

TAMIL NADU PUBLIC SERVICE COMMISSION
ASSISTANT DIRECTOR OF HANDLOOMS AND TEXTILES
TEXTILE TECHNOLOGY (DEGREE STANDARD)

CODE NO:235

Unit I: Fibre Identification and Blend analysis

- i) Textile fibre Classification.
- ii) Fine, gross structure and properties of fibres
- iii) Microscopic, physical and chemical test methods for fibre identification; blend analysis
- iv) Morphology characterization – Density, XRD, Electron microscopy
- v) Thermal characterization methods - DSC, DMA / TMA, TGA

Unit II: Physical Properties of Fibres

- i) Mechanical – Tensile, Elastic recovery, Time Effect, Bending, Twisting & Compression
- ii) Optical - Absorption and dichroism, Reflection and lustre.
- iii) Electrical and Thermal Properties - Dielectric property, Static Electricity, Structural changes in fibres on thermal treatment

Unit III: Synthetic Fibre Spinning and Post Spinning Operations

- i) Requirements of fibre forming polymers
- ii) Spinning of Polymers - Melt Spinning, Wet spinning, Dry spinning
- iii) Post Spinning Operations – Drawing, Crimping, Heat setting, Tow-to-top conversion, Texturing methods

Unit IV: Spinning:

- i) Principles of opening, cleaning and mixing/blending of fibrous materials
- ii) Draft and Drafting, Irregularity introduced by drafting
- iii) Roller arrangements in drafting systems;
- iv) Combing cycle, combing efficiency, lap preparation;
- v) Mechanism of roving bobbin building, roving twist;
- vi) Ring Cop formation, forces acting on yarn and traveller;
- vii) Single and folded yarn twist, production of core spun / compact spun yarn.
- viii) Alternate Spinning systems - rotor spinning, air jet spinning, friction spinning.
- ix) Principles of long staple spinning – Jute, Wool

Unit V: Weaving:

- i) Warp winding - random and precision winding, winding parameters
- ii) Yarn clearers and Tensioners; yarn splicing
- iii) Types of warping - beam and sectional warping, pirn winding process;

- iv) Sizing Techniques, sizing of spun and filament yarns
- v) Primary, Secondary and Tertiary motions of loom, Loom timings.
- vi) Tappet, Dobby and Jacquard shedding;
- vii) Principles of Shuttleless Weft insertion systems.
- viii) Principles of Circular and Multiphase weaving
- ix) Basic woven fabric constructions and its derivatives

Unit VI: Testing & Quality Control:

- i) Sample selection techniques using statistics.
- ii) Measurement of fibre length, strength, fineness, maturity
- iii) HVI and AFIS techniques
- iv) Determination of yarn count, twist and hairiness
- v) Tensile testing of fibres, yarns and fabrics
- vi) Evenness testing of slivers, rovings and yarns
- vii) fabric properties - air permeability, drape, crease recovery, tear / bursting strength & abrasion.
- viii) Objective Evaluation of fabric hand - FAST and KESF
- ix) Statistical analysis of experimental results – Mean, SD, CV%

Unit VII: Chemical Processing:

- i) Preparatory processes for natural fibres, synthetics and common blends
- ii) Dyeing of fibres using various dye classes.
- iii) Batch-wise and continuous dyeing techniques
- iv) Styles of printing. Printing thickeners and auxiliaries.
- v) Printing of cotton with reactive dyes.
- vi) Printing of polyester with disperse dyes.
- vii) Mechanical and chemical finishing of cotton

Unit VIII: Knitting & Garments:

- i) Knitting - Yarn quality requirements, principles of weft and warp knitting
- ii) Basic weft and warp knitted structures and its properties
- iii) Garments - Pattern making, Spreading, Cutting, Marker efficiency
- iv) Stitches and Seams
- v) Types of Sewing machine
- vi) Sewing thread attributes
- vii) Inspection and Merchandising

Unit IX: Nonwovens & Technical Textiles:

- i) Nonwovens - Web formation
- ii) Bonding methods – mechanical, thermal and chemical.
- iii) Finishing and Application of nonwovens
- iv) Technical Textiles - Property requirements
- v) Industrial Textiles - Belts, Ropes, Tyre-cords, Coated abrasives
- vi) Automotive Textiles - Filter fabrics, Airbags, Carpets

- vii) Geotextiles – Applications in civil engineering
- viii) Agriculture Textiles – Crop covers, bird nets, soil mats and sacks
- ix) Packaging Textiles – Food packing and bags.

