SYLLABUS OF ENTRANCE TEST FOR Ph. D. IN

BOTANY/ BIOCHEMISTRY / BIOTECHNOLOGY/ BIOSCIENCE/ MICROBIOLOGY/ ZOOLOGY/ ENVIRONMENTAL SCIENCE

(Under Revised Ordinance 16 notified vide letter no/Acad./2018/1944 dated 24/05/2018)

(Academic Session 2018 – 2019 & Onwards)

The question paper of the entrance test will have two sections A & B, each consisting of 50 objective type compulsory questions. Each question will carry 1 mark.

SECTION-A

"RESEARCH METHODOLOGY"

(The part A shall be of generic nature, indented to assess the research aptitude of the candidate.)

SECTION-B

"SUBJECT SPECIFIC"

(Based on PG syllabus of relevant subject of Rani Durgavati Vishwavidyalaya, Jabalpur.)

Approved by:-

Board of Studies in Botany/ Biochemistry / Biotechnology/ Bioscience/ Microbiology/ Zoology/ Environmental Science on 25/06/2018, Faculty of Life Science on 25/06/2018

Standing Committee of Academic Council on , Executive Council on

RANI DURGAVATI UNIVERSITY, JABALPUR

Syllabus for M. Phil. and Ph.D. entrance test in chemistry w.e.f. 2018 and onward

(In accordance with the revised ordinance no.82 and 16 for M. Phil. and Ph.D. respectively)

The M. Phil. and doctoral entrance test will have the 100 multiple choice questions. The question paper shall consist of two sections, (A) and (B). Each section shall consist of 50 questions each of 1 mark. Section (A) will be based on research methodology and section (B) on Chemistry. The candidate must secure minimum 50% mark (45% for SC/ST/ OBC/ PH).

Section A: Research Methodology 50 Marks

Research aptitude

- Research: Meaning, Characteristics and type of research
- Steps of research, Methods of research
- Research ethics: Paper, Articles, Workshop, Seminar, Conference and Symposium.
- Thesis writing: Characteristic of thesis writing and format

Reasoning (Including Mathematical)

- Number series, Letter series and Codes
- Relationship and classification

Communication skill

- Communication: Nature, characteristics, types, barriers and effective class room communication

Information and communication technology

- Meaning of ICT, advantages, disadvantages and uses
- General abbreviation and terminology
- Basic of internet and Emailing

Section B: Chemistry 50 Marks

Inorganic Chemistry

1. Chemical periodicity
2. Structure and bonding in homo and heteronuclear molecules, including shapes of molecules (VSEPR theory).

3. Concepts of acid and bases, Hard –Soft acid base concept, Non-aqueous solvents.
4. Main group elements and their compounds: Allotropy, synthesis, structure and bonding industrial importance of the compounds.
5. Transition elements and coordination compounds: structure bonding theories. Spectral and magnetic properties, reaction mechanisms.
6. Metal carbonyls and nitrosyls: Structure and bonding
7. Inner transition elements: spectral and magnetic properties, redox chemistry, analytical applications.
8. Organometallic compounds: synthesis, bonding and structure, and reactivity, Organometallics in homogeneous catalysis.
9. Cages and metal clusters.
10. Bioinorganic chemistry: photo systems, porphyries, metalloenzymes, oxygen transport electron–transfer reactions nitrogen fixation, metal complexes in medicine.
11. Characterization of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer, UV-Vis, NQR, Mass spectrometry and Electron spectroscopy.
12. Nuclear chemistry: nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.
13. Chemical applications of Group theory; symmetry elements and symmetry operations; matrix representation of symmetry operations; point groups; character tables; prediction of IR and Raman active modes.

Organic chemistry

1. IUPAC nomenclature of organic molecules including region-and stereoisomers.
2. Principle of stereochemistry: configurational and conformational isomerism in acyclic and cyclic compounds; stereogenicity stereo selectivity, enantioselectivity and diastereosslectivity.
3. Aromaticity: Benzenoid and non-benzenzenoid compounds- generation and reactions.
4. Organic reactive intermediates: Generation stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzynes and nitrenes.
5. Organic reaction mechanisms involving addition, elimination and substitution reaction with electrophonic or radical species. Determination of reaction pathways.
6. Common named reaction and rearrangements – application in organic synthesis.
7. Organic transformations and reagents: Functional group interconversion including oxidations and reduction; common catalysts and reagents (organic, inorganic, organomatallic and enzymatic). Chemo, regio and sterioselective transformations.
8. Asymmetric synthesis: Chiral auxiliaries, methods of asymmetric induction, substrate, reagent and catalyst controlled reactions; determination of enantiomeric and diastereomeric excess; enantio –discrimination. Resolution-optical and kinetic.
9. Pericyclic reaction: electrocyclisation, cycloaddition, sigmatropic rearrangements and other related concerted reaction. Principles and application of photochemical reactions in organic chemistry.

10. Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatom (O, N, S).
11. Chemistry of natural products: Carbohydrates, proteins and peptides, fatty acids, nucleic acids, terpenes, steroids and alkaloids. Biogenesis of terpenoids and alkaloids.
12. Structure determination of organic compounds by IR, UV-Vis, ^{1}H & ^{13}NMR and Mass spectroscopic techniques.

Physical chemistry

1. Basic principle and application of quantum mechanics.
2. Approximate method of quantum mechanics: variation principle; perturbation theory up to second order in energy.
3. Atomic structure and spectroscopy; term symbols.
4. Chemical bonding in diatomics; elementary concepts of MO and VB theories; Huckel theory for conjugated pi electron system.
5. Molecular spectroscopy: rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities – selection rules. Basic principle of magnetic response techniques.
6. Chemical thermodynamics: Laws state and path function and their application thermodynamics description of various type of processes: Maxwell relations; spontaneity and equilibria; temperature and pressure dependence of thermodynamic quantities; Le chatelier principle; thermodynamics of idea and non-ideal gases and solutions.
7. Statistical thermodynamics: Boltzmann distribution; kinetic theory of gases; partition functions and their relation to thermodynamic quantities.
8. Electrochemistry : Nernst equation, redox systems, electrochemical cells; Debye Huckel theory ; electrolytic conductance- Kohlrausch's Law and its applications; ionic equilibria; conductometric and potentiometric titration.
9. Chemical kinetics : empirical rate laws and temperature dependence; complex reactions; steady state approximation ; determination of reaction mechanism; collision and transition state theories of rate constants; unimolecular reactions ; enzyme kinetics; salt effects; homogeneous catalysis ; photochemical reaction.
10. Colloids and surfaces: stability and properties of colloids; isotherms and surface area; heterogeneous reactions.
11. Solid state: crystal structures; Bragg law and applications; band structure of solids.

Interdisciplinary topics

1. Chemistry in nanoscience and technology.
2. Catalysis and green chemistry.
3. Medicinal chemistry.
4. Environmental chemistry.
5. Analytical chemistry.
6. Polymer chemistry

RANI DURGAVATI VISHWAVIDHYALAYA, JABALPUR

Department of Post – Graduate Studies and Research in Economics

Draft of Syllabus for Ph.D. Programme – Economics (Entrance and Course work)

S. No.	Contents
1.	Highlights of Amendments in Ordinance 16
2.	Ph.D. Entrance (DET) Syllabus – Economics
3.	**Pre-Ph.D. Coursework** Paper 01 – Research Methodology
4.	**Pre-Ph.D. Coursework** Paper 02 – Review of Published research in the relevant field
5.	**Pre-Ph.D. Coursework** Paper 03 Computer Application
6.	**Pre-Ph.D. Coursework** Paper 04 - Advance Courses in Economics
7.	**Pre-Ph.D. Coursework** Paper 05 – Comprehensive Viva Voce

RANI DURGAVATI VISHWAVIDHYALAYA, JABALPUR

Department of Post – Graduate Studies and Research in Economics

Draft of Syllabus for Ph.D. Programme – Economics (Entrance and Course work)

Date: 13/07/2018

The Ph.D. Ordinance 16 has been revised and notified by the *Rani Durgawati Vishwavidyalaya, Jabalpur* on 24.05.2018. This would be effective from the session 2018-19.

