TS ECET - 2024

Syllabus for B.Sc.(Mathematics)

MATHEMATICS (100 Marks)

Unit- I: Partial Differentiation

Functions of two variables, Neighborhood of a point(a, b), Continuity of a Function of two variables, Continuity at a point, Limit of a Function of two variables, Partial Derivatives - Geometrical representation of a Function of two Variables - Homogeneous Functions. Theorem on Total Differentials, Composite Functions, Differentiation of Composite Functions, Implicit Functions, Equality of $f_{xy}(a,b)$ and $f_{yx}(a,b)$, Taylor's theorem for function of two variables, Maxima and Minima of functions of two variables, Lagrange's Method of undetermined multipliers.

Unit- II: Curvature and Lengths of Plane Curves

Definition of Curvature, Radius of Curvature, Length of Arc as a Function, Derivative of arc, Radius of Curvature, Cartesian Equations, Newtonian Method , Centre of Curvature, Chord of Curvature. Evolutes and Involutes, Properties of the evolutes. One Parameter Family of Curves, Definition and Determination of Envelope. Lengths of Plane Curves: Expression for the lengths of curves $y = f(x)$, Expressions for the length of arcs x=f(y); x=f(t), y= ϕ(t); r=f(θ).

Unit- III: Differential Equations of First Order

Variables Separable method, Homogeneous Differential Equations, Differential Equations Reducible to Homogeneous Form, Linear Differential Equations, Differential Equations Reducible to Linear Form, Exact differential equations, Integrating Factors, Change in variables. Differential Equations of first order but not first degree: Equations Solvable for p, Equations Solvable for y, Equations Solvable for x, Equations that do not contain x (or y), Equations Homogeneous in x and y, Equations of the First degree in x and y, Clairaut's equation.

Unit- IV: Higher order Linear Differential Equations and PDE

Higher order Linear Differential Equations: Solution of homogeneous linear Differential equations with constant coefficients, Solution of non-homogeneous differential equations $P(D)y = Q(x)$ with constant coefficients by means of polynomial operators when $Q(x) = e^{ax}, b\sin ax, b\cos ax, bx^k, Ve^{ax}$, Method of undetermined coefficients. Method of variation of parameters, Lineardifferential equations with non-constant coefficients, the Cauchy-Euler Equation, Legendre's Linear Equations, Partial Differential Equations: Formation and solution, Equations easily integrable, Linear equations of first order.

Unit- V: Sequences and Series

Sequences: Limits of Sequences, Limit Theorems for Sequences, Monotone Sequences and Cauchy Sequences, Subsequences, Limit superior and Limit inferior, Series, Alternating Series and Integral Tests.

Unit- VI: Continuity, Differentiation and Riemann Integral

Continuity: Continuous Functions, Properties of Continuous Functions, Uniform Continuity, Limits of Functions, Basic properties of the derivative, the mean value theorems, L-Hospital Rule, Taylor's theorem. The Riemann Integral, Properties of Riemann Integral, Fundamental Theorem of Calculus.

Unit- VII: Groups

Definition and Examples of Groups, Elementary Properties of Groups, Finite Groups, Subgroups, Subgroup Tests, Cosets and Lagrange's Theorem, Properties of Cosets, Cyclic Groups, Properties of Cyclic Groups, Normal Subgroups and Factor Groups, Group Homomorphisms, Properties of Homomorphisms, The First Isomorphism Theorem, Automorphisms, Permutation Groups: Definition and Properties of Permutations, Isomorphisms, Cayley's Theorem

Unit- VIII: Rings

Rings, Examples of Rings, Properties of Rings, Subrings, Integral Domains, Fields, Characteristics of a Ring. Ideals, Factor Rings, Prime Ideals and Maximal Ideals. Ring Homomorphisms and isomorphisms.

Unit- IX: Vector Spaces

Vector Spaces and Subspaces -Null Spaces, Column Spaces, and Linear Transformations, Linearly Independent Sets, Bases, Coordinate Systems, The Dimension of a Vector space, Rank, Change of Basis.

Unit- X: Diagonalization and Orthogonality

Eigenvalues and Eigenvectors, The Characteristic Equation, Diagonalization, Eigenvectors of Linear Transformations, Inner Product spaces, Length and Orthogonality, Orthogonal Sets, Orthogonal Projections, The Gram-Schmidt Process.

ANALYTICAL ABILITY (50 Marks)

Unit- I: Data Sufficiency: A question is given followed by data in the form of two statements labeled as I and II. If the data given in I alone is sufficient to answer the question then choice (1) is the correct answer. If the data given in II alone is sufficient to answer the question, then choice (2) is the correct answer. If both I and II put together are sufficient to answer the question but neither of the statements alone is sufficient, then Choice (3) is the correct answer. If both I and II put together are not sufficient to answer the question and additional data is needed, then choice (4) is the correct answer.

Unit- II: Sequences and Series: Analogies of numbers and alphabets completion of blank spaces following the pattern in A: b:: C:d relationship, odd thing out; Missing number in a sequence or a series.

Unit- III: Data Analysis: The data given in a Table, Graph, Bar Diagram, Pie Chart, Venn diagram or a passage is to be analyzed and the questions pertaining to the data are to be answered.

Unit- IV: Coding and Decoding Problems: A code pattern of English Alphabet is given. A given word or a group of letters are to be coded and decoded based on the given code or codes.

Unit- V: Date, Time and Arrangement Problems: Calendar problems, Clock Problems, Blood Relationship, Arrivals, Departures and Schedules; Seating Arrangements, Symbol and Notation Interpretation.

COMMUNICATIVE ENGLISH (50 Marks)

Unit- I: ***Vocabulary***

i.) Synonyms
ii.) Antonyms
iii.) Spelling
iv.) One Word Substitutes
v.) Words Often Confused
vi.) Idioms
vii.) Phrasal Verbs

Unit- II: ***Grammar***

i.) Articles
ii.) Prepositions
iii.) Question Tags
iv.) Active / Passive Voice
v.) Tenses
vi.) Concord
vii.) Correction of Sentences

Unit- III: ***Reading Comprehension***

(a) Reading Comprehension (Passage 1)
(b) Reading Comprehension (Passage 2)

*****