10. COMMERCE AND ACCOUNTANCY

PAPER - I

ACCOUNTING AND FINANCE (PART - I)

Accounting, Auditing and Taxation

Accounting as a financial information system — Impact of behavioral sciences — Methods of accounting of changing price levels with particular reference to current Purchasing Power (CPP) accounting Advanced problems of company accounts — Amalgamation absorption and reconstruction of companies — Accounting of holding companies — Valuation of shares and goodwill. Controllership functions—Property control legal and management.

Important provisions of the Income Tax Act., 1961 — Definition-Charge of Income tax — Exemptions Depreciation and investment allowance-Simple problems of computation of income under the various heads and determination of assessable income — Income tax authorities.

Nature and functions of Cost Accounting — Cost classification-Techniques of segregating semivariable costs into fixed and variable components — job costing — FIFO and weighted average methods or calculating equivalent units of production — Reconciliation of cost and financial accounts — Marginal Costing — Cost-volumeprofit relationship; Algebraic formulae and graphical representation-Shut-down point-Techniques of cost control and cost reduction-Budgetary control-flexible Budgets — Standard costing and variance analysis-Responsibility accounting-Bases of charging overheads and their inherent fallacy - Costing for pricing decisions.

Significance of the attest function — Programming the audit-works-Valuation and verification of assets, fixed, wasting and current assets — Verification of liabilities — Audit of limited companies - appointment status, powers, duties and liabilities of the auditor — Auditor's report-Audit of share capital and transfer of shares -Special points in the audit of banking and insurance companies.

Part - I

BUSINESS FINANCE AND FINANCIAL INSTITUTIONS.

Concept and scope of Financial Management Financial goals of corporations — Capital budgeting; Rules of the thumb and Discounted cash flow approaches — Incorporating uncertainty in investment decisions - Designing an optimal capital structure - Weighted average cost of capital and the controversy surrounding the Modigliani and Miller model, Sources - of raising short-term, intermediate and longterm finance — Role of public and convertible debentures — Norms and guidelines regarding debt-equity rations, — Determinants of an optimal dividend policy — optimising models of James E. Walter and John Lintner —Forms of divident payment — Structure of working capital and the variable affecting the level of difference of components — Cash flow approach of forecasting working capital needs — Profiles of working capital in Indian industries — Credit management and credit policy — Consideration of tax in relation to financial planning and cash flow statements.

Organisation and deficiencies of Indian Money Market structure of assets and liabilities of commercial

banks — Achievements and failures of nationalisation Regional rural banks Recommendations of the Tandon (P.L.) study group on following of bank credit, 1976 and their revision by the Chore (K.B.) committee, 1979 - An assessment of the monetary and credit policies of the Reserve bank of India — Constituents of the Indian Capital Market — Functions and working of All India term financial institutions (IDBI, IFCI, ICICI and IRCI) — Investment policies of the Life Insurance corporation of India and the Unit Trust of India — Present state of stock exchanges and their regulation.

Provision of the Negotiable Instruments Act, 1881.

Crossings and endorsements with particular reference to statutory protection to the paying and collecting bankers — Salient Provision of the Banking Regulation Act,1949 with regard to chartering, supervision and regulation of banks.

PAPER -11

Organisation Theory and Industrial Relations.

Part - I

ORGANISATION THEORY

Nature and concept of Organisation : Organisation goals Primary and secondary goals Single and multiple goals, ends-means chain-Displacement, succession, expansion and multiplication of goals — Formal organisation : Type, Structure — Line and Staff, functional matrix, and project — Informal organisation - functions and limitations.

Evolution of organisation theory : (classical, Neo-classical and system approach-Bureaucracy Nature and basis of power, sources of power, power structure and politics-Organisational behaviour as a dynamic system : technical social and power systems interrelations and interactions — Perception-Status system : Theoretical and empirical foundations of Maslow, Megergore, Horzberg, Likert, Vroom, Porter and Lawler, Odam and Human Models of motivation. Morale and productivity-Leadership; Theories and styles — Management of Conflicts in organisation -- Transactional Analysis — Significance of culture to organisations. Limits of rationality - simon - March approach. Organisational change, adoptation, growth and development-Organisational control and effectiveness.

