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Scheme of examination for the post of Senior Engineer (Civil)

Subject		Maximum Marks	Time
PAPER-I **(All questions will be objective type with no negative marking)**			
Part-A	**English Language-** Comprehension, Grammar, Sentence correction, One words, Antonyms, Synonyms etc.	**20**	**120 minutes**
	Mathematics & Numerical Ability: Arithmetic - upto 10th Standard. Numerical Computation, Numerical Reasoning, Data Reasoning and Data Interpretation.	**10**	
Part-B	**Domain knowledge**	**70**	
Total marks of written examination		**100**	**120 minutes**

Notes:-

1- The written examination is qualifying only and no marks shall be taken into account for final selection or ranking of individual candidate.

2- Only those candidates who score minimum cut off marks in the examination, as may be fixed by the IIT Indore at its discretion, will be called for further stage of selection.

Syllabus for Domain Knowledge -- Senior Engineer (Civil)

Engineering Mechanics	Force (resolution of force, moment of force, force system composition of forces), Equilibrium, Friction, Centroid and Center of gravity, Simplemachines.
Building Construction	Building components (substructure, superstructure) type of structure(load bearing, framed and composite structures).
Building material	Masonry materials (stones, bricks and mortars), Timber and miscellaneous materials (glass, plastic, fiber, aluminum steel, galvanized iron, bitumen, PVC, CPVC and PPF).
Construction of substructure	Job layout, earthwork, foundation (types, dewatering coffer dams, bearing capacity).
Construction of superstructure	Stone masonry brick masonry, Hollow concrete block masonry, composite masonry, cavity wall, doors and windows, vertical communication (stairs, lifts escalators), scaffolding and shoring.
Building finishes	Floors (finishes, process of laying), walls (plastering, pointing, painting) and roofing materials including RCC).
Building Maintenance	Cracks (causes, type, repairs- grouting, epoxy etc.), settlement (causesand remedial measures), and re-baring techniques.
Building drawing	Conventions (type of lines, symbols), planning of building (principles of planning for residential and public buildings, rules and byelaws), drawing (plan, elevation, section, site plan, location plan, foundation plan, working drawing) perspective drawing.
Concrete Technology	Properties of various types/ grades of cement, properties of coarse and fine aggregates, properties of concrete (water cement ratio properties of fresh and hardened concrete), Concrete, quality control of concrete (batching, formwork, transportation, placing, compaction, curing waterproofing), extreme weather concreting and chemical admixtures, properties of special concrete (ready mix, RCC, pre-stressed, fibre reinforced precast high performance).

Surveying	Types of survey, chain and cross staff survey (principle, ranging triangulation, chaining, errors, finding area), compass survey (principle, bearing of line, prismatic compass, traversing, local attraction, calculation of bearings, angles and local attraction) levelling (dumpy level, recording in level book. Temporary adjustment, methods of reduction of levels, classification of levelling, tilting level, auto level, sources of errors, precautions and difficulties in levelling), contouring (contour interval, characteristics, methods of locating, interpolation, establishing grade contours, uses of contour maps), area and volume measurements, [lane table survey (principles, setting, method) theodolite survey (components, adjustments, measurements, traversing), Tachometric survey curves (types, setting out), advanced survey equipment, aerial survey and remote sensing.
Computer Aided Design	CAD Software (AutoCAD, Auto Civil, 3D Max etc.), CAD commands, generation of plan, elevation, section, site plan, area statement, 3Dview.
Geo Technical Engineering	Application of Geo Technical Engineering in design of foundation, pavement, earth retaining structures, earthen dams etc., physical properties of soil, permeability of soil and seepage analysis, shear strength of soil, bearing capacity of soil, compaction and stabilizationof soil, site investigation and sub soil exploration.
Hydraulics	Properties of fluid, hydrostatic pressure, measurements of liquid pressure in pipes, fundamentals of fluid flow, flow of liquid through pipes, flow through open channel, flow measuring devices, hydraulic machines.
Irrigation Engineering	Hydrology, investigation and reservoir planning, percolation tanks, diver head works.
Mechanics of Structure	Stress and strain, shear force and bending moment, moment of intertia stresses in beams analysis of trusses, strain energy.
Theory of structure	Direct and bending stresses, slope and deflection, fixed beam, continuous beam, moment distribution method, columns.
Design of Concrete Structure	Working Stress method, Limit State method, analysis and design of singly reinforced and doubly reinforced sections shear, bond and development length, analysis and design of T Beam, slab axially laded column and footings.
Design of Steel Structure	Types of sections, grades of steel, strength characteristics, IS Code, Connections, Design of tension and compression members, steel roof truss, beams, column bases.

Transportation Engineering	Railway Engineering (alignment and gauges, permanent way, railway track geometrics, branching of tracks, stations and yards, track maintenance), Bridge engineering (site selection, investigation, component parts of bridge, permanent and temporary bridges, inspection and maintenance), Tunnel engineering (classification, shape and sizes, tunnel investigation and surveying, method of tunnelling in various strata, precautions, equipment, explosives lining and ventilation).
Highway Engineering	Road Engineering, investigation for road project geometric design of highways, construction of road pavements and materials traffic engineering, hill roads drainage of roads, maintenance and repair of roads.
Environmental Engineering	Environmental pollution and control, public water supply, domestic sewage, solid waste management, environmental sanitation and plumbing.
Advanced Construction Techniques and Equipment	Fibers and plastics, artificial timber, advanced concreting methods (under water concreting, ready mix concrete, tremix concreting, special concretes), formwork, pre-fabricated construction, soil reinforcing techniques, hosting and conveying equipment, earth moving machinery (exaction and compaction equipment), concrete mixers, stone crushers, pile driving equipment, working of hot mix bitumen plant bitumen paver, floor polishing machines.
Estimating and Costing	Types of estimates (approximate, detailed), mode of measurements and rate analysis.
Contracts and Accounts	Types of Engineering Contracts Tender and tender documents, payment, specification.