Some of the major changes done in this revision of Ordinance are:

- DET 2018, would now be of 2hrs duration of 100 marks, with 100 multiple choice questions divided into two equal Section A for Research Methodology and Section B on Subject of Research.
- Minimum qualifying marks would be 50% (45% for ST/SC/OBC/PH) in Pre Ph.D. Entrance exam (DET).
- The Course Structure of the Pre -Ph.D. Entrance & Course Work has been revised.
- Passing Condition: 55% marks separately in each component of Pre Ph.D. course work.

The Pre-Ph.D. Course Work will now comprise of following five components.

Code	Components	Marks	Credits
Paper 01	Research Methodology	100	4
Paper 02	Review of Published research in the relevant field	50	3
Paper 03	Computer Application	50	3
Paper 04	Advance Course in Economics	50	3
Paper 05	Comprehensive Viva-Voce	50	3
	Total	**300**	**16**

Note: 1 Credits =10 Contact Hours

RANI DURGAVATI VISHWAVIDHYALAYA, JABALPUR

Syllabus for Ph.D. Entrance Exam

Department of Post – Graduate Studies and Research in Economics

Total marks -100 **Time Duration: 2 hours**

The paper will be divided into two sections.

Section A - This section will comprise of research methodology, aptitude and reasoning test. This section will be of 50 marks from Unit I.

Section B - This section will have objective questions from the core economics subjects. This section will be of 50 marks from Unit II to XI.

****

Ph.D. Entrance Test

Section A: Research Methodology

Unit I

Concept of function and types of functions; Limit, continuity and derivative; Rules of differenatiation; Interpretation of revenue, cost demand, supply functions; Elasticities and their types; Multivariable functions; Concept and types of production functions; Rules of partial defferentiation and interpretation of partial derivatives; problems of maxima and minima in single and multivariable functions; Concept of integration; Simple rules of integration; Application to consumer's surplus and peoducer's surplus.

Determinants and their basic properties; Solution of simultaneous equations through Cramer's rule; Concept of matrix- their types, simple operations on matrices, matrix inversion and rank of a matrix; Concept of vector- its properties; Matrices and vectors; Introduction to input-output analysis; Difference equations-Solution of first order and decond order difference equations;

Meaning, assumptions and limitations of simple correlation and regression analysis; pearson's product moment and spearman's rank correlation coefficients and their properties; Concept of the least squares and the lines of regression; Standard error of estimate and regression (applications only).

Deterministic and non-deterministic experiments; Various types of events-

classical and empirical definitions of probability; Laws of addition and multiplication; Conditional probability and concept of interdependence; Baye's theorem and its applications; Properties (without derivations) of Binomial, poisson and Normal distributions.

Basic concept of sampling-random and non- random sampling; Simple random; stratified random and p.p.s. sampling; Concept of an estimator and its sampling distribution; Desirable properties of an estimator; Formulation of statistical hypotheses - Null and alternative; Goodness of fit; Confidence intervals and level of significance; Hypothesis testing based on z,t,x2 (Chi-square) and F tests; Type I and Type II errors.

Section B: Economics

Unit II

Elasticities of demand - theoretical aspects and empirical estimation; elasticity of supply; Theories of demand Revealed preference theory; Revision of demand theory by Hicks. Indirect utility functions; Recent developments in demand analysis Consumer's surplus; Inter-temporal consumption; Recent developments in demand. Elementary theory of price formation- demand and supply equilibrium; Cobweb theorem.

Production function Isoquants - Least cost combination of inputs; Elasticity of substitution; Euler's theorem; Technical progress and production function; Empirical work on production functions; Traditional and modern theories of costs - Empirical evidence; Derivation of cost functions from production function; derived demand for factors.

Price and output determination: Perfect competition; Monopoly - short run and long run equilibrium, price discrimination, welfare aspects, monopoly control and regulation. Critical evaluation of marginal analysis; Baumol's sales revenue maximization model; Wiliamson's model of managerial discretion; Marris model of managerial enterprise.

Marginal productivity theory; Theory of distribution in imperfect product and factor markets; Determination of rent, wages, interest and profit; Macro theories of distribution - Ricardian, Marxian, and Kaldor's.

Pigovian welfare economics; pareto optimal conditions; Social welfare function; Compensation principle; Inability to obtain optimum welfare - Imperfections, market failure, decreasing costs, uncertainty and non-existent and incomplete markets; Theory of Second Best - Arrow's impossibility theorem.

Partial and general equilibrium, Walrasian excess demand and input-output approaches to general equilibrium, existence, stability and uniqueness of equilibrium and general equilibrium, Stolper-Samuelson theorem, relationship between output mix and real factor prices.

Unit III

Circular Flow of Income in two,-three-and four-sector economy; different forms

of national income accounting - Social accounting, input-output accounting, flow of funds accounting and balance of payments accounting.

Keynes psychological law of consumption - implications of the law; short-run and long-run consumption function; Empirical evidence on consumption function; Income consumption relationship.

Marginal efficiency of investment and level of investment; Marginal efficiency of capital and investment - long run and short run; The accelerator and investment behaviour - impact of inflation; Influence of policy measures on investment - empirical evidence.

RBI approach to money supply; High powered money and money multiplier; budget deficits and money supply; money supply and open economy; control of money supply.

Classical approach to demand for money - Quantity theory approach, Fisher's equation, Cambridge quantity theory, Keynes's liquidity preference approach, transaction, precautionary and speculative demand for money - aggregate demand for money; Derivation of LM curve.

Neo-Classical and Keynesian views on interest; The IS-LM model; Extension of IS-LM model with Government sector; Relative effectiveness of monetary and fiscal policies; Extension of IS-LM models with labour market and flexible prices.

Post-Keynesian approaches to demand for money - Patinkin and the Real Balance Effect, approaches of Baumol and To bin; Friedman and the modern quantity theory; Crisis in Keynesian economics and the revival of monetarism.

Classical Keynesian and Monetarist approaches to inflation; Structuralist theory of inflation; Philips curve analysis - Short run and long run Philips curve; Samuelson and Solow - the natural rate of unemployment hypothesis; Tobin's modified Philips curve; Adaptive expectations and rational expectations; Policies to control inflation.

Theories of Schumpeter, Kaldor, Samuelson and Hicks, Goodwin's model; Control of business cycles - relative efficacy of monetary and fiscal policies.

Unit IV

Economic growth and development - Factors affecting economic growth : capital, labour and technology; Growth models - Harrod and Domar, instability of equilibrium; Neo-classical growth models - Solow and Meade, Mrs. Joan Robinson's growth model; Cambridge criticism of Neo-classical analysis of growth.

Technological progress - embodied and disembodied technical progress; Hicks, Harrod; lesrning by doing, production function approach to the economic growth; Total factor productivity and growth accounting: Growth models of Kaldor.

Development and underdevelopment - Perpetuation of underdevelopment;

Poverty - Absolute and relative; Measuring development and development gap - Per capita income, inequality of income, Human development index and other indices of development and quality of life - Food security, education, health and nutrition; Human resource development; Population problem and growth pattern of Population - Economic development and institutions.

Classical Theory of development - contributions of Adam Smith, Ricardo, Malthus and James Mill, Kari Marx and development of capitalistic economy - theory of social change, surplus value and profit; Immutable laws of capitalist development; Role of credit, profit and degeneration of capitalism; Structural analysis of development.

Partial theories of growth and development - vicious circle of poverty, circular causation, unlimited supply of labour, big push, balanced growth, unbalanced growth, critical minimum effort thesis, low-income equilibrium trap; Dualism-technical behavioral and social; Ranis and Fei model; Dixit and Marglin model, Kelly et. al. Model; Dependency theory of development; Structural view development.

International trade as engine of growth; Static and dynamic gains from trade; prebisch, Singer and Myrdal thesis vs. free trade; Export-led growth; Dual gap analysis; Balance of payments; Tariffs and effective protection; Post-GATT international economic order; WTO and developing countries.

