

	Name of Paper	Questions	Marks	Time
(i)	Section A- General Awareness & Aptitude Test-			3 Hours
	(a) General Knowledge of Rajasthan and its History , Art & Culture, Literature, Monuments, Heritage, Geography, Traditions, etc.	30	90	
	(b) Every day Science, General Aptitude e.g. History, Maths., innovation, Indian and International events etc.	30	90	
(ii)	Section B – Civil Engineering	90	270	

Note:

- 40% shall be pass marks for the exam.
- Senior Secondary Level will be the standard of the Section –A of paper & Section B is of Degree level.
- The pattern of question paper will be Objective Type (MCQ).
- Maximum Marks and Negative Marking-The maximum marks of the paper will be 450. For every correct answer 3 marks will be awarded and for every incorrect answer 1 marks will be deducted.

## SYLLABUS

### On-Line Examination

#### Section - A

##### General Awareness & Aptitude Test-

(a) Knowledge and Current Affairs relating to Rajasthan,

(राजस्थान का इतिहास, कला एवं संस्कृति, साहित्य, परम्पराएँ एवं विरासत)	
1.	राजस्थान के इतिहास के प्रमुख स्रोत
2.	राजस्थान की प्रमुख प्रागैतिहासिक सभ्यताएँ
3.	राजस्थान के प्रमुख राजवंश एवं उनकी उपलब्धियाँ
4.	मुगल-राजपूत संबंध
5.	स्थापत्य कला की प्रमुख विशेषताएँ
6.	महत्वपूर्ण किले, स्मारक एवं संरचनायें
7.	राजस्थान के धार्मिक आंदोलन एवं लोक देवी-देवताएँ
8.	राजस्थान की प्रमुख चित्रकलाएँ, बोलियाँ एवं हस्तशिल्प
9.	राजस्थानी भाषा एवं साहित्य की प्रमुख कृतियाँ, क्षेत्रीय बोलियाँ
10.	मेले, त्यौहार, लोक संगीत, लोक नृत्य, वाद्ययंत्र एवं आभूषण
11.	राजस्थानी संस्कृति, परम्परा एवं विरासत
12.	महत्वपूर्ण ऐतिहासिक पर्यटन स्थल
13.	राजस्थान के प्रमुख व्यक्तित्व
14.	राजस्थान की रियासतें एवं ब्रिटिश संधियाँ, 1857 का जन-आंदोलन
15.	कृषक एवं जन-जाति आंदोलन, प्रजामंडल आंदोलन
16.	राजस्थान का एकीकरण
17.	राजस्थान का राजनीतिक जनजागरण एवं विकास- महिलाओं के विशेष संदर्भ में।
राजस्थान का भूगोल	
1.	स्थिति एवं विस्तार
2.	मुख्य भौतिक विभाग:- मरुस्थलीय प्रदेश, अरावली पर्वतीय प्रदेश, मैदानी प्रदेश. पठारी प्रदेश
3.	अपवाह तन्त्र
4.	जलवायु

5. मृदा
6. प्राकृतिक वनस्पति
7. वन एवं वन्य जीव संरक्षण
8. पर्यावरणीय एवं पारिस्थिकीय मुद्दे
9. मरुस्थलीकरण
10. कृषि- जलवायु प्रदेश एवं प्रमुख फसलें
11. पशुधन
12. बहुउद्देशीय परियोजनाएँ
13. सिंचाई परियोजनाएँ
14. जल संरक्षण
15. परिवहन
16. खनिज संपदाएँ

राजस्थान की  
राजनीतिक एवं प्रशासनिक व्यवस्था:-

1. राजस्थान में स्थानीय, नगरीय प्रशासन
2. 74वां संविधान संशोधन विधेयक
3. राज्यपाल, राजस्थान विधान सभा, मुख्य मंत्री, जिला प्रशासन, लोकायुक्त
4. राज्य मानवाधिकार आयोग
5. राज्य सूचना आयोग
6. राज्य निर्वाचन आयोग
7. राजस्थान लोक सेवा गारन्टी अधिनियम, 2011

