INFORMATION BROCHURE

FOR
ADMISSION TO
PhD PROGRAMME
(JULY 2020 SESSION)

RESEARCH UNIT
Indira Gandhi National Open University
Maidan Garhi,
New Delhi-110 068
www.ignou.ac.in

NTA-Helpline numbers 0120-6895200 between 09:00 am to 6:00pm.

For queries applicants may contact:
researchunit@ignou.ac.in
011-29571984/85/98/86
From 10.00 A.M. to 5.30 P.M
Monday to Friday (excluding Gazette holidays)
Candidates are required to apply online only. The Online Link for PhD Entrance Portal is as under:
http://ignouexams.nta.nic.in/
The online portal for submission of applications will be operational from 28\textsuperscript{th} February, 2020.

1. GENERAL INFORMATION

a) Applications are invited for admission to Ph.D programme in selected disciplines for the July 2020 session. The list of disciplines, name of the Programme coordinators and discipline wise number of seats available are given in Appendix II.

b) The Ph.D Programme is offered in strict compliance of the UGC (Minimum Standards and Procedure for award of M.Phil/ Ph.D Degrees) Regulations, 2016 and amendments thereto from time to time.

c) Selected candidates will be governed by IGNOU Ordinance/IGNOU Regulation/Guidelines for conducting Ph.D Degree Programme.

d) Entrance Test is compulsory for all candidates applying for admission to Ph.D Programme.

e) Admission to the Ph.D Degree Programme is strictly on merit, based on the performance in the Entrance Test and Interview.

f) The syllabus of the Entrance Test shall be as per the ‘University Grants Commission (Minimum Standards and Procedures for Award of MPhil / PhD Degrees) Regulations, 2016 consisting of 50% of Research methodology and 50% subject specific.

g) The question paper shall have total 100 questions consisting of 50% on research methodology and 50% on specific subject.

h) All the questions shall be Multiple Choice questions (MCQ) with 4 options and only one correct answer. There shall be no negative marking.

i) The Entrance Test shall have a 70% weightage and 30% weightage shall be given to the interview/viva.

j) IGNOU offers Ph.D programme under two categories: Part time and Full time. Both categories of students will be required to attend classes, if course work is allotted to them.

k) The minimum and maximum duration of Ph.D programme is three years and six years respectively. The Women Candidates and Persons with Disabilities (40% or more / “severe” where percentage is not defined) are given two years extra in the maximum duration.

l) The Ph.D programme involves coursework during the first six months of admission, which will be conducted in IGNOU Campus at New Delhi only. A student has to attend the coursework on a regular basis. At least 80 per cent attendance is compulsory.
m) As of now IGNOU does not have hostel facilities for students. Students have to make their own arrangements for stay in Delhi.

2. ELIGIBILITY CRITERIA FOR Ph.D.

The eligibility criteria for admission to Ph.D programme are as follows:

a) Master's Degree from a University recognized by UGC in the relevant discipline with atleast 55% marks [50% marks in the case of SC, ST and OBC (Non-creamy Layer)/Differently-Abled and other categories of candidates as per the decision of UGC from time to time, or for those who had obtained their Master's Degree prior to 19th September, 1991] excluding grace marks.

b) See Appendix II for further details.

3. SELECTION PROCEDURE

Stage 1: Entrance Test

a) The Entrance Test will be conducted by NTA at National Level across the country. The list of eligible candidates to appear for the Entrance Test will be displayed on NTA website.

b) No separate communication shall be sent to candidates in this regard.

c) Hall Tickets enabling the candidates to take the Entrance Test will also be displayed on NTA website. Candidates are required to download and print the same to appear in the Entrance Test.

d) Candidates are required to bring with them an original identity proof having photograph, such as Aadhar Card, Voter ID Card, Driving License, Passport and ID Card issued by Govt. Agencies.

e) Those who secure at least 50% marks in the Entrance Test (45% marks in case of SC/ST/OBC (Non Creamy layers) / Differently abled persons) will be shortlisted for the interview in order of merit subject to the maximum limit of five times of the available seats.

Stage 2: Interview/ Presentation

a) Short-listed Candidates in the Entrance Test will be called for interview/presentation of Synopsis before the Discipline specific Doctoral Research Committee.

b) Offer letters for admission will be sent to the Selected Candidates only.
Important Dates

- Last date for submission of online application - 23rd March, 2020
- Downloading of Admit Cards from NTA website - 09th April, 2020 onwards
- Entrance Test - 29th April, 2020
- Declaration of Entrance Result – 8th May, 2020

Application fee (Non-refundable)

For Online Application to PhD Programme (July 2020)

is Rs.1000/- (for candidates belonging to General/ OBC)

Rs.800/- (for candidates belonging to SC/ST/EWS)

Note:

1. The candidates before applying for PhD Entrance Test must ensure their eligibility to appear the test and to go through the specific criteria (Appendix-I) before applying for a particular discipline.

