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QUESTION PAPERS

Syllabi of Various Civil Engineering Exams Published by KPSC

ASSISTANT PROFESSOR IN CIVIL ENGINEERING (2023)

Module I (25 marks)

Engineering Mechanics, Mechanics of Structures, Concrete and Construction Technology, Surveying, Quantity surveying and Valuation.

Mechanics-statics-coplanar forces-conditions of equilibrium, support reactions (simply supported and overhanging beams)- Friction-laws of friction-applications, Centre of gravity, moment of inertia of plane areas-Dynamics-rectilinear motion-Newton's laws of motion- curvilinear motion.

Simple stress and strain relationship in two dimensions- normal and shear stresses & strains-relationship between elastic constants, Bending Moment & Shear force for cantilever beams and Simply supported beams for different types of loading. Bending stresses and shear stresses in symmetrical cross sectionsprincipal stresses -Torsion of solid and hollow circular shafts. Direct and bending stresses in short columns-buckling/crippling load for columns with different end conditions.

Concrete –fresh and hardened properties-mix design- Aggregates – Mechanical & Physical properties- Grading requirements. Construction- planning and scheduling- bar charts,CPM,PERT.

Principles of surveying and levelling, contouring, theory of errors, reduction of levels in levelling. computation of areas and volume, theodolite, triangulation, Total station-working principles.

Quantity surveying & valuation – Building construction – detailed specification, preparation of data and analysis of rates for various items of work. Type of estimates – Detailed estimate for buildings. Valuation methods. GIS, Geoinformatics, Total Action

Module II: Geotechnical Engineering (15 marks)

Soil Mechanics—basic soil properties -relationship between basic soil properties. Index properties - sieve analysis – well graded, poorly graded and gap graded soils,Stoke's law, hydrometer analysis, relative density, consistency, Atterberg Limits, classification of soils. Permeability of soils -Principle of effective stress -Shear strength of soil, compressibility and consolidation - normally consolidated, under consolidated and over consolidated states - estimation of pre consolidation pressure estimation of magnitude of settlement of normally consolidated clays, coefficient of consolidation. Stability of finite slopes - Toe failure, base failure, slip failure - Factor of safety with respect to cohesion and angle of internal friction - stability number. Compaction of soils - Standard Proctor, Modified Proctor, I.S. light & Heavy Compaction Tests – OMC - Zero Air voids line - Control of compaction. Stresses in soil due to loaded areas - vertical stress beneath loaded areas of strip, rectangular and circular shapes, Isobarspressure bulbs-lateral earth pressure – at-rest, active and passive earth pressures - Influence of surcharge, inclined backfill and water table on earth pressure-Earth pressure on retaining walls with layered backfill.

Shallow foundations – ultimate, safe and allowable bearing capacity, failure mechanism, local and general shear failure - factors affecting bearing capacity – influence of water table -allowable bearing capacity of Rafts on sands and clays. Deep foundations - elements of a well foundation – problems encountered in well sinking – methods to rectify tilts and shifts. Pile foundations - point bearing and friction piles - bearing capacity of single pile in clay and sand[I.S. Static formulae] -group action - group efficiency - capacity of Pile groups.

ASSISTANT ENGINEER (DIRECT & BY TRANSFER)
KERALA WATER AUTHORITY (2022)

PART I - CIVIL ENGINEERING [25 Marks]

1. Mechanics of Solids and Structural Analysis (4 Marks)

Concept of stress and strain, relationship between elastic Constants, strain energy and complementaryenergy-strain energy due to tension. Bending moment and shear force, Stresses in beams, beams of uniform strength - beams of two materials – strain energy due to bending - shearing stresses in beams.

Stress on inclined planes for axial and biaxial stress fields - principal stresses - Mohr's circle of stress. Thin and Thick Cylinders, Torsion of solid and hollow circular shafts. Springs: Close coiled and open coiled helical springs. Deflection of beams, Theory of columns, Truss analysis, Displacement response of statically determinate structural systems using energy methods, Principle of virtual work, Statically indeterminate structures, Strain Energy methods, Moving loads and influence lines, Arches. Slope Deflection Method, Moment Distribution Method, Clapeyrons Theorem (Three Moment Equation).