Role of monetary and fiscal policies in developing countries - Prior savings, inflation and growth - Empirical evidence; External resources - FDI, aid vs. trade, technology inflow; MNC activity in developing countries; Barrowings - domestic and external; Burden of borrowing - IMF and World Bank policies in developing countries.

Need for investment criteria in developing countries - present vs., future, Alternative investment criteria; Cost-benefit analysis, Shadow prices, Project evaluation and UNIDO guidelines.

Need for planning - democratic, decentralized and indicative planning, micro-level planning Review of Indian plan models and planning.

Unit V

Role of Government in organized society; Changing perspective - government in a mixed economy: public and private sector, cooperation or competition; Government as an agent for economic planning and development; Government as a tool for operationalizing the planning process.

Private and public mechanism for allocating resources; Problems for allocating resources; Problems of preference revelation and aggregation of preferences; Voting systems; Arrow impossibility theorem; An economic theory of democracy; Politico-economic-bureaucracy.

Poverty alleviation; Provision of infrastructural facilities, removing distributional inequalities and regional imbalances. Wagner's law of increasing state activities; Wiesman - peacock hypothesis; Pure theory of public

expenditure; Structure and growth of public expenditure; Criteria for public investment; Social cost-benefit analysis - project evaluation, Estimation of costs, discount rate; Reforms in expenditure budgeting; Programme budgeting and zero base budgeting.

Theory of incidence; Alternative concepts of incidence - Allocative and equity aspects of individual taxes; Benefit and ability to pay approaches; Theory of optimal taxation; Excess burden of taxes; Trade-off between equity and efficiency; The problem of double taxation.

Classical view of public debt; Compensatory aspect of debt policy; Burden of public debt; Sources of public debt; Debt through created money; public borrowings and price level; Crowding out of private investment and activity; principles of debt management and repayment.

Objectives of fiscal policy - full employment, anti-inflation, economic growth, redistribution of income and wealth; Interdependence of fiscal and monetary policies; Budgetary deficits and its implications; Fiscal policy for stabilization - automatic vs. discretionary stabilization; Alternative measures of resource mobilization and their impact on growth, distribution and prices; Balanced budget multiplier.

Principles of multi-unit finance; Fiscal federalism in India; Vertical and horizontal imbalance; Assignment of function and sources of revenue; Constitutional provisions; Finance Commission and Planning Commission; Devolution of resources and grants; Theory of grants; Resource transfer from Union to States - Criteria for transfer of resources; Centre-State financial relations in India; problems of states' resources and indebtedness; Transfer of resources from Union and States to local bodies.

Indian tax system; Revenue of the Union, States and local bodies; Major taxes in India: base of taxes, direct and indirect taxes, taxation of agriculture, expenditure tax, reforms in direct and indirect taxes, taxes on services; Non-tax revenue of Centre, State and local bodies; Analysis of Centre and State Government budgets; Lack of flexibility in Centre and State budgets, shrinking size of development finance through budgets; Trends in public expenditure and public debt; Fiscal crisis and fiscal sector reforms in India; Reports of Finance Commissions in India.

Unit VI

The pure theory of international trade - Theories of absolute advantage, comparative advantage and opportunity costs, modern theory of international trade; Theorem of factor price equalization; Empirical testing of theory of absolute cost and comparative cost -Heckscher-Ohlin theory of trade.

Measurement of gains from trade and their distribution; Concepts of terms of trade, their uses and limitations; Hypothesis of secular deterioration of terms of trade, its empirical relevance and policy implications for less developed countries; The Theory of Interventions; Economic effects of tariffs and quotas on national income, output employment, terms of trade, income distribution;

Balance of payments on trading partners both in partial and general equilibrium analysis. The political economy of non-tariff barriers and their implications; nominal, effective and optimum rates of tariffs-their measurement, impact and welfare implications; Trade under imperfectly competitive market.

Meaning and components of balance of payments; Equilibrium and disequilibrium in the balance of payments; The process of adjustment under systems of gold standard, fixed exchange rates and flexible exchange rates; Expenditure-reducing and expenditure-switching policies and direct controls for adjustment; policies for achieving internal and external equilibrium simultaneously under alternative exchange rate regimes; A critical review of the monetary approach to the theory of balance of payments adjustment; Foreign trade multiplier with and without foreign repercussions and determination of national income and output; Relative merits and demerits of fixed and flexible exchange rates in the context of growth and development in developing countries.

Forms of economic cooperation; Reforms for the emergence of trading blocks at the global level; Static and Dynamic effects of a customs union and free trade areas; Rationale and economic progress of SAARC/SAPTA and ASEAN regions. Problems and prospects of forming a customs union in the Asian region. Regionalism (EU,NAFTA); Multilateralism and WTO; Rise and fall of gold standard and Bretton-woods system; Need, adequacy and determinants of international reserves; Conditionality clause of IMF; Emerging International Monetary System with special reference to Post-Maastrishit developments and developing countries; Reform of the International Monetary System. India and developing countries; Theory of short-term capital movements and East-Asian Crisis and lessons for developing countries; International trade and financial institutions- Functions of GATT/WTO (TRIPS. TRIMS), UNCTAD, IMF, World Bank and Asian Development Bank; WTO and World Bank from the point of view of India.

Trade problems and trade policies in India during the last five decades; Recent changes in the direction and composition of trade and their implications; Rationale and impact of trade reforms since 1991 on balance of payments, employment and growth, problems of India's international debt; Working and regulations of MNCs in India; Instruments of export promotion and recent import and export policies and agenda for future.

Unit VII

Objectives and strategy of planning; Failures and achievements of Plans; Developing grass-root organizations for development - Panchayats, NGOs and pressure groups.

Broad demographic features of Indian population, Rural-urban migrations; Urbanization and civic ameneties; Poverty and Inequality.

Energy; Social infrastructure - education and health; Environment; Regional imbalance; Issues and policies in financing infrastructure development.

Institutional Structure - land reforms in India; Technological change in agriculture - pricing of agricultural inputs and output; Terms of trade between agriculture and industry; Agricultural finance policy; Agricultural Marketing and Warehousing; Issues in food security - policies for sustainable agriculture

Industrial policy; Public Sector enterprises and their performance; Problem of sick units in India; Privatisation and disinvestment debate; Growth and pattern of industrialisation; Small-scale sector; Productivity in industrial sector; Exit policy - issues in labour market reforms; Approaches for employment generation.

Analysis of price behaviour in India; Financial sector reforms; Interest rate policy; Review of monetary policy of RBI; Money and capital markets; Working of SEBI in India.

Structure and direction of foreign trade; Balance of payments; Issues in export-import policy and FEMA; Exchange rate policy; Foreign capital and MNCs in India; The progress of trade reforms in India.

Rationale of internal and external reforms; Globalisation of Indian economy; W.T.O. and its impact on the different sectors of the economy; Need for and issues in good governance; Issues in competition and Safety nets in Indian economy.

Unit VIII

Concept and organization of a firm - ownership, control and objectives of the firm; Passive and active behaviour of the firm. Seller's concentration; Product differentiation; Entry conditions; Economiec of scale; Market structure and profitability; Market structure and innovation; Theories of industrial location - Weber and Sargent Florence; Factors affecting location.

Product pricing - Theories and evidence; investment expenditure - Methods of evaluating investment expenditure; Theories and empirical evidence on Mergers and acquisitions (M & As) and diversification.

Growth of the firm - Size and growth of a firm; Growth and profitability of the firm; Constraints on growth; productivity, efficiency and capacity utilization - Concept and measurement, Indian situation.

Classification of industries; Industrial policy in India -Role of Public and private sectors; Recent trends in Indian industrial growth; MNCs and transfer fo technology; Liberalization and privatization; Regional industrial growth in India; Industrial economic concentration and remedial measures; Issues in industrial proliferation and environmental preservation; Pollution control policies.

Owned, external and other components of funds; Role, nature, volume and types of institutional finance - IDBI, IFCI, SFCs, SIDC, commercial banks, etc.; Financial statement - Balance sheet, Profit and loss account; assessment of financial soundness, ratio analysis.

Structure of industrial labour; Employment dimensions of Indian industry;

Industrial legislation; Industrial relations; Exit policy and social security; Wages and problem of bonus - labour market reforms.

