

## Syllabus and Marking Scheme for MAH-B.Planning-CET 2022

The On Line test will have 100 questions based on Mathematics (Part-I), Aptitude Test (Part-II) and Planning Based Questions (Part-III) for 200 marks.

Sr. No.	Paper	Topic	No. of Questions	Mark/s per Question	Total Marks	Duration (minutes)
1	Part-I	Mathematics	25	02	50	30
2	Part-II	Aptitude Test	50	02	100	60
3	Part-III	Planning Based Questions	25	02	50	30
<b>TOTAL</b>			<b>100</b>	<b>-</b>	<b>200</b>	<b>120</b>

### Notes:

- The test will comprise of multiple choice objective type questions (Four Options)
- There is no negative marking System for this test.
- Test Duration: 120 minutes
- Medium of CET: English
- Mode of Examination – Online

## **9.1 SYLLABUS FOR MAH-B.Plan CET 2022**

### **Part I - MATHEMATICS**

#### **Unit-1: Sets, Relations and Functions:**

Sets and their representation: Union, intersection and complement of sets and their algebraic properties; Power set; Relation, Type of relations, equivalence relations, functions; one-one, into and onto functions, the composition of functions.

#### **Unit-2: Complex Numbers and Quadratic Equations:**

Complex numbers as ordered pairs of reals, Representation of complex numbers in the form  $a + ib$  and their representation in a plane, Argand diagram, algebra of complex number, modulus and argument (or amplitude) of a complex number, triangle inequality, Quadratic equations in real and complex number system and their solutions, Relations between roots and co-efficient, nature of roots, the formation of quadratic equations with given roots.

#### **Unit-3: Matrices and Determinants:**

Matrices, algebra of matrices, type of matrices, determinants and matrices of order two and three, properties of determinants, evaluation of determinants, area of triangles using determinants, Adjoint and evaluation of inverse of a square matrix using determinants and elementary transformations, Test of consistency and solution of simultaneous linear equations in two or three variables using determinants and matrices.

#### **Unit-4: Permutations and Combinations:**

The fundamental principle of counting, permutation as an arrangement and combination as section, Meaning of  $P(n,r)$  and  $C(n,r)$ , simple applications.

#### **Unit-5: Mathematical Inductions:**

Principle of Mathematical Induction and its simple applications

#### **Unit-6: Binomial Theorem and its Simple Applications:**

Binomial theorem for a positive integral index, general term and middle term, properties of Binomial coefficients and simple applications

#### **Unit-7: Sequence and Series:**

Arithmetic and Geometric progressions, insertion of arithmetic, geometric means between two given numbers, Relation between A.M and G.M sum up to  $n$  terms of special series;  $S_n$ ,  $S_{n^2}$ ,  $S_{n^3}$ . Arithmetico-Geometric progression.

#### **Unit-8: Limit, Continuity and Differentiability:**

Real-valued functions, algebra of functions, polynomials, rational, trigonometric, logarithmic and exponential functions, inverse function. Graphs of simple functions.

Limits, continuity and differentiability. Differentiation of the sum, difference, product and quotient of two functions. Differentiation of trigonometric, inverse trigonometric, logarithmic, exponential, composite and implicit functions; derivatives of order up to two, Rolle's and Lagrange's Mean Value Theorems, Applications of derivatives: Rate of change of quantities, monotonic-Increasing and decreasing functions, Maxima and minima of functions of one variable, tangents and normal.

### **Unit- 9: Integral Calculus:**

Integral as an anti-derivative, Fundamental Integrals involving algebraic, trigonometric, exponential and logarithms functions. Integrations by substitution, by parts and by partial functions, Integration using trigonometric identities.

Evaluation of simple integrals of the type

$$\int \frac{dx}{x^2+a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{a^2-x^2}, \int \frac{dx}{\sqrt{a^2-x^2}}$$

$$, \int \frac{dx}{ax^2+bx+c}, \int \frac{dx}{\sqrt{ax^2+bx+c}}, \int \frac{(px+q)dx}{ax^2+bx+c},$$

$$\int \frac{(px+q)dx}{\sqrt{ax^2+bx+c}}, \int \sqrt{a^2 \pm x^2} dx, \int \sqrt{x^2 - a^2} dx$$

Integral as limit of a sum. The fundamental theorem of calculus, properties of definite integrals. Evaluation of definite integrals, determining areas of the regions bounded by simple curves in standard form.