2. The candidates are required to download the filled in registration / application form for future reference.

3. Candidates are required to apply online only. No offline/hardcopy of the application form will be accepted.

4. A list of States and Cities for Research Entrance Examination is given in Appendix–I.

5. While applying, candidates must select four Examination City Centres in order of their preference. Since the seating capacity at each centre is limited, they will be considered for the allotment of the examination city centres as per NTA norms.

6. NTA can change the examination city centre opted by the candidate to another nearby centre, if number of candidates are more/less at any examination city centre.

7. The Examination City Centre, once opted, shall not be changed.

8. The Admit Card will be uploaded on NTA website https://ignouexams.nta.nic.in. Please check the admit card carefully for your Name, Subject Group, Date of Birth, Gender, Examination Centre Name, City, and Category, etc.

9. Reservation of seats shall be as per Government of India rules.

10. For any discipline specific query at any stage, candidates are advised to contact the concerned Programme Coordinator (see Appendix II)

11. For Discipline specific syllabus for Entrance Test please refer to Appendix III
12. Being called for interview does not entitle a candidate to stake claim for admission. The Doctoral Research Committee may not recommend a candidate if the discipline does not have the specialization in which he/she wants to carry out research.

13. The University reserves all the rights not to fill up some or all the seats vacant in a Research Degree programme in case suitable candidates are not found at the level of Test/Interview

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## Appendix - I

### Cities for NTA-IGNOU Research Entrance Test on 29th April, 2020

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## Appendix- II

Discipline-wise Vacancy of Seats/ Specific eligibility criteria and Programme Coordinators