Iron and Steel;Cotton testiles;Jute;Sugar;Coal;Cement and engineering goods; Development of small-scale and cottage industries in India.

Unit IX

Nature and scope of agricultural and rural economics; Traditional agriculture and its modernization; Role of agriculture in economic development; Interdependence between agriculture and industry - some empirical evidence; Agricultrual development, poverty and environment.

Livestock economics - Livestock resources and their productivity; problems of marketing; White revolution; fishery and poultry development; Forestry, Issues and problems in rural industrialization and development of agro-based industries.

Use of land, water and energy; Rural transport, communication, banking, extension services, role,modes and problems of rural electrification; Rural social infrastructure,- education and health and information dissemination. Principles of land utilization, land distribution-structure and trends, land tenures, Tenaney and Crop sharing, Problems of marginal and small farmers, Land reforms mearsures and performance.

Agricultural peoduction - Resource use and efficiency; Production function analysis in agriculture; Factor combination and resource substitution; Cost and supply curves; Size of farm and laws of returns - Theoretical and empirical findings; Farm budgeting and cost concepts; Supply response of individual crops and aggregate supply; Resource use efficiency in traditional agriculture; Technical change, labour absorption and gender issues in agricultural services.

Rural labour supply; Interlocking of factor markets; Mobility of labour and segmentation in labour markets; marginalisation of rural labour; Nature, extent and trends in rural unemployment; Agricultural wages in India; Male-female wage differences; Non-agricultural rural employment - Trends and determinants. Marketing and state policy; Agricultural markets and marketing efficiency - Marketing functions and costs; Market structure and imperfections; Regulated markets; Marketed and marketable surplus; Behaviour of agricultural prices - Cobweb model; Price and income stability; State policy with respect to agricultural marketing; Warehousing; Prices; Need for state intervention; Objectives of agricultural price policy - Instruments and evaluation; Food security in India and public distribution system.

Recent trends in agricultural growth in India; Inter-regional variations in growth of output and productivity; Cropping pattern shifts; Supply of inputs - Irrigation, power, seed and fertilizers; Pricing of input and role of subsidies; Distribution of gains from technological change; Role of Public investment and capital formation in Indian agriculture; Strategy of agricultural development and technological progress; International trade in agricultural commodities; Commodity agreements - Role of World Trade Organization; Issues in

liberalization of domestic and international trade in agriculture - Nature and features of agri-business; Role of MNCs; Globalization of Indian economy and problems and prospects of Indian agriculture; Impact of World Trade Organisation on Indian agriculture.

Unit X

Nature, meaning and scope of econometrics; Simple and general linear regression model- Assumptions, Estimation (through OLS approach) and properties of estimators; Gauss-Markov theorem; Concepts and derivation of Rs.2 and adjusted Rs.2 Concept and analysis of variance appeoach and its application in regression analysis; Estimation of non-linear equations-parabolic, exponential, geometric, hyperbolic.

Nature, test, consequences and remedial steps of problems of heteroscedasticity; multicollinearity and auto-correlation; Problems of specification error; Errors of measurement.

Dummy variable technique - Testing structural stability of regression models comparing to regressions, interaction effects, seasonal analysis use of dummy variables, regression with dummy dependent variables.

Autoregressive and distributed lag models - Koyak model, partial adjustment model, adaptive expectations; Instrumental variables; Problem of auto-correlation - Application; Almon approach to distributed-lag models; Error correlation mechanism.

The simultaneous equation bias and inconsistency of OLS estimators; The identification problem; Rules of identification - order and rank conditions; Methods of estimating simultaneous equation system; Recursive methods and OLS; Indirect least squares (ILS); 2SLS, 3SLS and ML methods - Applications.

Stationarity, unit roots, co-integration-squrious regression, Dickey-Fuller test, Engle-Granger test, Random walk model, Forecasting with ARIMA modelling; Box-Jenkins methodology.

Unit XI

Meaning and scope of demography; Components of population growth and their inter-dependence; Measures of population change; Structure, distribution and sources of population data; Theories of population - Malthus, Optimum theory of population; Theory of demographic transition - Views of Medows, Enke and Simon.

Population trends in the twentieth century; Population explosion - Threatened or real, distant or imminent; International aspects of population growth and distribution; Pattern of age and sex structure in more developed and less developed countries; Determinants of age and sex structure; Demographic effects of sex and age structure, economic and social implications; Age Pyramids and projections - Individual aging and population aging.

Importance of study of fertily - Total fertility rate[Gross reproduction rate and

net reproduction rate; Levels and trends of fertility in more and less developed countries; Factors affecting fertily - Socio-economic factors, economic status, health, education, nutrition, caste, religion, race, region, rural-urban and status of husband and wife. Mortality - Death rates, crude and age-specific; Mortality at birth and infant mortality rate; Levels and trends in more nad less developed countries; Sex and age pattern of mortality; Factors for decline in mortality in recent past; Life table - Construction and uses; Concepts of stable population; Methods of population projection.

Concepts and types - Temporary, internal and International; International migration - Its effect on population growth and pattern; Factors affecting migration; Theories of migration related to internal migration; Urbanization - Growth and distribution of rural-urban population in developed and developing countries.

Study of census in India - Methodology and characteristics of census; National Family Health Survey 1 and 2 and Rapid Household Survey; Changing characteristics of population in India; Population growth rates, trends and regional variations in sex ratio; Age structure of population, foetal, infant and child mortality rates; Maternal mortality rates; Life expectancy; Appraisal of Kerala model; Pattern of Migration and Urbanization in India.

Population, economy and environment linkages - Population, health, nutrition productivity nexus; Population and human development issues; Culture and fertility, Education and fertility, Demography and household economic behaviour.

Evolution of population policy in India - The shift in policy from population control to family welfare, to women empowernment; Family planning strategies and their outcomes; Reproductive health maternal nutrition and child health policies; Population and strategies for human development of different social groups; Social impact of new reproductive technologies and their regulation; The new population policy; Tasks before the National Population Commission.

RANI DURGAVATI VISHWAVIDHYALAYA, JABALPUR

Pre – Ph.D. Course Work in Economics

Paper 01 – Research Methodology

Max Marks: 100 (4 Credits)

UNIT I : Introduction & Research Design

Nature and Objectives of Research, Methods of Research: historical, descriptive and experimental, research process, research approaches, criteria for good research. Meaning of research design, need of research design, features of good design, various research designs, basic principles of experimental designs, designs of experiments.

UNIT II : Data Collection & Analysis

Types of Data, methods and techniques of data collection, primary and secondary data, Meta-Analysis, historical methods, content analysis, devices used in data collection, pilot study and pretext of tools, choices of data collection methods.

UNIT III : Processing and Analysis of Data

Measures of Central Tendency, Measures of Dispersion, Measures of Variation. Measures of Central Tendency vs. Measures of Dispersion, Normal Distribution, Measures of Skewness and interpretation, Correlation and Regression: Types and applications, Chi-square test: it's purpose and use.

UNIT IV : Paper Writing and Report Generation

Basic concept of paper/thesis writing report generation, writing research abstract, introduction, review of literature, result, conclusion, concepts of bibliography and references, significance of report writing, steps of report writing. Types of research reports, Methods of presentation of report. Format of publication in Research journal.

UNIT V : Computer Applications

Application of computers in research, Generating charts/graphs in Microsoft Excel, Power Point Presentation, Web Search: Introduction to Internet, Use of Internet and WWW. Using search engines like Google, Yahoo, etc.

Note: The examiner shall set total ten questions (two questions from each unit) covering the entire Syllabus. The candidate shall be required to attempt any five questions selecting at least one question from each unit.