(b) General Science, General Aptitude e.g. History, Maths., innovation, Indian and International events etc.:-

1. General Science:- General Science will cover General Application and understanding of Science including matters of everyday observations and experiences. Candidates are supposed to be familiar with matters such as electronics tele-communications, Satellites and elements of computers (both Hard & Soft Wares), research labs including CSIR managed national labs and institutes, Environment & pollution etc.
2. Current affairs: - Current events of State, National and International importance. National and International agencies and their activities. Games & Sports at State, National and International levels.
3. History & Culture: - Land Marks in the political and cultural history of India, Major monuments and literary works. Renaissance, struggle for freedom and national integration & Culture with special reference to:-
  - (a) The medieval background.
  - (b) Socio-economic life and organization.
  - (c) Freedom movement and political awakening.
  - (d) Political integration.
  - (e) Dialects and Literature.
  - (f) Music, Dance & theatre.
  - (g) Religious beliefs, cults, saints, poets, Warrior-saints, Lok Devtas & Lok deviyans.
  - (h) Handicrafts.
  - (i) Fairs and Festivals, Customs, Dresses, Ornaments with special reference to Folk and tribal aspects thereof.
4. Economic Developments:- Food and Commercial crops of Rajasthan, Agriculture based Industries, Major irrigation and River Valley, Projects for the development of the desert and waste lands. Indira Gandhi Canal Project, growth and location of Industries, Industrial raw materials. Mineral based industries, Small scale and Cottage industries, export items Rajasthani handicrafts. Tribes and their economy. Cooperative movement, Tourism Development. Economic Reforms in India and their impact.
5. Geography and Natural Resources:-
  - (a) Broad – physical features of the world important places, rivers, mountains, continents, oceans.

- (b) Ecology and wild-life of India.

## Section- B

### 1. Building Technology and Construction Mangement

**Building Materials:** stones, bricks, steel, Timber, lime, cement, sand, aggregates for cement concrete, paints, distempers, use of pozzolana manufacturing of lime concrete, cement concrete, for plain, reinforced and pre-stressed concrete work.

**Road Materials:** Course aggregate, screening and binding materials for WBM, Bricks for soiling. Course and fine aggregate for bituminous roads, IRC standard size aggregates, Tars and Asphalt, Asphaltic emulsions

**Mastic Asphalt and Minerals Fillers Construction Management:** Plants and equipments, planning for construction using network analysis CPM and PERT techniques.

### 2. Fluid Mechanics

**Fluids:** Definition, Ideal fluids, real fluids, Newtonian and Non-Newtonian fluids.

**Properties of Fluids:** Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.

**Hydrostatics:** Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, Manometers Bourdon pressure guage.

**Buoyancy:** Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces, Conditions of equilibrium for floating bodies, meta-centre and met centric height experimental and analytical determination of met centric height.

**Equilibrium of Fluid particles and flow:** Fluid mass subjected to horizontal and vertical acceleration and uniform rotation.

**Hydro-kinematics:** Types of Flows: Steady and unsteady, uniform and non-uniform, stream lines, path lines, stream tubes, principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective, Rotational and irrotational motions, free and forced vortex, circulation and vorticity velocity potential and stream function, elementary treatment of flow net. Euler's equations of motion and interation of Euler's equations, Bernoulli's equation for in compressible Fluids, assumptions in Bernoulli's equation, Energy correction factor.

Applications for Bernoulli's equation: Pilot tube, Venturi meter, orifices & mouth pieces, time of emptying of tanks b orifices, sharp edged rectangular, triangular and trapezoidal notches, Francis formula, velocity of approach. End contractions Cippoletti Weir, time of emptying reservoirs by weirs.

Momentum Equation and its Application: Development of momentum equation and control volume concept, Momentum correction factor, applications- Borda's Momentum Equation and its Application: Development of momentum equation by control volume concept, Momentum correction factor, applications- Borda's mouth pieces, sudden enlargement of flow, pressure on flat plates, Nozzles.