Part-II

INDUSTRIAL RELATIONS

Nature and scope of industrial relations. Industrial labour in India and its commitment-Theories of unionism-Trade union movement in India-Growth and structure-Role of outside leadership-Workers education and other problems-Collective bargaining-approaches conditions, limitations and its effectiveness in Indian conditions-Workers participation in management : philosophy, rationale, present day state of affairs *and its* future prospects.

Prevention and settlement of industrial disputes in India : preventive measures, settlement machinery and other measures in practice - industrial relations in public enterprises - Absenteeism and labour turn-over in Indian industries — Relative wages and wage differentials : wage policy in India — The Bonus issue —International Labour Organisation and India — Role of personnel department in the organisation — Executive development, personnel policies, personnel audit and personnel research.

19.MATHEMATICS

PAPER-I

Any five questions may be attempted out of 10 questions to be set in the paper. Each questions should carry 40 and should be divided in three/four parts. Every question taken in all parts together must be answerable in 34 to 36 minutes. The syllabus is divided in six topics. At least one question must be set from each topic.

* Linear Algebra Vector space, Linear dependence and independence, Subspace, bases, dimension, Finite dimensional vector spaces.

Matrices : Cayley - Hamilton theorem, eigenvalues and Eigen vectors, matrix of transformation, row and column reduction, echelon form, rank, equivalence, congruence and similarity. Reduction to cannonical forms. Orthogonal and unitary reduction of quadratic and hermitian forms, positive definite quadratic forms.

* Calculus : Real numbers, bounded sets, open and closed sets, real sequences, limits, continuity, differenticibility, mean value theorems, Taylor's theorem with remainders, indeterminate forms, maxima and minima, asymptotes, functions of several variables, continuity, differentiability, partial derivatives, maxima and minima, Lagranges methods of multipliers, jacobian, Reimann's definition of definite integrals. Indefinite integrals, infinite & improper integrals, beta & gamma functions, double and tripe integrals (evaluation techniques only), areas, surface and volumes, centre of gravity.

* Analytic geometry : Cartesian and polar co-ordinates in two and three dimensions, second degree equations in two and three dimensions, reduction to canonical forms, straight lines, shortest distance between two skew lines, plane, sphere, cone, cylinder, paraboloid, ellipsoid, hyperboloid of one and two sheets and their properties.

* Ordinary differential equations Formulation of differential equation, order and degree, equations of first order and first degree, integrating factors, equations of first order but not of first degree, clariaut's equation, singular solutions.

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Higher order linear equations with constant coefficients, complementary functions and particular integrals, general solution, Euler-Cauchy equation.

Second order linear equation with variable coefficients, determination of complete solution when one solution is known, method of variation of parameters.

- **Dynamics, Statics and Hydrostatics :** Degree of freedom and constraints, rectilinear motion, simple harmonic motion, motion in a plane projectile, constrained motion, work and energy, conservation of energy, motion under impulsive forces, Kepler's laws, orbit under central forces, motion of varying mass, motion under resistance.

Equilibrium of a system of particles, work and potential energy, friction, common catenary, principle of virtual work, stability of equilibrium, equilibrium of forces in three dimensions.

Pressure of heavy fluids, equilibrium of fluids under a given system of forces, Bernoulli's equation, center of pressure, thrust on curved surfaces, equilibrium of floating bodies, stability of equilibrium, metacenter, pressure of gases.

6. **Vector analysts:** Scalar and vector fields, triple products, differentiation of vector function of scalar variable, gradient, divengence and curl in cartesian, cylindrical and spherical co-ordinates and their physical interpretation. Higher order derivatives, vector identities and vector equations.

Application to geometry : Curves in spaces, curvature and torsion, Serret-Frenet formulae Gauss and Stoke's theorem, Green's identities.

PAPER-II

The paper will be in two sections. Each section will contain eight questions. Candidates will have to answer any five questions selecting at least one from each section. Each section divided in 3/4 parts, carried 60 marks and should be answerable in 34 to 36 minutes.

Section - A: Algebra, Complex Analysis, Operations Research, mathematical Modelling.

Section - B : Partial Differential Equation, Discrete Mathematics, Mechanics and Fluid Dynamics, Probability Theory.