Reference Books:

1. Kothari. C. R., "Research Methodology (sMethods and Techniques)", New Age Publisher.
2. Donald. H., Pamela S. Schindler, "Bussiness Research Methods", 8/e Tata McGraw Hill Co. Ltd
3. Bendat and Piersol, "Random Data: Analysis and Measurement Procedures", Wiley Interscience
4. Raymond Greenlaw, " Inline/Online: Fundamentals of Internet and the World Wide Web", Tata McGraw Hill Co. Ltd
5. John W. Creswell, "Research Design", Sage Publications, INC
6. Trivedi R. N. & Shukla D. P., " Research Methodology", College Book Depo, Jaipur
7. Bill Taylor, Gautam Sinha & Taposh Ghoshal," Research Methodology", Prentice Hall of India Private, New Delhi

RANI DURGAVATI VISHWAVIDHYALAYA, JABALPUR

Pre – Ph.D. Course Work in Economics

Paper 02 – Review of Published Research in the Relevant Field

Max Marks: 50 (3 Credits)

For this paper candidates will have to review literature in an area of research from refereed journals or the journals indexed on UGC and will prepare a research proposal and submit a report to the university at the end of the course work. The selection of problem and preparation of the proposal will be in consultation with research guide.

****

RANI DURGAVATI VISHWAVIDHYALAYA, JABALPUR

Pre – Ph.D. Course Work in Economics

Paper 03 - Computer Application

Max Marks: 50 (3 Credits)

UNIT I : INTRODUCTION TO COMPUTER ORGANIZATION

History and development of computer system concept, Characteristics, Capability and limitations. Generation of computers. Types of PC's, desktops, Laptops, Notebook, Work stations and their characteristics. Basic components of a computer system Control Unit, ALU, Input/ Output functions and characteristics, memory RAM, ROM, EPROM, PROM.

UNIT II : INPUT AND OUTPUT DEVICES

Input Devices: Keyboard, Mouse, Trackball, Joystick, Digitizing Tablet, Scanner, Digital Camera, MICR, OCR, OMR, Bar Code Reader, Voice Recognition, Light Pen, Touch Screen.
Output Devices: Monitors; characteristics and types of monitors, Video Standard, VGA, SVGA, XGA, LCD Screen etc. Printers; Daisy Wheel, Dot Matrix, Inkjet, Laser, Line Printer, Plotter, Sound Card and Speakers.

UNIT III : STORAGE DEVICES

Storage fundamental; primary and secondary, Various Storage Devices, Magnetic Tape, Cartridge Tape, Data Drives, Hard Drives, Floppy Disks, CD, VCD, CD-R, CD-RWDVD, DVD-RW, Zip Drive.

UNIT IV : OPERATING SYSTEM: MS-OFFICE

Introduction to Word Processing, MS Word; Features, Creating, Saving and Operating Multi Document Windows, Editing, Selecting, Inserting, Deleting and Moving Text. Previewing and Printing Documents. Formatting Documents.

Excel and Worksheet, creating and entering data into worksheet, Toolbars and Menus, Keyboard shortcuts, Working with single and multiple workbooks, copying, renaming, moving, adding and deleting. Working with formulas, cell referencing, auto sum, copying formulas, absolute and relative addressing.

Power Point; features, creating presentation using slide master and templates, working with slides, editing and formatting text, inserting clip art pictures and charts, slide sorter, slide transition effect and animation effects.

UNIT V : INTRODUCTION TO INTERNET

Internet; Concept, Protocol, Dial-up Connectivity, leased line, VSAT, Broadband, URLs, Domain names, Portals. E-mail, Pop & web based e-mails. Basics of sending and receiving e-mails. E-mails and Internet Ethics, Computer Virus, Antivirus Software, Web Browsers, e-book and e-journals.

Note: The examiner shall set total ten questions (two questions from each unit) covering the entire Syllabus. The candidate shall be required to attempt any five questions selecting at least one question from each unit.

SELECT READINGS :

1. Rajasekaran, S. (1986), Numerical Methods in Science and Engineering, A.H. Wheeler, Allahabad.
2. Sanders, D.H. (1988), Computers Today, McGraw-Hill (3rd Edition), New York.
3. Sinha, P.K. (1992), Computer Fundamentals, BPB Publications New Delhi.
4. Rajaraman, V. (1996), Fundamentals of Computers, Prentice Hall of India, New Delhi.
5. Lipschultz, M.M. and S. Lipschultz (1982), Theory and Problems of Data Processing, Schum's Outline Series, McGraw Hill, New York.
6. Schildt, H. (1987), C Made Easy, McGraw Hill Co., New York.
7. Levin, R.I. and C.A. Kifkpatrick, Quantitative Approaches to Management.
8. Wood, M.B. Introducing Computer Security.

RANI DURGAVATI VISHWAVIDHYALAYA, JABALPUR

Pre – Ph.D. Course Work in Economics

Paper 04 – Advance course in Economics

Max Marks: 50 (3 Credits)

Unit I

Recent developments in demand analysis (pragmatic approach and linear expenditure systems); Consumer's surplus; Inter-temporal consumption; Recent developments in demand. Elementary theory of price formation- demand and supply equilibrium; Cobweb theorem; lagged adjustment in interrelated markets. Technical progress and production function; Cobb-Douglas, CES, VES and Translog production function and their properties; Critical evaluation of marginal analysis; Baumol's sales revenue maximization model; Wiliamson's model of managerial discretion; Marris model of managerial enterprise. Individual behaviour towards risk, expected utility and certainty equivalence approaches, risk and risk aversion - sensitivity analysis, gambling and insurance, the economics of insurance cost and risk, risk pooling and risk spreading, mean-variance analysis and portfolio selection.

Unit II

Neo-Classical and Keynesian views on interest; The IS-LM model; Extension of IS-LM model with Government sector; Relative effectiveness of monetary and fiscal policies; Extension of IS-LM models with labour market and flexible prices. Classical Keynesian and Monetarist approaches to inflation; Structuralist theory of inflation; Philips curve analysis - Short run and long run Philips curve; Samuelson and Solow - the natural rate of unemployment hypothesis; Tobin's modified Philips curve; Adaptive expectations and rational expectations; Policies to control inflation.

Unit III

Human development index and other indices of development and quality of life - Food security, education, health and nutrition; Human resource development; Population problem and growth pattern of Population - Economic development and institutions.; Ranis and Fei model; Dixit and Marglin model, Kelly et. al. Model; Dependency theory of development; Structural view development.

Unit IV

Social cost-benefit analysis - project evaluation, Estimation of costs, discount rate; Reforms in expenditure budgeting; Programme budgeting and zero base budgeting. Finance Commission and Planning Commission; Analysis of Centre and State

Government budgets; Lack of flexibility in Centre and State budgets, shrinking size of development finance through budgets; Trends in public expenditure and public debt; Fiscal crisis and fiscal sector reforms in India; Reports of Finance Commissions in India.

Unit V

A critical review of the monetary approach to the theory of balance of payments adjustment; Foreign trade multiplier with and without foreign repercussions and determination of national income and output; Relative merits and demerits of fixed and flexible exchange rates in the context of growth and development in developing countries. Recent changes in the direction and composition of trade and their implications; Rationale and impact of trade reforms since 1991 on balance of payments, employment and growth, problems of India's international debt; Working and regulations of MNCs in India.

Note: The examiner shall set total ten questions (two questions from each unit) covering the entire Syllabus. The candidate shall be required to attempt any five questions selecting at least one question from each unit.

BASIC READING LIST :

1. Kreps David M. (1990), A Course in Microeconomic Theory, Princeton University press. princeton.
2. Koutsoyiannis, A.(1979), Modern Microeconomic (2nd Edition), Macmillan press, London.
3. Ackley,G.(1978), Macro Economics : Theory and Policy, Macmillan, New York.
4. Blackhouse, R. and A. Salansi (Eds.) (2000) Macroeconomics and the Real World (2 Vols.), Oxford University Press, London.
6. Romer, D.L. (1996), Advanced Macroeconomics, McGraw Hill Company Ltd., New York.
7. Adelman, I. (1961), Theories of Economic Growth and Development, Stanford University Press, Stanford.
8. Gillis, M.,D.H. Perkins, M. Romer and D.R. Snodgrass (1992), Economics of Development, (3rd Edition), W.W. Norton, New York.
9. Higgins, B. (1959), Economic Development, W.W. Norton, New York.
10. Hogendorn, J. (1996), Economic Development, Addison, Wesley, New York.
11. Buchanan, J.M. (1970), The Public Finances, Richard D. Irwin, Homewood.
12. Musgrave, R.A. (1959), The Theory of Public Finance, McGraw Hill, Kogakhusa, Tokyo.