2. Fluid Mechanics and Water Resources Engineering (4 Marks)

Fluid Statics- Fluid pressure, Buoyancy and floatation, Fluid Kinematics, Dynamics of fluid flow, Flow through orifice and notches, Flow through pipes, Boundary layer, Drag and Lift on immersed bodies. Hydraulic machines- flow through vanes (moving and stationary) Impulse and reaction Turbines, Centrifugal Pumps, Open channel flow, Uniform flow, Hydraulic Jump, Gradually varied flow, Dimensional analysis and model testing.

Hydrologic cycle, Precipitation, Infiltration and Evaporation-measurement and data analysis. Runoff-components and computation, Hydrograph, Unit Hydrograph and SHydrograph. Irrigation types and methods-Soil water plant relationships, Frequency of irrigation, Computation of crop water requirement. Stream flow measurement -Stage- discharge curve. Meandering of rivers, river training works. Surface water systems: diversion and storage systems, reservoir - estimation of storage capacity and yield of reservoirs - reservoir sedimentation -useful life of reservoir. Groundwater - Aquifer types and properties - Steady radial flow into a well. Estimation of yield of an open well.

3. Surveying and Levelling, Quantity Surveying and Valuation (4 Marks)

Basics of Surveying, Levelling and Contouring, Area and Volume Computation, Theodolite Survey, Mass Diagram. Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, Bearing of survey lines, Local attraction, Declination, Dip, Latitude and Departure, Methods of orientation, Principle of resection. Principles of levelling- Dumpy level, booking and reducing levels, Methods- simple, differential, reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in leveling. Triangulation, Theory of Errors, Electronic Distance Measurement, Total Station Survey, Global Positioning Systems, Remote Sensing, Contouring: Characteristics, methods, uses. Geographical Information System.

Analysis of rates - Data book and schedule of rates, Analysis of rates for various items of work, Detailed specification. Types of Estimate. Detailed estimate including quantities, abstract and preparation of various items of works, Preparation of bar bending schedules for various RCC works. Valuation- Methods of valuation, Depreciation, Fixation of rent.

4. Building materials, Construction Technology, Construction Management (3 Marks)

JUNIOR INSTRUCTOR – SURVEYOR {INDUSTRIAL TRAINING}SR FOR SC/ST AND ST ONLY

MODULE 1 – FUNDAMENTAL DEFINITIONS & CONCEPTS IN SURVEYING (10 marks)

Primary divisions of survey, Classification of survey. Basic principles of surveying. Units of measurements. Plans and maps. Scales – different types – representative fraction. Errors in surveying – Sources – kinds of errors – permissible error.

MODULE 2 - SURVEY USING CHAIN / TAPE (12 marks)

Linear measurements – different methods. Chain surveying - Instruments for chain surveying – chains – types of chain, Tapes – types. Ranging out survey lines. Measurement of length using chain and tape. Chaining on sloping ground – different methods. Errors in chaining.

Chain triangulation – Survey lines – arrangement of survey lines. Offsets for locating features. Cross staff survey. Field work and entering in field book. Conventional signs. Instruments for setting out right angles. Obstacles in chaining – methods to overcome obstacles. Plotting a chain survey.

MODULE 3 – PLANE TABLE SURVEYING (8 marks)

Instruments used in plane table surveying. Working operations. Methods of plane tabling – radiation, intersection and traversing.

MODULE 4 – COMPASS SURVEYING (10 marks)

Instruments for measurement of angles or directions. Bearing of a survey line. Designation of bearings. Conversion of bearings from one system to the other. Fore bearing and back bearing. Calculation of angles from bearings and vise versa. Prismatic and Surveyor's compass. Dip and Declination. Local attraction. Methods of correction of observed bearings.

MODULE 5 – LEVELLING & CONTOURING (12 marks)

Definition of terms in levelling. Methods of levelling. Levelling instruments. Types of level. Types of levelling staff. Temporary adjustments of a level. Simple levelling and differential levelling. Calculation of Reduced levels – Height of instrument method and Rise & fall method. Reciprocal levelling. Cross-sectioning. Profile levelling.