Section - A

1. **Algebra :** Groups, Sub groups, normal subgroups, homomorphism of groups, quotient groups basic isomorphism theorem, Sylow's theorem, permutation groups, Cayley theorem. Rings and ideals, Principal ideal Domains, Unique Factorisation Domains and Euclidean Domains, and Euclidean Domains, field extensions, finite fields.

2. **Complex Analysis :** Analytic function, Cauchy- Riemann equations, Cauchy's theorem, Cauchy's integral formula, power series, Taylor's series, Laurent's series, Singularities, Cauchy Residue Theorem, Contour integration, Conformal mapping, Bilinear transformation.

3. **Operations Research :** Linear programming problems, basic solution, basic feasible solution and optimal solution. Graphical method and simplex method of solution, Duality, Transportation and assignment problems.

Analysis of steady state and transient solution for queueing system with Poisson arrivals and exponential service time.

Deterministic replacement models, sequencing problem with two machines and n jobs, 3 machines and n jobs (special case).

1. **Mathematical Modeling**
   (a) Difference and differential equation growth models : Single species population models, Population growth-an age structure model. The spread of technological innovation.
   (b) Higher order linear models - A Model for the detection of diabetes.
   (c) Nonlinear population growth models : Prey - predator models, Epidemic growth models.
   (d) An Application in environment : Urban wastes water management planning models.
   (e) Models from political science : Proportional representation (cumulative and comparison voting) models.

Section-B

1. **Partial differential equations :** Curves and surfaces in three dimensions, formulation of partial differential equations, solutions of equations, solutions of equations of type $dx/P = dy/Q = dz/R$; orthogonaltrajectories, pfaffian differential equations, partial differential equations of the first order, solution by Cauchy's method of characteristics, Charpit's method of solutions, linear.partial differential equations of the second order with constant coefficients, equations of vibrating string, heat equation, Laplace equations.

2. **Probability** Notion of probability Random experiment, Sample space, axioms of probability, Elementary properties of probability, Equally likely outcome problems.

Random variables : Concept, cumulative distribution function, discrete and continuous random variables, expectations, mean, variance, moment generating function.

Discrete distribution : Binomial, geometric, Poisson.

Continuous distribution : Uniform, Exonential, Normal.Conditional probablity, and conditional expectation, Bayes theorem, independence, computing expectation by conditioning.

Bivariate random variables : Joint distribution, Joint and Conditional distributions.

Functions of random variables Sum of random variables, the law of large numbers and central limit theorem, approximation of distributions.

- **Mechanics and fluid dynamics :** Generalised co-ordinates, holonomic and non-holonomic systems D' Alembert's principle and Lagrange's equation, Hamilton equations, moment of inertia, motion of rigid bodies in two dimensions. Equation of continuity, Euler's equations of motion for inviscid flow, stream-lines, path of a particle, potential flow. Two dimensional and axisymytric motion, sources and sinks, votex motion, flow past a cylinder and a sphere, method of images, Navier - Stocke's equation for a viscous fluid.

- **Discrete Mathematics** introduction to graph theory graphs and degree sum theorem, connected graph, bi - partite graph, trees, Eulerian and Hamiltonian graph, plane graph and Euler's theorem, planar graphs, 5-color theorem, Marriage theorem.

Logic : Logical connectives, negation, quantifiers, compound statements, Truth table, Tautologies, Boolean algebra - Lattices, geometaical lattices and algebraic structures, duality, distributive and complemented lattices, boolean lattices and boolean algebras, boolean functions and expressions, design and implementation of digital networks, switching circuits.

27. STATISTICS

PAPER– I

Attempt any 5 questions choosing at most 2 from each section. Four questions of equal weightage will be set in each section.

I. **Probability** — Sample space and events, probability measures and probability space, Statistical independence, Random variable as a measurable function, Discrete and continuous random variables, Probability density and distribution functions, marginal and conditional distributions functions of random variables and.their distributions, expectation and movements, conditional expectation, correlation co-efficient; convergence in probability in LP almost everywhere; Markov, Chebychev and Kolmogrov inequalities, Borel Cantellilemma, Weak and strong law of large numbers probabality generating and characteristic functions. Uniquencess and continuity theorems. Determination of distribution by moments Linderberg-Levy Centrel limit theorem. Standard discrete and continuous probability distributions, their interrelations including limiting cases.

ii. **Statistical Inference** — Properties of estimates, consistency, unbiasedness, efficiency, sufficiency and completeness Cromer-Rao bond, Minimum variance unbiased estimation, Rao Blackwell and Lehmann Sheffe's theorem methods of estimation by moments maximum likelihood, minimum Chi-square. Properties of maximum

likelihood estimators confidence intervals for parameters of standards distributions.