Flow Through Pipes: Laminar flow, Raynolds experiment, transition from laminar to turbulent flow. Turbulent Flow: Laws of fluid friction, friction factor Moodys diagram, loss of head due to friction and other causes. Hydraulic gradient, total energy line Chezy's, and Manning's formula, flow through pallel pipes and pipes in series, flow through branched pipes. Flow along a bypass. Power transmission through pipe, condition for maximum power. Elementary water hammer concept.

### 3. Surveying, Estimating Costing & Field Engineering

**Introduction:** Importance of surveying to engineers, Plane and geodetic surveying, methods of location of points, principle of surveying from whole to part, conventional signs.

**Measurement of Distances:** different types of chains, tapes and their uses. Sources of error and precautions, corrections to tape measurements. Field problems in distance measurements. Advance techniques of distance measurement.

**Measurement of Angles And Direction:** Different types of direction measuring instruments and their uses. Reference meridians, Bearing and azimuths, magnetic declination and its variation. Use and adjustment of surveyors and prismatic compass.

Vernier and micro optic theodolite, temporary and permanent adjustment of vernier theodolite Measurement of horizontal and vertical angle by different methods. Application of theodolite in field problems.

**Traversing:** Different methods of traqversing chain & compass traverse, transit-tape traverse. Methods of computations and adjustment of traverse; transit rule, Bowditchrule, graphical method, axis method, Gales traverse table.

**Leveling:** Definitions of various terms in leveling. Different types of leveling. Sources of errors in leveling curvature and refraction corrections. Temporary and permanent adjustment of dumpy and tilting levels. Computation and adjustment of level. Profile leveling, L-Section and cross-sections.

**Plane Table Suveying:** Elements of plane table survey working operations, methods of plane table survey; intersection travesing and resection, two point and three point problems.

**Contouring:** Characteristics of contours, contour interval, contour gradient, Methods of locating counters, uses of contour maps.

**Trigonometric Leveling:** Trigonometric leveling, Objects accessible and non-accessible, Determination of levels object-when.

**Field Astronomy:** Definitions of terminology used in Astronomy.

Introduction of Remote Sensing and GIS Estimation for quantities for various types of construction, Rate Analysis, Preparation of Tender & contract documents, Centre-line diagram, Building layout.

#### 4. Irrigation & Water Resources

Definition, necessity, benefits, types and methods of irrigation, Hydrology- Measurement of rainfall, run off coefficient, rain guage, 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 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.

#### 5. Theory of Structures and Strength of Materials

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 T, channel and compound sections, chimneys, dams and retaining walls, Eccentric loads, slop deflection of simply supported and cantilever beams, critical load and columns. Torsion of circular section, Springs; Vibration.

## 6. Structural Analysis

Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.) Releases in structures, Maxwell's reciprocal theorem and Betti's theorem, Analysis of structures using Slope-deflection method. Analysis of structures using Moment-distribution method applied to continuous beams and portal frames with and without inclined members. Unit load method & their applications: deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames.

## 7. Soil Mechanics and Foundations Engineering

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, coefficient of permeability, determinations 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.

## 8. Design of R.C. Concrete and Masonry Structures

RCC beams- flexural strength, shear strength, bond strength, design of singly reinforced and double reinforced beams, cantilever beams, columns, 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)

**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.

## 9. Design of Steel Structures

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

## 10. Construction Technology

**Stone and Brick Masonry:** Ashlar, course and random rubble, stone pillar, dry stone and arch masonry, Brick bonds and type of walls.

**Lintels:** Plastering, Pointing, flooring, expansion and construction joints; centering and shuttering, General Selection criteria of site, Planning and orientation of buildings.

**Roofing:** Stone slab, RCC, G.C. Steel, Asbestos cement and jack arch roofing.

**Flooring:** Cement concrete, flag stone, terrazzo mosaic, Terrazzo tile, Brick on edge, timber Granolithic, Linoleum and other floorings.

**Plastering:** Lime, cement sand, composite and rough coat plaster, Plaster of Paris, Painting, Damp proof course, anti-termite treatment.