Contouring – Contour interval. Charecteristics of contours – methods of locating contours. Interpolation of contours. Contour gradient. Uses of contour maps.

MODULE 6 – THEODOLITE TRAVERSING (13 marks)

Definition and terms in theodolite surveying. Types of theodolite. Parts of a transit theodolite. Temporary and permanent adjustments of a theodolite. Measurement of horizontal angle. Measurement of vertical angles. Miscellaneous operations with theodolite.

Traverse survey – types of traverses. Methods of traversing – loose needle method, fast needle method. Checks in closed traverse, checks in open traverse. Traverse computations – Latitude and departure, Consecutive coordinates and independent coordinates. Closing error. Balancing a traverse – Bowditch's method and Transit method. Gale's traverse table. Omitted measurements.

MODULE 7–TACHEOMETRIC SURVEY & HYDROGRAPIC SURVEY (10 marks)

Instruments used in tacheometry. Different systems of tacheometric measurements – stadia method and tangential method. Use of anallactic lens. Hydrographic survey - Horizontal and vertical controls. Shore line

Name of Post : **Work Superintendent** Question Paper Code : **264 / 2006**
Department : **Agriculture** Date of test : **14/10/2006**

1. Vertical member provided to divide a panel vertically is

A. Rail B. Style
C. Mullion D. Transom

2. By using ……hinge, it is possible to raise the door shutter nearly'10 mm above floor level.

A. Strap B. Back flap
C. Parliamentary D. Skew butt

3. Ratio of the length of the drawing to the actual size of the object is termed as

A. FAR B. RF
C. SF D. SFR

4. Trimmed size of A2 drawing sheet is termed as

A. 420 x594 B. 841 x 1189
C. 594 x 841 C. None of these

5. A solid figure having six equal square surface is

A. Hexagon B. Cube
C. Tetrahedron D. Hexahedron

6. Cast iron contain ……% carbon

A.1.5 to 6.5 B. 4 to 8
C. 5 to 10 D. None of these

7. Compressive strength of 1: 1 1/2 : 3 mix concrete after 28 days

A. 10 N/mm^2 B. 15 N/ MM^2
C. 20 N/mm^2 D. 25 N/mm^2

8. One micron is …….metre

A. 10^{-2} B. 10^{-3}
C. 10^{-6} D. 10^{-12}

9. For the construction of brick wall ..... bond is commonly used

A. English Bond B. Flemish Bond
C. Rat – Trap Bond D. Monk Bond

10. Adjacent side divided by hypotenuse of a triangle is

A. Sin θ B. tan θ
C. Cos θ D. None of these

11. Two point and three point problems are typical cases of

A. Radiation B. Intersection
C. Traversing D. Resection

12. The inclination of the needle with horizontal is…… of the needle

A. Dip B. Declination
C. Azimuth D. Meridian

13. The field book in chain surveying is about ….. and opens length wise

A. 40 cm x 20 cm B. 20 cm x 20 cm
C. 40 cm x 12 cm D. 20 cm x 12 cm

14. …..is the most suitable well-conditioned triangle in chain survey

A. Right Angled Triangle
B. Irregular triangle
C. Isosceles Triangle
D. Equilateral Triangle

15. Live load for classroom building is :

A. 150 kg/m^2 B. 300 kg/m^2
C. 400 kg/m^2 D. 500 kg/m^2

16. Imaginary lines containing vertical joints of masonry is

A. Perpends B. Stringer
C. Springer D. none of these

17. Instrument used for reducing the drawing is

A. Planimeter B. Penta graph
C. Animometer D. Current meter

18. One hectare is equal to …….acres

A. 247 B. 24.70
C. 2.47 D. 0.247

19. -40^{0}C is equal to

A. -40^0 F B. -140^{0}F
C. 172^0 F D. 212^0 F

20. The outer most part of a flush door is called

A. Core B. Laminies
C. Frame D. Planks

Name of Post : **Draftsman Gr. - I/Town Planning surveyor Gr. - I** Question Paper Code : **124/2023**
Department : **Town and Country Planning** Date of test : **18/7/2023**

1. A 20 m chain was used to measure the length of line and was found as 500 m. later it was found that the chain was 0.05 m too long. What is the true length of line ?