Simple and composite hypotheses, statistical tests and critical region, two kinds of error, power function unbiased tests, most powerful and uniformly most powerful tests Neyman person Lemma, Optimal tests for simple hypotheses concerning one parameter, monotone likelihood ratio property and its use in constructing U M P test, likelihood ratio criterion and its asymptotic distribution, Chi-square and Kolmogoro tests for goodness of fit. Run test for

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randomness. Sign test for Location, Wilcoxon-Mann-whitney test and Kologor-Simirnov test for the two sample problem. Distribution-free confidence intervals for quantities and confidence bands for distribution functions. Notions of a sequential test, Welds, SPRT, its CC and ASN function.

III. **Linear Inference and Multivariate Analysis** —Theory of least squares and Analysis of variance, Gausse Markoff theory, normal equations, least square estimates and their precision. Tests of significance and intervals estimates based on least square theory in one way, two way and three way classified data. Regression Analysis, linear regression, estimates and tests about correlation and regression coefficient curve linear regresson and orthogonal polynomials, test for linearity of regression Multivariate normal distribution, multiple regression, multiple and partial correlation. Mahalanobis D^2 and Hotelling T^2 – Statistics and *their* applications (derivations of distribution of D^2 and T^2 excluded) Fisher's discriminant analysis.

PAPER–II

- Select any three sections.
- Attempt any 5 questions from the selected sections, choosing at most, two questions from each selected section. Four questions of equal weight will be set in each section.
- **Sampling Theory and Design of Experiments** — Nature and scope of sampling, simple random sampling, sampling from finite populations with and without replacement, estimation of the standard errors sampling with equal probabilities and PPS sampling. Stratified random and systematic sampling, two stage and multi-stage sampling, multiphase and cluster sampling schemes.

Estimation of population total and mean, use of biased and unbiased estimates auxiliary variables, double sampling standard errors of estimates cost and variance functions ratio and regression estimates and their relative efficiency. Planning and organization of sample surveys with special reference to recent large scale surveys conducted in India.

Principles of experimental designs, CRD, RBD, LSD, missing plot technique factorial experiments 2nd and 3rd design general theory of total and partial confounding and fractional replication. analysis of split plot, BIB and simple lattice designs.

- **Engineering Statistics** — Concepts of quality and meaning of control, Different types of control charts like X-R charts, P charts np charts and cumulative sum control charts.

Sampling inspection Vs 100 percent inspection. Single, double multiple and sequetial sampling plans for attributes inspection, OC, ASN and ATI curves. Concept of producer's risk and consumer's risk. AQL, AOQL, LTPD etc. Variable sampling plants.

Definition of Reliability, maintainability and availability. Life distribution failure rate and bath-tub, failure curve exponential and Weibull models, Reliability of series and parallel systems and other simple configurations. Different types of redundancy like hot and cold and use of redundancy in reliability improvement problems in life testing, Censored and turncated experiments for exponential model.

- **Operational Research** — Scope and definition of Or different types of modesl, their construction and obtaining solution.

Homogenous discrete time Markov chains, transition probability matrix, classification of states and ergodic theorems. Homogenous continuous time Markov chains. Elements of queuing theory, M/M/1 and M/M/K queues, the problem of machine interference and GI/M/1 and B/GI queues.

Concept of scientific inventory management and analytical structure of inventory problems simple models with deterministic and stochastic demand with and without leadtime. Storage models with particular reference to dam type.

The Structure and formation of a linear programming problem. The simplex procedure two phase methods and charnes-M Method with artifical variables. The quality theory of linear programming and its economic interpretation. Sensitivity analysis.

Transportation and Assignment Problems — Replacement of items that fail and those that deteriorate, group and individual replacement policies.

Introduction to computers and elements of Fortran IV Programming Formats for input and output statements, specification and logical statements and subroutines. Application to some simple statistical problems.

- **Quantitative Economics** — Concept of time-series, additive and multiplicative modols, resolution into four components, determination of trend by free-hand drawing, moving averages and fitting of mathematical curves, seasonal indices and estimate of the variance of the random components.