13. Shoup, C.S. (1970), Public Finance, Aldine, Chicago.

14. Bhagwati, J. (Ed.) (1981), International Trade, Selected Readings, Cambridge, University Press, Massachusetts.

15. Carbough, R.J. (1999), International Economics, International Thompson Publishing, New York.

16. Kenen, P.B. (1994), The International Economy, Cambridge, University Press, London.

17. 9. Krugman, P.R. and M. Obstfeld (1994), International Economics : Theory and Policy, Glenview, Foresman.

18. Salvatore, D. (1997), International Economics, Prentice Hall, Upper Saddle River, N.J. New York.

****

RANI DURGAVATI VISHWAVIDHYALAYA, JABALPUR

Pre – Ph.D. Course Work in Economics

Paper 05 – Comprehensive Viva-Voce

Max Marks : 50 (Credit 3)

Candidate is expected to face a comprehensive viva-voce on the elective subject and literature review report submitted to the university. The presentation need to be prepared and presented in consultation with research guide.

****

RANI DURGAVATI VISHWAVIDYALAYA, JABALPUR

SYLLABUS

M. Phil and Ph. D. Entrance Test (w.e.f. 2018-19)

In accordance with Revised M. Phil. and Ph.D. Ordinances

ELECTRONICS

The Question paper of the Entrance test will have two sections A and B, each consisting of 50 objective type compulsory questions. The section A will represent a component of "Research Methodology" whereas section B shall be "Subject Specific". Each question will carry one mark.

i. There will be no negative marks
ii. The duration of the Entrance test will be Two hours.
iii The candidate must score minimum 50% marks in the Entrance test to qualify for the interview.

(Time 2 Hours) **PART –A & B** **(Max Marks 100)**

PART –A

Part –A shall consist of 50 objective type compulsory questions of 1 mark each based on Research Methodology. It shall be of generic nature, intended to assess the Research aptitude of the candidate. It will primarily be designed to test reasoning ability, data interpretation and quantitative aptitude of the candidate.

PART –B

UNIT –I

Electronic Transport in semiconductor, PN Junction, Diode equation and diode equivalent circuit. Breakdown in diodes, Zener diodes, Tunnel diode, Semiconductor diodes, characteristics and equivalent circuits of BJT,JFET,MOSFET, IC, fabrication – crystal growth, epitaxy, oxidation, lithography, doping, etching, isolation methods, metallization, bonding, Thin film active and passive devices.

UNIT-II

Superposition, Thevenin, Norton and Maximum Power Transfer Theorems, Network elements, Network graphs, Nodal and Mesh analysis, Zero and Poles, Bode Plots, Laplace, Fourier and Z-transforms. Time and frequency domain responses. Image impedance and passive filters. Two –port Network Parameters. Transfer functions, Signal representation. State variable method of circuit analysis, AC circuit analysis, Transient analysis.

UNIT-III

Rectifiers, Voltage regulated ICs and regulated power supply, Biasing of Bipolar junction transistors and JFET. Single stage amplifier, Multistage amplifiers, Feedback in amplifiers, oscillators , function generators, multivibrators, Operational Amplifiers (OPAMP) – characteristics and Applications, Computational Applications, Integrator, Differentiator, Wave shaping circuits, F to V and V to F converters. Active filters, Schmitt trigger, Phase locked loop.

UNIT-IV

Logic families, flip –flops, Gates, Boolean algebra and minimization techniques, Multivibrators and clock circuits, Counters-Ring, Ripple. Synchronous, Asynchronous, Up and down shift registers, multiplexers and demultiplexers, Arithmetic circuits Memories, A/D and D/A converters.

UNIT-V

Architecture of 8085 and 8086 Microprocessors, Addressing modes,8085 instruction set,8085interrupts,Programming, Memory and I/O interfacing, Interfacing 8155, 8255, 8279, 8253, 8257, 8259, 8251,with 8085 Microprocessors Serial communication protocols, Introduction of Microcontrollers (8 bit)-8031/8051 and 8048.

UNIT-VI

Introduction of High –level Programming Language, Introduction of data in C. Operators and its precedence, Various data types in C, Storage classes in C. Decision-making and forming loop in program, Handling character, Arrays in C, Structure, and union, User defined function, Pointers in C, Advanced pointer. Pointer to structures, pointer to functions. Dynamic data structure, file handling in C, Command line argument, Graphics-video modes, video adapters, Drawing various object on screen, Interfacing to external hardware via serial /parallel port using C, Applying C to electronic circuit problems. Introduction to object –Oriented Programming and C++.

Introduction of FORTRAN language, programming discipline , statements to write a program, intrinsic functions, integer-type statement, IF statement, Data validation, Format-directed input and output. Subscripted variables and DO loops. Array, Fortran Subprogram.

UNIT-VII

Maxwell's equations, Time varying fields, Wave equation and its solution, Rectangular waveguide, Propagation of wave in ionosphere, Poynting vector, Antenna

parameters, Half-wave antenna, Transmission lines, Characteristic of Impedance matching, Smith chart, Microwave components-T, Magic-T Tuner. Circulator isolator, Direction couplers, Sources-Reflex Klystron, Principle of operation of Magnetron, Solid State Microwave devices, Basic Theory of Gunn, GaAs FET, Crystal Detector and PIN diode for detection of microwaves.

UNIT- VIII

Basic principle of amplitude, frequency and phase modulation, Demodulation, Intermediate frequency and principle of super heterodyne receiver, Spectral analysis and signal transmission through linear systems, Random signals and noise, Noise temperature and noise figure. Basic concepts of information theory, Digital modulation and Demodulation: PM, PCM, ASK, FSK, PSK, Time –division Multiplexing, Frequency-Division Multiplexing, Data Communications- Circuits, Codes and Modems. Basic concepts of signal processing and digital filters.

UNIT-IX(a)

Characteristics of solid state power devices –SCR, Triac, UJT, Triggering circuits, choppers, inverters, converters. AC-regulators, speed control of A.C. and D.C motors. Stepper and synchronous motors; Three phase controlled rectifier; Switch mode power supply; Uninterrupted power supply.

UNIT-IX (b)

Optical sources –LED ,Spontaneous emission, Stimulated emission, Semiconductor Diode LASER, Photodetectors- p-n photodiode. PIN photodiode, Phototransistors, Optocouplers, Solar cells, Display devices, Optical Fibres-Light propagation in fibre, Types of fibre, Characteristic parameters, Modes, Fibre splicing, Fibre optic communication systems –coupling to and from the fibre, Modulation, Multiplexing and coding, Repeaters, Bandwidth and Rise time budgets.

UNIT-X (a)

Transducers- Resistance, Inductance Capacitance, Peizoelectric, Thermoelectric, Hall effect, Photoelectric, Techogenerators, Measurement of displacement, velocity, acceleration, force, torque, strain, speed and sound temperature, pressure, flow humidity, thickness, pH, position.

Measuring Equipment –Measurement of R, L and C, Bridge and Potentiometers, voltage, current ,power energy, frequency/time, phase, DVMs, DMMs, CRO, Digital storage oscilloscope, Logic probes, Logic State Analyser, Spectrum Analyzer, Recorder, Noise and Interference in instrumentation, Instrumentation amplifiers, Radio Telemetry.

Analytical Instruments-Biomedical instruments –ECG, blood pressure measurements, spectrophotometers, Electron Microscope, X-ray diffractometer.

UNIT- X (b)

Open–loop and close-loop control system. Error amplifier, on-off controller, Proportional (p),Proportional –Integral (PI),Proportional –Derivative (PD) ,PID controllers, Dynamic Behaviour of control systems-servomechanism characteristic parameters of control systems-Accuracy, Sensitivity, Disturbances, Transient response, Stability, Routh-Hurwitz criterion, Bode plots, Nyquist criterion, Controlling speed. Temperature and position using analog / digital control circuits.