Unit X: Textile Management & Environment Conservation:

- i) Industrial Engineering – Work study, method study,
- ii) Costing – Elements, Balance sheet, P & L Account
- iii) Tools – TQM, 5S, Kaizen, MIS.
- iv) Marketing Management
- v) Industrial relations and Labour laws
- vi) Energy conservation in textile production process
- vii) Characteristics of Effluent
- viii) Effluent treatment.

TAMIL NADU PUBLIC SERVICE COMMISSION
ASSISTANT DIRECTOR OF HANDLOOMS AND TEXTILES
COMMERCE (POST GRADUATE DEGREE STANDARD)

CODE NO:236

UNIT I Company law- Types of companies – one-man company, small company, private company, Public company – Prospectus – types – Shelf prospectus, Red-herring prospectus - Appointment of directors – powers of directors - Audit committee – Related party transactions - Doctrine of indoor management - Modes of winding up

UNIT II Business Environment – Meaning – Environmental scanning and Strategic Early Warning System (SEWS), intellectual property rights and information policy – FDI and its impact on the economy, technology transfer - Corporate social responsibility - business and environment - Interface - legal, political, economic, social and cultural aspects

UNIT III Management– Definition and significance of management – Principles and functions of management - planning – organising - direction - motivation - co-ordination and control - management Vs administration - scientific management - rationalisation - personnel management - nature, scope, labour problem, employee turnover, absenteeism, trade union – Core Competence, TQM

UNIT IV Marketing– Definition and approaches to marketing –market segmentation - new product development – product life cycle - market channel - Pricing - advertisement and salesmanship - promotional strategies - consumer protection in India - Market Intelligence - Procedure and Law **relating** to import and export - Quality control Standardisation agencies - national and international – e-commerce – meaning, features, importance

UNIT V Taxation - Sales tax, excise duty, customs duty, MAT, VAT - Direct taxation: Income tax: computation of income under heads salaries and house property – Transfer pricing - **DTAA (Double Taxation Avoidance Agreement)** – **ICDS (Income Computation & Disclosure Standards)** – **GST**

UNIT VI Financial Accounting - Advanced problems in partnership accounts, Departmental and branch accounts, Hire purchase and Instalment system, Depreciation and Insurance Claims - Recent developments in accounting – social accounting, forensic accounting, fair value accounting, carbon accounting, kaizen accounting)

UNIT VII Management and Cost Accounting – Management Accounting - **Meaning and significance** - cash flow, fund flow - Ratio analysis - interpretation of financial statements - Marginal costing cost - Volume Profit relationship, Break-even - analysis - budgets - budgetary control - **Cost Accounting**– Nature and scope –

cost centre and profit centre - Standard Costing - Variance analysis - responsibility accounting - profit planning and control

UNIT VIII Financial Management – Goals of financial management – Capital budgeting – methods of evaluating capital investment projects – pay-back method, Accounting rate of Return method, Net Present Value method, Internal Rate of Return method – Cost of capital – meaning and significance – capital structure – Operating leverage, financial leverage, combined leverage – EBIT-EPS analysis

UNIT IX Auditing: Meaning and significance – Audit of companies - appointment, status, Powers, duties and liabilities of auditors - audit report of share capital and transfer of shares – Investigation – Secretarial audit

UNIT X Computer programming for Management- Concept, languages: **C, C + +, java, visual basic, Oracle, xBRL (Extensible Business Reporting Language)** - Computerised Accounting

TAMIL NADU PUBLIC SERVICE COMMISSION
ASSISTANT DIRECTOR OF HANDLOOMS AND TEXTILES
ECONOMICS (POST GRADUATE DEGREE STANDARD)

CODE NO:237

UNIT I

Importance and Scope of Economics - Micro and Macro Economics – Economic Statics and dynamics - Interdependence- Theory of consumer behaviour - Indifference curve analysis - Revealed Preference Theory - Elasticity of demand and its applications – Consumer's surplus.

UNIT II

Theory of production and cost - production function - optimum factor combination - Linear and Homogenous production function - Cobb - Douglas - CES production Function - Translog (TL) production function - Break even analysis.- Value - Price determination under different market structures – Producer's Surplus.

