simpson’s rule, trapezoidal rule;

ii. Finding root of an equation by a) Newton-Raphson techniques b) Bisection method

iii. Solution of simultaneous equations by a) Gauss elimination method, b) Gauss-Jordan method, c) Iteration method.

Civil Engineering, Paper – II (Code No. 019)

Standard: Degree in Civil Engineering
Medium: English
Nature of paper: Conventional

Max. Marks : 200
Duration: 3 hrs

Section A (40 Marks)
Surveying: Classification of surveys, measurement of distances-direct and indirect methods, optical and electronic devices, prismatic compass, local attraction; plane table surveying, levelling, calculations of volumes, contours, theodolite, theodolite traversing, omitted measurements, trigonometric levelling, tacheometry, curves, photogrammetry, geodetic surveying, hydrographic surveying.

Section B (40 Marks)
Engineering Materials: Stones, bricks, cements, lime, mortar, timber, plastic, concrete, steel, paints and varnishes

Building planning: Principles of building planning and design, integrated approach, building byelaws, building services such as vertical transportation, water supply sanitation, thermal ventilation, lighting, acoustics, fire protection, electrical fittings.


Section D (40 Marks)

Geo-technical Engineering: Geotechnical properties, stresses in soil, shear resistance, compaction, consolidation and earth pressure, stability of slopes, bearing capacity, settlements, shallow and deep foundations, cofferdams, ground water control.

Section E (40 Marks)

Construction Planning and Management: Elements of scientific management, elements of material management, safety engineering, network analysis, construction equipment, site layout, quality control.

Civil Engineering, Paper – III (Code No. 020)

Standard: Degree in Civil Engineering
Max. Marks: 200
Medium: English
Duration: 3 hrs
Nature of paper: Conventional

Section A (40 Marks)

Fluid Mechanics: Properties of fluids, fluid statics and buoyancy, kinematics and dynamics, flow measurement, flow in open channel, flow in closed conduits, dimensional and model analysis, losses in pipe flow, siphon, water hammer, boundary layer and control, pipe network.

Fluid Machines: Hydraulic turbines, centrifugal pumps, reciprocating pumps, power house, classification and layout.

Section B (40 Marks)

Engineering Hydrology: Hydrological cycle, precipitation, evaporation, infiltration, runoff, hydrographs, reservoir planning & sediment control, floods, flood routing, ground water.

Irrigation Engineering: Water requirement of crops, methods of irrigation, lift irrigation, water logging, dams, spillways, energy dissipation, diversion head works, canal and canal structures, cross drainage works, river training works.

Section C (40 Marks)

Highway Engineering: Planning of highway systems, alignment and geometric design, horizontal and vertical curves, grade separation, materials and different surfaces and maintenance, rigid and flexible pavement, traffic engineering.

Bridge Engineering: Selection of site, types of bridges, discharge, waterway, spans, afflux, scour, standards, specifications, loads and forces, erection of superstructure, strengthening.

Tunnelling: Open cuts, surveys, criteria for selection of size and shapes, driving in soft and hard grounds, mucking, dust control, ventilation, lighting and drainage, special methods of tunneling.

Section D (40 Marks)

Environmental Engineering

Water Supply Engineering: Sources of supply, design of intakes, estimation of demand, water quality standards, primary and secondary treatment, maintenance of treatment units, conveyance and distribution of treated water, rural water supply.

Waste Water Engineering & Pollution control: Quantity, collection and conveyance and quality, disposal, design of sewer and sewerage systems, pumping, characteristics of sewage and its treatment, rural sanitation, sources and effects of air and noise pollution, monitoring, standards

Solid Waste Management: Sources, classification, collection and disposal.
परीक्षेचे टप्पे: लेखी परीक्षा - ५५० गुण, मुलाखत - ७५ गुण.

