

AGRICULTURE UNIVERSITY JODHPUR

SYLLABUS & EXAMINATION SCHEME FOR THE POST OF JUNIOR ENGINEER (CIVIL)

PHASE – I (प्रश्न पत्रों की संख्या : 01)

परीक्षा योजना

प्रश्न-पत्र	अंक	अधिकतम अंक	समय
भाग-अ: सामान्य ज्ञान (राजस्थान का इतिहास, कला एवं संस्कृति, परम्पराएं, विरासत एवं राजस्थान का भूगोल, राजस्थान की राजनीतिक एवं प्रशासनिक व्यवस्था)	40	120 अंक	2 घण्टे
भाग-ब: सिविल अभियांत्रिकी	80		

नोट :-

1. प्रश्न पत्र में बहुविकल्पीय प्रकार के प्रश्न होंगे व सभी प्रश्नों के अंक समान होंगे।
2. परीक्षा में न्यूनतम निर्धारित उत्तीर्णांक 40 प्रतिशत है। इससे कम अंक प्राप्त करने वाले अभ्यर्थी नियुक्ति के लिए पात्र नहीं होंगे।
3. किसी प्रश्न विशेष के गलत उत्तर के लिए परीक्षार्थी के प्राप्तांकों में से उस प्रश्न के पूर्णांक का एक-तिहाई अंक (1/3) अंक काटा जायेगा।

पाठ्यक्रम (SYLLABUS)

भाग-अ :- सामान्य ज्ञान (GENERAL KNOWLEDGE)

➤ राजस्थान का इतिहास, कला एवं संस्कृति, साहित्य, परम्पराएं एवं विरासत :

1. राजस्थान के इतिहास के प्रमुख स्रोत
2. राजस्थान की प्रमुख प्रागैतिहासिक सभ्यताएं
3. राजस्थान के प्रमुख राजवंश एवं उनकी उपलब्धियां
4. मुगल राजपूत संबंध
5. स्थापत्य कला की प्रमुख विशेषताएं
6. महत्वपूर्ण किले, स्मारक एवं संरचनायें
7. राजस्थान के धार्मिक आंदोलन एवं लोक देवी-देवता
8. राजस्थान की प्रमुख चित्रकलाएं, शैलियां एवं हस्तशिल्प
9. राजस्थानी भाषा एवं साहित्य की प्रमुख कृतियां, क्षेत्रीय बोलियां
10. मेले, त्यौहार, लोक संगीत, लोक नृत्य, वाद्य एवं आभूषण
11. राजस्थानी संस्कृति, परंपरा एवं विरासत
12. महत्वपूर्ण ऐतिहासिक पर्यटन स्थल
13. राजस्थान के प्रमुख व्यक्तित्व
14. राजस्थान की रियासतें एवं ब्रिटिश संधियां, 1857 का जन आंदोलन
15. कृषक एवं जन-जाति आंदोलन, प्रजामंडल आंदोलन
16. राजस्थान का एकीकरण
17. राजस्थान का राजनीति 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 तंत्र
4. जलवायु एवं मृदा
5. प्राकृतिक वनस्पति

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6. वन एवं वन्यजीव संरक्षण
7. पर्यावरणीय एवं पारिस्थितिकीय मुद्दे
8. मरुस्थलीकरण
9. कृषि-जलवायु प्रदेश एवं प्रमुख फसलें
10. पशुधन
11. बहुउद्देशीय परियोजनाएं
12. सिंचाई परियोजनाएं एवं जल संरक्षण
13. परिवहन एवं खनिज सम्पदाएं

➤ **राजस्थान की राजनीतिक एवं प्रशासनिक व्यवस्था :-**

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

भाग-ब :- सिविल अभियांत्रिकी (CIVIL ENGINEERING)

1. Building technology and construction management

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, screenings and bindings materials for WBM, bricks for soling. Coarse and fine aggregate for bituminous roads, IRC standard size aggregates, tars and Asphalt, asphaltic concrete, 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 gauge.

Buoyancy: Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces, conditions of equilibrium for floating bodies, meta-center and metacentric 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, streamlines, 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 integration of Euler's equations, Bernoulli's equation for incompressible fluids, assumptions in Bernoulli's equation, energy correction factor.



Applications for Bernoulli's equation: Pitot tube, Venturi meter, Orifice meter, orifices and mouth pieces, time of emptying of tanks by 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 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, Reynolds experiment, transition from laminar to turbulent flow. Turbulent flow: Laws of fluid friction, friction factor Moody's diagram, loss of head due to friction and other causes. Hydraulic gradient, total energy line Chezy's and Manning's formula, flow through parallel pipes and pipes in series, flow through branched pipes, Flow along a bypass, Power transmission by 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 & 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 traversing; chain & compass traverse, transit-tape traverse. Methods of computations and adjustment of traverse, transit rule, Bow ditch rule, graphical method, axis method, Gales traverse table.

Leveling: Definitions of various terms in leveling, Different types of leveling, Sources of error sin 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 Surveying: Elements of plane table survey working operations, methods of plane table survey; intersection traversing and resection, two point and three point problems.

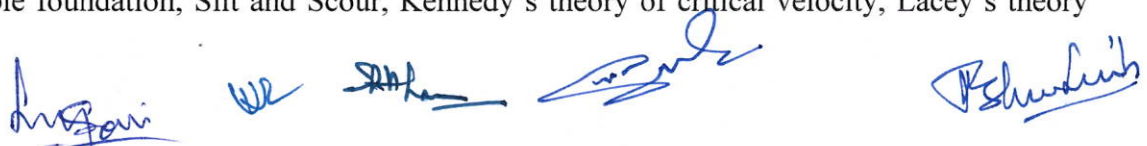
Contouring: Characteristics of contours, contour interval, contour gradient, Methods of locating contours, uses of contour maps.

Trigonometric Leveling: Trigonometric leveling, objects accessible and non-accessible, determination of levels object-when.

Field Astronomy: Definitions of terminology used in Astronomy, Introduction to 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 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.

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 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, 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 statically Indeterminate 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 inter relationship 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, 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. 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)

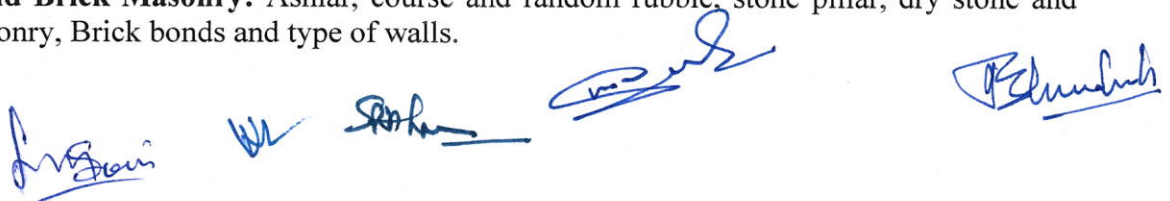
Concrete Technology: Properties, Advantages and uses of concrete, cement aggregates, Importance of water quality, water cement ratio, workability, mix design, storage, batching, mixing, placement, compaction, finishing and curing of concrete, quality control of concrete, hot weather and cold weather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



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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-termites 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 and 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 clearness.

Flexible pavements: Sub-base, base course and shoulder stone/ Kankar brick soling, WBM courses, shoulders. Granular sub-base, stabilized soil roads cement / lime stabilized sub base, sand bitumen base course, crushed cement concrete base/sub-base course. Prime and tack coats, surface dressing, open graded premix carpet, semi dense carpet, build-up spray grout base course, bituminous base binder course. 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.