UNIT III

General Equilibrium analysis – Nash equilibrium - Welfare Economics – Welfare Criteria: Bergon's social welfare function - Pareto criterion and optimality conditions- Kaldor - Hicks Welfare Criterion - Scitovsky's Paradox – Arrow's impossibility theorem – Rawl's theory of social justice - Input - output analysis – Information (asymmetric).

UNIT IV

National income - Measurement - difficulties - Sectoral shares – Circular flow of income –Classical Theory of income and employment - Keynesian Analysis - Theory of aggregate demand and aggregate supply – IS - LM model - Absolute income hypothesis - Relative income hypothesis - Permanent income hypothesis – Multiplier – Accelerator – Business cycles.

UNIT V

Economic Systems - Market economy - Command economy - Mixed economy - Approaches to economic development - Adamsmith - Ricardo - Malthus - Schumpeter - Karl Marx - Gandhiji - J.C.Kumarappa - Periyar – Ambedkar Ideas.

UNIT VI

Money - Friedman's theory - Don Patikin's theory – Tobin's theory – Baumol's model - Inflation - Deflation - Causes - effects - measures to control.- Banking - Importance - Role and functions of Commercial Banks and Central Bank – Money Supply in India.

UNIT VII

Composition and direction of foreign trade - Importance of foreign trade and economic development - Balance of payments - Terms of trade – Foreign direct investment – Exchange rate - EXIM policy - GATT - WTO - Dunkel Draft - TRIPS - TRIMS – FEMA -UNCTAD - International Financial Institutions - IBRD and IMF - New International Economic Order.

UNIT VIII

Fiscal Function - Direct and Indirect taxes - Public expenditure - Public borrowing - techniques - Debt management Fiscal Federalism - Fiscal policy – Compensatory and functional finance - Types of budget - Budget formulation - Centre and State Financial Relations in India.

UNIT IX

Economic Development - leading issues in India and Tamil Nadu - Economic and non - economic factors - Agriculture - Prospects and problems – Trends in agricultural productivity – Green revolution - Land reform and effects - Rural Industrialization - Industry - Role of private and public Sectors - Industrial labour - Labour legislation - Social security measures.

UNIT X

Planning – Types of Planning - National and state objectives and achievements – Models adopted in Indian plans - New Economic Policy – Liberalization, Privatisation and Globalisation - Multi - National Corporations – Sustainable Development(Transition from MDGs to SDGs).

TAMIL NADU PUBLIC SERVICE COMMISSION
ASSISTANT DIRECTOR OF HANDLOOMS AND TEXTILES
MATHEMATICS (POST GRADUATE DEGREE STANDARD)

CODE NO:238

I. ALGEBRA

Group - examples - subgroup - Normal subgroups - homomorphisms - Isomorphism - Cayley's theorem - Cauchy's theorem - Sylow's theorem - Finite abelian groups - Rings - Euclidean rings - Polynomial rings - Polynomial over the rational field - Polynomials over Commutative rings - Division rings - Frobenius theorem. Field: Finite fields - Wedderburn's theorem, Extension Fields - Roots of Polynomials - Elements of Galois theory - Solvability of radicals - Linear Transformations: Canonical forms - Nilpotent transformations

II REAL ANALYSIS

Limit, Continuity, types of discontinuities, infinite limits, function of bounded variation, elements of metric spaces. Riemann Integral - Fundamental theorem of calculus - mean value theorem. Riemann - Stieltjes Integral, Infinite series and infinite products, sequences of functions, Fourier series and Fourier Integrals. Outer measure, measurable sets and Lebesgue measures, measurable functions. Littlewood's three principles. Lebesgue Integral of bounded function over a set of finite measure. Integration of a non negative function. General Lebesgue Integral.

III COMPLEX ANALYSIS

Local properties of analytic functions - Removable singularities Taylor's theorem - Zeros and poles, local mapping - maximum principle - Harmonic functions - Definitions & basic properties - mean value property - Poisson's formula - Schwarz's theorem - reflection principle - power series expansions - Weierstrass's theorem - Taylor's series, Laurent's series.

IV TOPOLOGY

Topological spaces & continuous functions, metric topology, Connectedness, compactness, countability and separation axiom, Fundamental group and covering spaces.