A. 500.25 B. 498.75
C. 499.75 D. 501.25

2. Primary line plotted on paper is called

A. Tie line B. Check line
C. Base line D. Boundary line

3. The line normal to a level surface is known as

A. Level line B. Plumb line
C. Line of collimation D. Horizontal line

4. What is/are principle/s of plane table surveying ?

i. An unknown point can be fixed by knowing its directions from two known positions.

ii. The whole plot is divided into right angled triangles and trapezium, computing individual areas and adding these areas together to get the area of whole plot.

A. i only B. ii only
C. i and ii D. None of these

5. Which of the following is/are errors due to the external forces in compass survey ?

i. Variations in declination
ii. Incorrect centering
iii. Local attraction

A. i only B. ii and iii only
C. iii only D. i and iii only

6. The line joining the optical center of object glass to the center of the eye piece is known as

A. Axis of level tube B. Horizontal axis
C. Axis of telescope D. Line of sight

7. Tellurometer uses _____ of EM spectrum.

A. light waves B. Radio waves
C. Infrared rays D. Gamma rays

8. The outer line of an object are drawn using _____ pencil.

A. 3H B. HB
C. H D. 2H

9. The layout plan are drawn to a scale not less than

A. 1 : 2000 B. 1 : 500
C. 1 : 1000 D. 1 : 1400

10. The horizontal clearance of building for low and medium voltage line is

A. 2.1 m B. 3 m
C. 1.2 m D. 2.5 cm

11. The correct set of the combination of total station is

A. Theodolite, EDM
B. Electronic theodolite, EDM
C. EDM, GPS
D. Theodolite, Compass

12. How many minimum satellites are operational in the constellation of GPS ?

A. 20 B. 24
C. 28 D. 32

13. How many meridians are used in surveying ?

A. 6 B. 8
C. 3 D. 5

14. Which of the following expression is correct to calculate the correction of curvature (C_c) in levelling ? ('d' is the distance sighted measured in km)

A. $C_c = 0.05658\ d^2$ m B. $C_c = 0.07849\ d^2$ m
C. $C_c = 0.01121\ d^2$ m D. $C_c = 0.06728\ d^2$ m

15. The length to width ratio of A2 drawing paper is

A. $1 : \sqrt{2}$ B. 1 : 2
C. $\sqrt{2} : 1$ D. $1 : \sqrt{3}$

16. The command used to draw an arc between two non parallel entities is called

A. Stretch B. Array
C. Fillet D. Extend

17. Which of the following are draw commands used in AutoCAD ?

i. Arc ii. Hatch
iii. Text

ANSWER KEY

1	**B**	21	**D**	41	**A**	61	**D**	81	**D**
2	**B**	22	**A**	42	**A**	62	**C**	82	**C**
3	**B**	23	**B**	43	**B**	63	**D**	83	**B**
4	**A**	24	**C**	44	**D**	64	**B**	84	**A**
5	**D**	25	**D**	45	**A**	65	**B**	85	**C**
6	**C**	26	**B**	46	**C**	66	**C**	86	**B**
7	**B**	27	**C**	47	**B**	67	**C**	87	**D**
8	**C**	28	**A**	48	**A**	68	**C**	88	**B**
9	**B**	29	**C**	49	**B**	69	**D**	89	**C**
10	**C**	30	**B**	50	**A**	70	**C**	90	**D**
11	**B**	31	**A**	51	**A**	71	**A**	91	**C**
12	**B**	32	**D**	52	**B**	72	**B**	92	**C**
13	**C**	33	**B**	53	**B**	73	**A**	93	**D**
14	**B**	34	**C**	54	**C**	74	**C**	94	**A**
15	**C**	35	**A**	55	**D**	75	**B**	95	**D**
16	**C**	36	**B**	56	**D**	76	**B**	96	**C**
17	**D**	37	**C**	57	**C**	77	**A**	97	**C**
18	**B**	38	**B**	58	**B**	78	**D**	98	**D**
19	**B**	39	**B**	59	**B**	79	**C**	99	**B**
20	**A**	40	**B**	60	**C**	80	**D**	100	**A**