**Centering and Shuttering:** Centering form work, shuttering and moulds, timber & Steel trestles and false work, scaffolding and shoring, under pinning.

## 11. Auto-Cad Civil Engineering Drawing

## 12. Public Health Engineering

Per capita requirement of water for urban areas, Forecast of population. Sources. Water

supply standards of purity of public water supplies with various methods of purification; House drainage system. Distribution network with all the ancillaries: system of drainage. Layout of sewerage systems. Primary, secondary treatments, trickling filters, lagoons and other treatment unit sand their design criteria. Flushing of sewers; sewage treatment; Urban water supply and sanitation.

### 13. Highway and Bridges

**Principles of highway planning:** classification of road land width, building line, center line, formation width, pavement width, Camber, longitudinal gradient sight distance, horizontal curve, super elevation, vertical curve, lateral and vertical clearances.

**Flexible pavements:** Sub-base, base course and shoulder stone/ Kankar brick soling, WBM courses, shoulders. Granual sub-base, stabilized soil roads cement/ lime stabilized sub base, sad bitumen base course, crushed cement concrete base/sub-base course. Prime and take coats, surface dressing, open graded premix carpet, semi dense carpet, build-up spraygrout base course, bituminous base binder couse. Asphaltic Concrete, seal coats, mixed seal surfacing. Penetration macadam base/binder course, full and semi groups.

**Traffic Engineering :** traffic characteristics, road user characteristics, vehicular characteristics, volume, speed and delay studies origin and destination study, traffic flow characteristics, traffic capacity and parking studies, traffic regulation, traffic control devices, Intersection control.

**Alignment:** traffic engineering, pavement design, paving materials and highway construction and maintenance of different types of roads.

### 6. अन्य योग्यताएँ :-

(1) **स्वास्थ्य**— उपरोक्त पदों पर भर्ती के लिए उम्मीदवार अच्छे मानसिक और शारीरिक स्वास्थ्य का होना चाहिए और वह ऐसे किसी मानसिक या शारीरिक दोष से मुक्त होना चाहिए जो कि उपरोक्त वर्णित पद के रूप में उसके कर्तव्यों के कुशल पालन में बाधा डाल सके और यदि वह चयनित कर लिया जाता है तो उसे इसके लिये अपना आरोग्यता प्रमाण पत्र उस जिले के मुख्य चिकित्सा एवं स्वास्थ्य अधिकारी या मेडीकल ज्यूरिस्ट द्वारा हस्ताक्षरित प्रस्तुत करना होगा जिस जिले में सामान्यतः वह निवास करता है।

(2) **चरित्र**— सेवा में सीधी भर्ती के लिए आवेदक का चरित्र ऐसा होना चाहिये जिससे कि वह उपरोक्त वर्णित पद पर नियुक्ति के लिये योग्य हो सके। उसे सचरित्र का प्रमाण पत्र ऐसे विश्वविद्यालय, स्कूल या कॉलेज जहां उसने अंतिम शिक्षा प्राप्त की हो के प्रधानाचार्य / शिक्षा अधिकारी के द्वारा प्रदत्त प्रस्तुत करना होगा और दो ऐसे उत्तरदायी व्यक्तियों के प्रमाण पत्र भी प्रस्तुत करने होंगे जो आवेदन-पत्र की दिनांक से 6 महीने पहले के न हो और अभ्यर्थी के रिश्तेदार द्वारा दिये हुये नहीं हो

### 7. राष्ट्रीयता :-

(क) भारत का नागरिक हो, या

(ख) नेपाल का प्रजाजन हो. या

(ग) भूटान का प्रजाजन हो, या

(घ) ऐसा तिब्बती शरणार्थी जो दिनांक 1-1-62 से पहले भारत में स्थाई रूप से बसने के विचार से आया था, या

(ङ) भारतीय मूल का व्यक्ति जो भारत में स्थाई रूप से बसने के विचार से पाकिस्तान, बर्मा, श्रीलंका, पूर्वी अफ्रीकी देश कीनिया, युगान्डा और संयुक्त तंजानिया गणराज्य (भूतपूर्व टंगानिया