V. FUNCTIONAL ANALYSIS:-

Fundamentals of normed Linear spaces, bounded Linear maps on Banach spaces, open mapping theorem, converse of Reimann - Lebesgue Lemma, spaces of bounded linear maps, weak and weak convergence, compact linear maps, geometry of Hilbert space, Approximation and optimisation, Bounded operators of Hilbert spaces, spectrum of bounded operators on Hilbert spaces.

VI. DIFFERENTIAL EQUATIONS:-

Linear differential equations of higher order - Linear dependence and Wronskian basic theory - solutions in power series - Introduction to second order linear equations with ordinary points. Legendre equations and Legendre polynomial, Second order equations with regular singular points, Bessel equations. Partial differential equations; first order, complete Integral, general Integral, singular Integral, Compatible systems of first order equation, Charpit's method. Partial differential equations of second order - Linear and partial equations with constant co-efficients Laplace equation - Elementary solutions of Laplace equation.

VII DIFFERENTIAL GEOMETRY

Curves, analytic representation, arc length, tangent, osculating plane, Curvature, torsion, formula of Frenet, Contact, natural equations, helices, involutes & evolutes, Elementary theory of surfaces - Analytic representation - first & second fundamental forms, normal - tangent form, developable surfaces, Euler's theorem, Dupin's indicatrices - Conjugate directions, Triply orthogonal system of surface,

Fundamental Equations: Gauss, Gauss - Weingastern, Codassi, Curvilinear, Coordinates in space. Geodesics on surfaces Geodesic curvature, Geodesics, Geodesic Coordinates, surfaces of constant curvature, rotation of surfaces of constant curve.

VIII. MECHANICS AND FLUID DYNAMICS:-

STATICS:- Equilibrium of a system of particles, work and potential energy, friction, commoniatenary principles of virtual work - stability of equilibrium of forces in three dimensions. DYNAMICS:- Rectilinear motion - motion with constant acceleration motion under gravity - motion along an included plane - motion under gravity in a resisting medium Impulsive forces & Impact, Principles of Conservation of Linear momentum, Collision of two smooth spheres - Direct Impact of sphere on a fixed plane - Projectiles - Circular motion of a particle, Central orbits, moments of enertia, motions of a rigid body about a fixed axis - K.E. of rotation - moment of momentum - motion of a circular disc - hoop or a sphere rolling down an inclined plane.

Compressible flow; effects of compressibility, Linearised theory, thermodynamical consideration, energy equation, plane shock waves, oblique shockwaves, prantle-mayer expansion - Navier Stoke's equation - dissipation of energy - diffusion of vorticity condition of no slip - steady flow between concentric rotating cylinder - steady viscos flow in tubes of uniform cross section - uniqueness theorem, Reynolds number, Boundary Layer thoery.

IX. PROBABILITY & MATHEMATICAL STATISTICS: -

Probability of an event, Baye's theorem, Variables - random. Discrete & continuous distributions - Expected values & functions. Moment generating function and Charasteristic functions - Chebychev's inequality statements of uniqueness theorem & inverse theorems on charasteristics functions.

STANDARD DISTRIBUTIONS:

Binomial, poisson, normal & uniform Sampling distribution of Statistics based on normal distribution – Chi square concept of bivariate distributions, Correlation and regression, Linear prediction, rank Correlation Coefficient, Partial & multiple Correlation. Sample moments & their functions. Notion of sample - statistic - Chi square - distribution, t, Fisher's, Z distributions - distribution of regression coefficients.

SIGNIFICANT TESTS:

Concepts - parametric tests for small & large samples - Chisquare test - test of Independence by contingency table - theory of hypothesis testing - Power function - Most powerful tests - Uniformly most powerful test - unbiased tests.

X OPERATIONS RESEARCH

Origin & Development of operation's research, Nature & Characteristics of O.R. Models in O.R. General solution methods for O.R.models, uses and limitations of O.R.

LINEAR PROGRAMMING

Formulation of problem, graphical solutions, standard form. Definition of basic solution, degenerate solution, simplex method, Definition of artificial variable.

TRANSPORTATION PROBLEM

Definition, solutions to transportation problem - initial feasible solution - optimality test - Degeneracy - Travelling salesman problem. Sequencing : Processing n jobs through m machines, Replacement of equipment that deteriorates or falls suddenly.