RANI DURGAVATI VISHWAVIDYALAYA, JABALPUR

SYLLABUS
M. Phil and Ph. D. Entrance Test (w.e.f.2018-19)
In accordance with Revised M. Phil. and Ph.D. Ordinances

PHYSICS

The Question paper of the Entrance test will have two sections A and B, each consisting of 50 objective type compulsory questions. The section A will represent a component of "Research Methodology" whereas section B shall be "Subject Specific". Each question will carry one mark.

i. There will be no negative marks
ii. The duration of the Entrance test will be Two hours.
iii The candidate must score minimum 50% marks in the Entrance test to qualify for the interview.

(Time 2 Hours) **PART –A & B** **(Max Marks 100)**

PART –A

Part –A shall consist of 50 objective type compulsory questions of 1 mark each based on Research Methodology. It shall be of generic nature, intended to assess the Research aptitude of the candidate. It will primarily be designed to test reasoning ability, data interpretation and quantitative aptitude of the candidate.

PART –B

I Mathematical Methods of Physics

Dimensional analysis, Vector algebra and vector calculus. Linear algebra, matrices, Cayley-Hamilton Theorem Eigen values and eigenvectors. Linear ordinary differential equations of first & second order, Special functions (Hermite, Bessel,

Laguerre and Legendre function). Fourier series and Laplace transforms. Elements of complex analysis, analytical functions, Taylor & Laurent series, poles, residues and evaluation of integrals. Elementary probability theory random variables, binomial. Poisson and normal distributions. Central limit theorem.

II Classical Mechanics

Newton's laws, Dynamical systems, Phase space dynamics, stability analysis, Central force motions. Two body Collisions –Scattering in laboratory and Centre of mass frames. Rigid body dynamics moment of inertia tensor. Non- inertial frames and pseudo forces. Variational principle. Generalized coordinates, Largrangian and Hamiltonian formalism and equations of motion. Conservation Laws and cyclic coordinates. Periodic motion : small oscillations, normal modes. Special theory of relativity Lorentz transformations, relativistic kinematics and energy equivalence.

III Electromagnetic Theory

Electromagnetics Gauss's law and its applications Laplace and Poission equations, boundary value problems. Magnetostatics: Biot-Savart law, Ampere's theorem. Electromagnetic induction. Maxwell's equations in free space and linear isotropic media: boundry conditions on the fields at interfaces. Scalar and vector potentials,gauge invariance. Electromagnetic waves in free space. Dielectrics and conductors. Reflection and refraction, polarization, Fresnel's law interference, coherence, and diffraction. Dynamics of charged particles in static and uniform electromagnetic fields.

IV Quantum Mechanics

Wave–particle duality. Schrodinger equation (time-dependent and time – independent). Eigen value problems (Particle in a box. harmonic oscillator, etc)Tunneling through a barrier. Wave-function in coordinate and momentum representations. Commutators and Heisenberg uncertainty principle. Dirac notation for state vectors. Motion in a central potential: orbital angular momentum, angular momentum algebra, spin, addition of angular moment: Hydrogen atom, Stern.

Gerlach experiment. Time independent perturbation theory and applications. Variational method. Time dependent perturbation theory and Fermi's golden rule, selection rules, Identical particles, Pauli exclusion principle, spin–statistics connection.

V Thermodynamic and Statistical Physics

Laws of thermodynamics and their consequences. Thermodynamic potentials. Maxwell relations, chemical potential, phase equilibria, phase space, micro –and macro-states. Micro-canonical, canonical and noise reduction, shielding and grounding. Fourier transforms, lock–in detector, box–car integrator, modulation techniques.

VI Electronics and Experimental Methods

Semiconductor devices (diodes, junctions, transistors, field effect devices, homo-and hetero-junction devices), devices structure, devices characteristics, frequency dependence and applications, Opto-electronic devices (solar cell, Photo detector, LEDs).Operational amplifier and their application. Digital techniques and applications (Registers, counters, comparators and similar circuits).A/D and D/A converters, Microprocessor and Microcontroller basics. Data Inter pretation and analysis. Precision and accuracy. Error analysis, propagation of errors. Least squares fitting, Linear and non linear curve fitting, Chi-square test, Transducers (Himpertions pressure/vacuum, magnetic fields, vibration, optical and particle detectors).Measurement and control Signal conditioning and recovery. Impedance matching, amplification(op-amp based, instrumentation amp, feedback).filtering and noise reduction, Shielding and grounding. Fourier transforms, Lock-in detector, box –car integrator, modulation techniques, High frequency devices (including generators and detectors).

VII Atomic & Molecular Physics

Quantum states of an electron in an atom. Electron spin. Spectrum of helium and alkali atom. Relativistic corrections for energy levels of hydrogen atom,

hyperfine structure and isotopic shift, width of spectrum lines.LS & JJ couplings. Zeeman, Paschen-Bach & Stark effects. Electron spin resonance. Nuclear magnetic resonance, chemical shift. Frank-Condon principle. Born-Oppenheimer approximation. Electronic, rotational, vibrational and Raman spectra of diatomic molecules , selection rules. Lasers spontaneous and stimulated emission, Einstein A & B coefficients. Optical pumping, Population inversion, rate equation. Modes of resonators and coherence length.

VIII Condensed Matter Physics

Bravais lattices, Reciprocal lattice, Diffraction and the structure factor. Bonding of solids. Elastic properties, phonos, lattice specific heat. Free Electron Theory and Electronic specific heat. Response and relaxation phenomena. Drudge mode of electrical and thermal conductivity. Hall effect and thermoelectric power. Electron motion in a periodic potential, band theory of solids, Matter, Insulators and semiconductors, Superconductivity, type–I and type- II superconductors. Josephson junctions. Superfluidity, Defects of dislocation. Ordered Phases of matter: translational and orientational order, Kinds of liquid crystalline order, quasi crystals.

IX Nuclear and Particle Physics

Basic nuclear properties: size, shape and charge distribution, spin and parity. Binding energy, semi empirical mass formula, liquid drop model. Nature of the nuclear force, form of nucleon –nucleon potential, charge –independence and charge–symmetry of nuclear forces. Deutron problem. Evidence of shell structure, single-particle shell model, Its validity and limitations. Rotational spectra. Elementary ideas of alpha, beta and gamma decays and their selection rules. Fission and fusion. Nuclear reactions. reactions mechanism, compound nuclei and direct reactions.

Classification of fundamental forces. Elementary particles and their quantum numbers(charge, spin parity, isospin, strangeness, etc,) Gellemann- Nishijima formula. Quark model, baryons and mesons. C,P, and T invariance. Application of

symmetry arguments to particle reactions. Parity non-conservation in weak interaction. Relativistic kinematics.

SYLLABUS FOR Ph.D & M.PhIL ENTRANCE EXAMINATION
DEPARTMENT OF POLITICAL SCIENCE, R.D.V.V.

RESEARCH METHODOLOGY

Nature of social research, Research problem and research design, Hypothesis-concept and variables,

Sampling, Tools and techniques of data collection, Case Study & Pilot Study, Survey Analysis and Report writing.

POLITICAL THEORY AND THOUGHT

Ancient & Modern Indian Political Thought, Greek Political Thought, European Political Thought, Contemporary Political Thought.

Democracy, liberty, equality, sovereignty, law Individual and social justice, role of Ideology and theories of change, behaviouralism, Decline and resurgence of political theory.

COMPARITIVE POLITICS AND POLITICAL ANALYSIS

Evolution of comparative politics as a discipline, nature and scope, approaches to study of comparative politics, Constitution-concepts, Forms of government, Organs of Government, Party system, Pressure Groups, Rule of law and Judicial Review.

INDIAN GOVERNMENT AND POLITICS

National Movement, constitutional development and the making of Indian constitution, Parliament, President , Prime Minister, Council of Ministers, Governor, Chief Minister, Council of Ministers, State Legislator, Panchayti Raj Institutions, Indian Judiciary, Electoral System, Class, caste, region, gender, religion, concept of welfare state.