Definition, construction, interpretation and limitation of index numbers, Lespeyre parsche EcgewothMarshalll and Fisher index numbers their comparitions tests for index numbers and construction of cost of living index.

Theory and analysis of consumer demand — Specification and estimation of demand functions. Demand elasticities. Theory of production, supply functions and elasticities, input demand functions. Estimation of parameters in single ecuation model.— classical least squares, generalised leasts squares beteroscedasticity, serial correlation, multicollinearity, errors in variables model, simultaneous equation models—Identification, rank and order conditions. Indirect least squares and two stage least squares, Short-term economic forecasting.

- **Demography and psychometry** — Sources of demographic data : Census registration : NSS and other demographic surveys. Limitation and uses of demographic data.

Vital rates and rations : Definition construction and uses.

Life tables — complete and absidged : Construction of life tables from vital statistics and census returns Uses of life tables.

Logistic and other population growth curves.

Measure of fertility. Gross and net reproduction rates.

kStable population theory. Uses of stable and quasi-stable population techniques in estimation of demographic parameters.

Morbidity and its measurement Standard Classification by cause of death. Health surveys and use of hospital statistics.

Educational and psychological statistics methods of Standardisation of scales and tests. IQ tests, reliability of tests and T and Z scores.

अर्थशास्त्र (Economics)

प्रश्न पत्र–1

1. अर्थव्यवस्था का ढाँचा, राष्ट्रीय आय का लेखीकरण।

2. आर्थिक विकल्प (Economical Choice)- उपभोक्ता व्यवहार उत्पादक व्यवहार और बाजार के रूप।

3. निवेश संबंधी निर्णय तथा आय और रोजगार का निर्धारण आय, वितरण और वृद्धि के समग्र आर्थिक प्रतिरूप।

4. बैंक व्यवस्था–योजनाबद्ध – विकासशील अर्थव्यवस्था के केन्द्रीय बैंक व्यवस्था के उदेश्य और साधन तथा साख संबंधी नीतियाँ। झारखण्ड के वाणिज्य बैंकों के क्रियाकलाप।

5. करों के प्रकार और अर्थव्यवस्था के बजटीय और राजकोषीय नीति के उदेश्य और साधना।

6. अंतर्राष्ट्रीय व्यापार प्रशुल्क पद्धित, विनियम दर, अदायगी शोध, अन्तराष्ट्रीय मुद्रा व बैंक संस्थान।

प्रश्न पत्र–2

1. भारतीय अर्थव्यवस्था, भारतीय अर्थ नीति के निदेशक सिद्धांत, योजनाबद्ध वृद्धि और वितरण न्याय गरीबी का उन्मूलन भारतीय अर्थव्यवस्था का संस्थागत ढाँचा संधीय शासन संरचना कृषि औद्योगिक क्षेत्र, सार्वजनिक और निजी क्षेत्र राष्ट्रीय आय, उसका क्षेत्रीय और क्षेत्रीय वितरण गरीबी कहाँ– कहाँ और कितनी।

2. कृषि उत्पादन कृषि नीति भूमि सुधार प्रौद्योगिकीय परिवर्त्तन—औद्योगिक क्षेत्र रो सह— संबंध।

3. औद्योगिक उत्पादन— औद्योगिक नीति। सार्वजनिक और निजी क्षेत्र क्षेत्रीय वितरण— एकाधिकार प्रथा का नियंत्रण एकाधिकार।

4. कृषि उत्पादों और औद्योगिक उत्पादों के मूल्य निर्धारण संबंधी नीतियाँ अधिप्राप्ति और सार्वजनिक वितरण।

5. बजट की प्रवृत्तियाँ और राजकोषीय वितरण।

6. मुद्रा और साख प्रवृत्तियाँ और नीति बैंक व्यवस्था और वित्तीय संस्थाएँ।

7. विदेशी व्यापार और अदायगी कोष।

8. भारतीय योजना— उद्देश्य, व्यूह, रचना अनुभव और समस्याएँ।

9. झारखण्ड की अर्थ व्यवस्था :— कृषि एवं उद्योग के सापेक्षिक स्थान, आर्थिक विकास के मार्ग की रूकावटें, गरीबी एवं बेरोजगारी, भूमि सुधार की प्रगति।