प्रश्नपत्रिकांची संख्या: तीन

<table>
<thead>
<tr>
<th>पेपर क्रमांक व संकेतकांक</th>
<th>विषय</th>
<th>परीक्षा संख्या</th>
<th>गुण</th>
<th>माध्यम</th>
<th>कालावधी</th>
<th>दर्जा</th>
<th>प्रश्नपत्रिकांचे स्वरूप</th>
</tr>
</thead>
<tbody>
<tr>
<td>१ (अनिवार्य) (संकेतक ०१४)</td>
<td>मराठी</td>
<td>२५०</td>
<td>मराठी</td>
<td>दीड तास</td>
<td>बारावी</td>
<td>वस्तुविशेष बहुपत्रांधी</td>
<td></td>
</tr>
<tr>
<td>साधारण अध्ययन</td>
<td>इंग्रजी</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>सांस्कृतिक व आधुनिक योजना</td>
<td>मराठी व इंग्रजी</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>२ (अनिवार्य) (संकेतक ०२९)</td>
<td>स्वायत्त अभिव्यक्तिकी (पेपर - १)</td>
<td>२००</td>
<td>इंग्रजी</td>
<td>दोन तास</td>
<td>बी.ई (सिक्कील)</td>
<td>वस्तुविशेष बहुपत्रांधी</td>
<td></td>
</tr>
<tr>
<td>सांस्कृतिक व आधुनिक योजना</td>
<td>(पेपर - २)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>३ (अनिवार्य) (संकेतक ०३०)</td>
<td>स्वायत्त अभिव्यक्तिकी</td>
<td>२००</td>
<td>इंग्रजी</td>
<td>दोन तास</td>
<td>बी.ई (सिक्कील)</td>
<td>वस्तुविशेष बहुपत्रांधी</td>
<td></td>
</tr>
</tbody>
</table>

अभ्यासक्रम

मराठी, इंग्रजी, साधारण अध्ययन वा विषयानुसार खालील घटक व उपघटकांचा समावेश असेल:

- मराठी: (५० गुण) - सर्व साधारण शाळासमूह, वाक्यरचना, व्याकरण, मौलनी व वाक्यप्रचार यांचा अर्थ व उपयोग तसेच उत्तरायावरील प्रश्नांची उत्तरे
- इंग्रजी: (५० गुण) - Common Vocabulary, Sentence structure, Grammar, Use of Idioms and phrases & their machining and comprehension of passage.
- साधारण अध्ययन:
  १. भारताचा विषयानिक: महाराष्ट्राचा इतिहास (१८५७ ते १९९०)
  २. भारतीय अर्थव्यवस्था:
    १. भारतीय आयात - नियंत्रण
    २. राष्ट्रीय विकासात सरकारी, सहकारी, आयोजक वेकंडी भूमिका
    ३. शासनीय अर्थव्यवस्था - अर्थव्यवस्था, लेखा, लेखापरीक्षण, इत्यादी
    ४. पंचवार्षिक योजना
    ५. किंमती वाढण्याची कारणे व उपाय.
  ३. भारताचा विषयानिक: महाराष्ट्राचा भूगोल
  ४. पर्यावरण:- मानवी विकास व पर्यावरण, पर्यावरण - पूर्वक विकास, नैसर्गिक साधनसंपत्तीचे संरक्षण विशेषत: वनसंरक्षण, विविध प्रकाराची प्रदूषण व पर्यावरणातील आपत्ती, पर्यावरण संरक्षणात कार्यात्मक असलेल्या राज्य/राष्ट्र/आधुनिक पातळीवरील संंघन / संस्था.
  ५. भारतीय राज्यव्यवस्था
  ६. जागृती तसेच भारतातील चालू घडामोडी: - राजकारणी, आधुनिक, सामाजिक, प्रशस्त, भौगोलिक, खगोलशास्त्रीय, सांस्कृतिक, वैज्ञानिक, इत्यादी.

मराठी, इंग्रजी, सांस्कृतिक व आधुनिक योजना वा विषयानुसार खालील घटक व उपघटकांचा समावेश असेल:
Civil Engineering, Paper – I (Code No. 029)

**Standard:** Degree in Civil Engineering

**Max. Marks:** 200

**Medium:** English

**No. of Questions:** 100

**Nature of paper:** Objective

**Duration:** 2 hrs

1. **Building Construction & Materials:**
   Properties of wet and hardened concrete, tests on concrete, factors affecting strength of concrete, water-cement ratio, aggregate-cement ratio, mix design, additives, design of form work, types of formwork.
   Stones, bricks, cements, lime, mortar, timber, plastic, concrete, steel, paints and varnishes
   Foundations, stones, brick and block masonry, steel and reinforced cement concrete structures, floors, doors and windows, roofs, finishing works, water proofing.
   Principles of building planning and design, integrated approach, building byelaws, building services such as vertical transportation, water supply sanitation, thermal ventilation, lighting, acoustics, fire protection, electrical fittings.