PUBLIC ADMINISTRATION

Development of public administration as a discipline: approaches to the study of public administration, Theories of Organisation, Chief Executive, Recruitment, Training, Promotion, Discipline, Bureaucracy, Leadership, Financial Administration, Good Governance: Right to information.

INTERNATIONAL RELATIONS

Theories and Approaches to the study of International relations, Power, interest and ideology in international relations, National Interest, Cold War, International, regional and sub regional organizations, Political economy of international relations, New international economic order, International Treaty, Human rights , Diplomacy, India and foreign policy-role in international affairs ,relations with neighboring nations .

रानी दुर्गावती विश्वविद्यालय, जबलपुर
प्री. पी–एच. डी. (संस्कृत) प्रवेश–परीक्षा पाठ्यक्रम
संशोधित अध्यादेश 82 /2018 के अनुसार

प्री. पी–एच. डी. प्रवेश–परीक्षा के अन्तर्गत 100 अंकों का एक प्रश्नपत्र होगा जिसमें एक–एक अंक के 100 वस्तुनिष्ठ प्रश्न होंगे। प्रश्नपत्र के दो भाग होंगे। प्री. पी–एच. डी. पवेश–परीक्षा उत्तीर्ण करने के लिए न्यूनतम 50 प्रतिशत अंक प्राप्त करना अनिवार्य होगा। प्रश्नपत्र की अवधि दो घण्टे होगी।

पाठ्यक्रम

प्रथम भाग –	शोधप्रविधि	50 अंक
द्वितीय भाग–	विषय (संस्कृत) आधारित	50 अंक

प्रथम भाग– अनुसन्धान पद्धति एवं प्रविधि

अंक 50

1. अनुसन्धान की परिभाषा, अनुसन्धान के लिए प्रयुक्त शब्द, अनुसन्धान का उद्देश्य।
2. अनुसन्धान के विभिन्न चरण।
3. अनुसन्धान की व्याप्ति, सीमा एवं विविध क्षेत्र।
4. अनुसन्धान के प्रकार एवं पद्धतियाँ।
5. अनुसन्धान प्रविधि– विषय निर्वाचन, प्राक्कल्पना, शोध–विषय की रूपरेखा, शोध–पद्धति का निर्वाह।
6. शोध–सामग्री– संकलन, विश्लेषण, विवेचन, वर्गीकरण।
7. शोध–प्रबन्ध– विषयानुक्रम, भूमिका, अध्याय विभाजन, पादटिप्पणो, सन्दर्भचयन, उपसंहार, परिशिष्ट आदि।
8. शोधकार्य तथा शोध–प्रबन्ध लेखन में आने वाली कठिनाइयाँ, दोष, गुणात्मकता।
9. अनुसन्धान के विविध साधन– मुद्रित, तकनीकि, यान्त्रिक।
10. शोधपत्र, शोधालेख, कार्यशाला, संगोष्ठी आदि का स्वरूप।

द्वितीय भाग– विषय (संस्कृत) आधारित

अंक 50

1. वैदिक वाड़मय–

1. ऋग्वेद सूक्त – अग्नि सूक्त (1.1), इन्द्र सूक्त (2.12), पुरुष सूक्त (10.90), हिरण्यगर्भ सूक्त (10.121)
2. यजुर्वेद तथा अथर्ववेद सूक्त – शिवसकल्प सूक्त (32,1–6), राष्ट्राभिवर्धनम् (1.29)
3. देवता परिचय– इन्द्र, अग्नि, विष्णु, उषस, पर्जन्य, सोम।
4. पंचमहायज्ञ, दर्श–पौर्णमास यज्ञ।
5. ऋग्वेद का क्रम, संहिताओं, ब्राह्मणों, आरण्यकों एवं उपनिषदों का सामान्य परिचय (विषय वस्तु ,महत्त्व)।
6. वैदिक काल निर्धारण के विभिन्न सिद्धांत
7. षड् वेदांगों का सामान्य परिचय
8. पाणिनि शिक्षा
9. ऋक्प्रातिशाख्य – समानाक्षर, संध्यक्षर, अघोष, सोष्म, रक्त, , प्रगृह्य संज्ञाएँ।
10. निरुक्त– षड्भावविकार,पदविचार, (नाम, अख्यात्, उपसर्ग, निपात्), निर्वचन– आचार्य, वीर, इन्द्र, गौ, समुद्र, आदित्य, अग्नि ,नदी, अश्व।

2. व्याकरण एवं भाषा विज्ञान–

1. संज्ञा एवं परिभाषा प्रकरण (सिद्धांत कौमुदी)
2. कारक प्रकरण (सिद्धांत कौमुदी)
3. समास प्रकरण (लघुसिद्धांत कौमुदी)
4. भाषा विज्ञान – परिभाषा, वर्गीकरण, (आकृतिमूलक एवं परिवार मूलक वर्गीकरण)
5. ध्वनि परिवर्तन सम्बंधी नियम (ग्रिम, ग्रासमैन, वर्नर), ध्वनियंत्र, अर्थपरिवर्तन के कारण एवं दिशाएँ, भारोपीय भाषा परिवार।

3. दर्शन–

1. तर्कभाषा– पदार्थ, कारण, प्रमा, प्रमाण ।
2. वेदान्तसार– अनुबन्धचतुष्टय, अज्ञान की शक्तियाँ, अध्यारोप एवं अपवाद, पंचीकरण, लिंग शरीर, जीवन्मुक्त लक्षण।
3. सांख्यकारिका– सृष्टि–प्रकिया, सत्कार्यवाद, पुरुषस्वरूप, प्रत्यय–सर्ग, कैवल्य।
4. अर्थसंग्रह– धर्म का लक्षण, भावना विचार, विधि के प्रकार, अर्थवाद।
5. योग दर्शन– चित्तभूमि, चित्तवृत्तियाँ, योगांग, ईश्वर का स्वरूप।
6. जैन, बौद्ध एवं चार्वाक दर्शन का सामान्य परिचय।

4. संस्कृत साहित्य–

1. रामायण– कम, प्रमुख आख्यान, उत्तरवर्ती साहित्य पर प्रभाव
2. महाभारत– कम, प्रमुख आख्यान, उत्तरवर्ती साहित्य पर प्रभाव
3. मनुस्मृति – धर्म का लक्षण, धर्म के घटक, संस्कार, विवाह के भेद, पुत्र के प्रकार।
4. कौटिल्य अर्थशास्त्र– विनयाधिकारिक प्रथम दस अधिकार।
5. प्रमुख पुराणों का परिचय

5. काव्यशास्त्र एवं नाट्यशास्त्र–

1. प्रमुख काव्यशास्त्रीय सिद्धान्त एवं चिन्तक
2. काव्यप्रकाश– काव्यहेतु, काव्यप्रयोजन, काव्यलक्षण, काव्यभेद, शब्दक्तियाँ, गुण, अलंकार (अनुप्रास, यमक, वकोक्ति, उपमा, रूपक, उत्प्रेक्षा, विभावना, विशेषोक्ति।
3. ध्वन्यालोक – प्रथम उद्योत।
4. रसगंगाधर– प्रथम आनन (रसनिरूपण पर्यन्त)।
5. काव्यमीमांसा– प्रथम, द्वितीय, तृतीय एवं चतुर्थ अध्याय।
6. नाट्यशास्त्र – प्रथम एवं द्वितीय अध्याय।
7. दशरूपक – प्रथम प्रकाश (सन्धिभेद छोड़कर), द्वितीय प्रकाश ।

6. पद्य, गद्य एवं नाट्य–

1. सामान्य अध्ययन– अभिज्ञानशाकुन्तलम, उत्तररामचरितम्, मृच्छकटिकम्, वेणीसंहार, मुद्राराक्षस, रत्नावली, दशकुमारचरितम्, हर्षचरितम्।
2. विशेष अध्ययन– रघुवंशम्–त्रयोदश सर्ग, कुमारसंभवम्–पंचम सर्ग, शिशुपालवध– प्रथमसर्ग, नैषधीयचरितम् –प्रथम सर्ग, मेघदूतम्–पूर्वमेघ, कादम्बरी–महाश्वेता वृत्तान्त।