### **Unit-10: Differential Equations**

Ordinary differential equations, their order and degree, the formation of differential equations, solution of differential equation by the method of separation of variables, solution of a homogeneous and linear differential equation of the type.

$$\frac{dy}{dx} + p(x)y = q(x)$$

### **Unit-11: Co-Ordinate Geometry**

Cartesian system of rectangular co-ordinates, 10 in a plane, distance formula, sections formula, locus and its equation, translation of axis, slop of a line, parallel and perpendicular lines, intercept of a line on the co-ordinate axes.

Straight line - Various forms of equations of a line, intersection of lines, angles between two lines, conditions for concurrence of three lines, the distance of a point from a line, equations of internal and external bisectors of angles between two lines co-ordinate of the centroid, orthocentre and circumcentre of a triangle, equation of the family of lines passing through the point of intersection of two lines.

Circle, conic sections - A standard form of equations of a circle, the general form of the equation of a circle, its radius and central, equation of a circle when the endpoints of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be tangent to a circle, equation of the tangent, sections of conics, equations of conic sections (parabola, ellipse and hyperbola) in standard forms, condition for  $Y = mx + c$  to be a tangent and point (s) of tangency.

### **Unit-12: Three Dimensional Geometry**

Coordinates of a point in space, the distance between two points, section formula, direction ratios and direction cosines, the angle between two intersecting lines. Skew lines, the shortest distance between them and its equation. Equations of a line and a plane in different forms, the intersection of a line and a plane, coplanar lines.

### **Unit-13: Vector Algebra**

Vectors and scalars, the addition of vectors, components of a vector in two dimensions and three-dimensional space, scalar and vector products, scalar and vector triple product.

### **Unit-14: Statistics and Probability**

Measures of discretion; calculation of mean, median, mode of grouped and ungrouped data calculation of standard deviation, variance and mean deviation for grouped and ungrouped data.

Probability: Probability of an event, addition and multiplication theorems of probability, Baye's theorem, probability distribution of a random variate, Bernoulli trials and binomial distribution.

### **Unit-15: Trigonometry**

Trigonometrical identities and equations, trigonometrical functions, inverse trigonometrical functions and their properties, heights and distance.

### **Unit -16: Mathematical Reasoning**

Statement logical operations and, or, implies, implied by, if and only if, understanding of tautology, contradiction, converse and contrapositive.

## **Part II - APTITUDE**

### **Unit-1**

Awareness of persons. Buildings, Materials. Objects, Texture related to Architecture and Build-environment, Visualising three dimensional objects from two-dimensional drawings. Visualising. Different sides of three-dimensional objects. Analytical Reasoning Mental Ability (Visual, Numerical and Verbal)

## **Unit- 2: Three Dimensional- Perception:**

Understanding and appreciation of scale and proportions of objects, building forms and elements, colour texture harmony and contrast Design and drawing of geometrical or abstract shapes and patterns in pencil.

Transformation of forms both 2D and 3D union, subtraction rotation, development of surfaces and volumes, Generation of Plan, elevations and 3D views of objects, Creating two dimensional and three-dimensional compositions using given shapes and forms.

## **Part III – PLANNING**

### **Unit-1: General Awareness**

General knowledge questions and knowledge about prominent cities, development issues, government programmes etc.

### **Unit-2: Social Sciences**

The idea of nationalism, nationalism in India, pre-modern world, 19th-century global economy, colonialism and colonial cities, industrialisation, resources and development, types of resources, agriculture, water, mineral resources, industries, national economy; Human Settlements.

Power-sharing, federalism, political parties, democracy, the constitution of India.

Economic development- economic sectors, globalisation, the concept of development, poverty; Population structure, social exclusion and inequality, urbanisation, rural development, colonial cities.

### **Unit-3: Thinking Skills**

Comprehension (unseen passage); map reading skills, scale, distance, direction, area etc.; critical reasoning; understanding of charts, graphs and tables; basic concepts of statistics and quantitative reasoning.