2. **Strength of materials:**
   Stresses, strains, principal stresses, bending moments, shear forces and torsion theory, bending theory of beam, deflection of beam, theories of buckling of columns.

3. **Structural Analysis:**
   Analysis of beams, frames and trusses, slope deflection method, moment distribution method, analysis of arches and suspension cables, influence lines, stiffness and flexibility matrix methods.

4. **Steel Structures:**
   Design of riveted and welded connections, columns, footings, trusses, steel beams, plate girders.

5. **Design of reinforced cement concrete structures** (Working stress and limit state):
   Design of slab, beams, columns, footing, retaining walls, tanks, building frames, staircases

6. **Prestressed Concrete:**
   Principles of prestressing, materials used and their properties, permissible stresses as per I.S. codes, systems of prestressing, losses in prestress, design of pre-tensioned and post-tensioned beams- simply supported, rectangular and T-beams, cable profile, end block design, bridge girder.

7. **Construction Planning and Management:**
   Elements of scientific management, elements of material management, safety engineering, network analysis, construction equipment, site layout, quality control. Contract Management.

Civil Engineering, Paper –II (Code No. 030)

**Standard:** Degree in Civil Engineering

**Max. Marks:** 200

**Medium:** English

**No. of Questions:** 100

**Nature of paper:** Objective

**Duration:** 2 hrs

1. **Surveying:**
   Classification of surveys, measurement of distances-direct and indirect methods, optical and electronic devices, prismatic compass, local attraction; plane table surveying, levelling, calculations of volumes, contours, theodolite, theodolite traversing, omitted measurements, trigonometric levelling, tacheometry, curves, photogrammetry, geodetic surveying, hydrographic surveying.

2. **Estimating, Costing and Valuation:**
   Specification, estimation, costing, tenders and contracts, rate analysis, valuation.

3. **Geo-technical Engineering:**
   Geotechnical properties, stresses in soil, shear resistance, compaction, consolidation and earth pressure, stability of slopes, bearing capacity, settlements, shallow and deep foundations, cofferdams, ground water control.

4. **Fluid Mechanics:**
   Properties of fluids, fluid statics and buoyancy, kinematics and dynamics, flow measurement, flow in open channel, flow in closed conduits, dimensional and model analysis, losses in pipe flow, siphon, water hammer, boundary layer and control, pipe network, hydraulic turbines, centrifugal pumps, reciprocating pumps, power house, classification and layout.

5. **Engineering Hydrology:**
   Hydrological cycle, precipitation, evaporation, infiltration, runoff, hydrographs, reservoir planning & sediment control, floods, flood routing, ground water.

6. **Irrigation Engineering:**
   Water requirement of crops, methods of irrigation, lift irrigation, water logging, dams, spillways, energy dissipation, diversion head works, canal and canal structures, cross drainage works, river training works. Water Management.

7. **Highway Engineering:**
Planning of highway systems, alignment and geometric design, horizontal and vertical curves, grade separation, materials and different surfaces and maintenance, rigid and flexible pavement, traffic engineering.

8. **Bridge Engineering:**
Selection of site, types of bridges, discharge, waterway, spans, afflux, scour, standards, specifications, loads and forces, erection of superstructure, strengthening.

9. **Environmental Engineering**

**Water Supply Engineering:** Sources of supply, design of intakes, estimation of demand, water quality standards, primary and secondary treatment, maintenance of treatment units, conveyance and distribution of treated water, rural water supply.

**Waste Water Engineering & Pollution control:** Quantity, collection and conveyance and quality, disposal, design of sewer and sewerage systems, pumping, characteristics of sewage and its treatment, rural sanitation, sources and effects of air and noise pollution, monitoring, standards

**Solid Waste Management:** Sources, classification, collection and disposal.

************