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<tr>
<th>Sl No</th>
<th>School</th>
<th>Discipline</th>
<th>PhD vacancies</th>
<th>Name of Programme Coordinator / Contact</th>
<th>Eligibility Criteria</th>
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<tr>
<td>1.</td>
<td>School of Social Sciences (SOSS)</td>
<td>Anthropology (PHDAN)</td>
<td>GEN – 07, SC - 01, ST - 00, OBC – 03, EWS – 01</td>
<td>Dr. K. Anil Kumar <a href="mailto:anilkumaranthro@gmail.com">anilkumaranthro@gmail.com</a> / <a href="mailto:anilonline1@rediffmail.com">anilonline1@rediffmail.com</a></td>
<td>Post Graduation in Anthropology and Allied disciplines</td>
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<td>2.</td>
<td>Economics (PHDEC)</td>
<td>GEN – 05, SC - 01, ST - 00, OBC – 01, EWS – 00</td>
<td>Prof. Narayan Prasad <a href="mailto:nps20@rediffmail.com">nps20@rediffmail.com</a></td>
<td>Master’s Degree or M.Phil. Degree in Economics</td>
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<td>3.</td>
<td>Library &amp; Information Science (PHDLIS)</td>
<td>GEN – 06, SC - 01, ST - 00, OBC – 02, EWS – 00</td>
<td>Dr. Z. Yanthan <a href="mailto:zyanthan@ignou.ac.in">zyanthan@ignou.ac.in</a></td>
<td>Master's Degree and/or M.Phil. Degree in Library and Information Science</td>
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<td>4.</td>
<td>Political Science (PHDPS)</td>
<td>GEN – 03, SC - 00, ST - 00, OBC – 00, EWS – 00</td>
<td>Prof. Anurag Joshi <a href="mailto:anuragjoshi@ignou.ac.in">anuragjoshi@ignou.ac.in</a></td>
<td>Master's Degree and/or M.Phil. Degree in Political Science or allied disciplines</td>
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<td>5.</td>
<td>Psychology (PHDPC)</td>
<td>GEN – 09, SC - 02, ST - 01, OBC – 04, EWS – 01</td>
<td>Prof. Suhas Shetgovekar <a href="mailto:sshtgovekar@ignou.ac.in">sshtgovekar@ignou.ac.in</a> / Dr. Monika Misra <a href="mailto:monikamisra@ignou.ac.in">monikamisra@ignou.ac.in</a></td>
<td>Master's Degree and/or M.Phil. Degree in Psychology</td>
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| 12. | Statistics (PHDSTAT) | GEN – 07  
SC - 01  
ST - 00  
OBC – 03  
EWS – 01  
Total – 12 | Dr. Neha Garg  
naharg@ignou.ac.in  
011-29572806 | Geoinformatics or Remote Sensing and GIS from any recognized University.  
| 13. | School of Continuing Education (SOCE)  
Food & Nutritional Science (PHDFN) | GEN – 04  
SC - 00  
ST - 00  
OBC – 01  
EWS – 00  
Total – 05 | Prof. Deeksha Kapur  
dekshakapur@ignou.ac.in  
011-29572960 | A Master’s Degree (M.Sc.) in Food and Nutrition / Dietetics / Public Health Nutrition or an equivalent grade from a recognized institution with UGC-NET qualified. |
| 14. | Home Science (PHDHC) | GEN – 03  
SC - 00  
ST - 00  
OBC – 01  
EWS – 00  
Total - 04 | Prof. Heena K. Bijli  
heenakbijili@ignou.ac.in  
| 15. | School of Management Studies (SOMS)  
Commerce (PHDCOM) | GEN – 05  
SC - 01  
ST - 00  
OBC – 01  
EWS – 00  
Total – 07 | Dr. Madhulika P. Sarkar  
Madhulikap.sarkar@ignou.ac.in  
011-29573023 | Masters Degree in Commerce or any other allied discipline from any recognized University/Institute of higher learning |
| 16. | Management (PHDMGMT) | GEN – 03  
SC - 01  
ST - 00  
OBC – 01  
EWS – 00  
Total - 05 | Prof. Neeti Agarwal  
phdmanagement@ignou.ac.in  
011-29573020 | Master's Degree and/or M. Phil. Degree in Management Studies or in allied disciplines.  
The seats are available in Financial Management, Operations Management, Human Resource Management and General Management |
| 17. School of Education (SOE) | Education (PHDES) | GEN – 10  
SC - 03  
ST - 01  
OBC – 05  
EWS – 01  
Total –20 | Prof. Amitav Mishra  
011-29572999  
amitav@ignou.ac.in | MA(Education) or M.Ed. |
| 18. School of Gender & Development Studies (SOGDS) | Gender & Development Studies (PHDGDS) | GEN – 07  
SC - 01  
ST - 00  
OBC – 03  
EWS – 01  
Total – 12 | Prof. Savita Singh  
savitasingh@ignou.ac.in  
011-29571613 | Master’s degree in Gender Studies or Gender & Development Studies with 55%  
OR  
Master’s degree in other streams with one or two courses in the area of Gender Studies or Gender & Development Studies and/or with demonstrable evidence of teaching and / or research and publications in the area of Gender Studies or Gender & Development Studies. |
| 19. School of Journalism & Mass Communication (SOJNMS) | Journalism & Mass Communications (PHDJMC) | GEN – 05  
SC - 01  
ST - 00  
OBC – 01  
EWS – 00  
Total – 07 | Dr. K.S Arul Selvan  
skarul@ignou.ac.in  
Dr. Shikha Rai  
drshikharai@ignou.ac.in  
011-29571607 | Masters Degree in Communication or related disciplines (Social Sciences and Humanities with demonstrated interest in the Communication and Media Research). |
| 20. School of Agriculture (SOA) | Dairy Science & Technology (PHDDR) | GEN – 03  
SC - 00  
ST - 00  
OBC – 01  
EWS – 00  
Total - 04 | Prof. M. K. Salooja  
mksalooja@ignou.ac.in  
| 21. | School of Extension & Development Studies (SOEDS) | Development Studies (PHDDV) | GEN – 10  
SC - 02  
ST - 01  
OBC – 04  
EWS – 01  
Total - 18 | Prof. Nehal A. Farooquee  
nafarooquee@ignou.ac.in  
011-29571664 | Possesses Master’s Degree from a University recognized by UGC or any other qualification recognized as equivalent thereto in such fields of study as are notified for the purpose from time to time by the University with at least 55% marks (50% marks in the case of SC, ST, OBC (Non-creamy Layer) and Differently-Abled and other categories of candidates as per the decision of UGC from time to time, or for those who had obtained their Master’s Degree prior to 19th September, 1991) excluding grace mark. |
| 22. | School of Computer & Information Science (SOCIS) | Computer Science (PHDCS) | GEN – 04  
SC - 00  
ST - 00  
OBC – 01  
EWS – 00  
Total – 05 | Dr. V. V. Subrahmanyam  
vvsubrahmanyam@ignou.ac.in  
011-29572901/2909 | Possesses Master’s Degree from a University recognized by UGC or any other qualification recognized as equivalent thereto in such fields of study as are notified for the purpose from time to time by the University with at least 55% marks (50% marks in the case of SC, ST, OBC (Non-creamy Layer) and Differently-Abled and other categories of candidates as per the decision of UGC from time to time, or for those who had obtained their Master’s Degree prior to 19th September, 1991) excluding grace mark. |
| 23. | School of Law (SOL) | Law (PHDLE) | GEN – 03  
SC - 00  
ST - 00  
OBC – 01  
EWS – 00  
Total – 04 | Dr. Gurmeet Kaur  
gurmeetkaur@ignou.ac.in  
011-29572984 | Master’s Degree in Law from a University recognized by UGC or any other qualification recognized as equivalent thereto in the field of law as notified for the purpose from time to time by the University. |
| 24. | School of Health Sciences (SOHS) | Nursing (PHDNS) | GEN – 03  
SC - 00  
ST - 00  
OBC – 00  
EWS – 00  
Total – 03 | Prof. Pity Koul  
pkoul@ignou.ac.in  
011-29572807 | Master's Degree and/or M.Phil. Degree in Nursing |
| 25. | School of Social Work (SOSW) | Social Work (PHDSW) | GEN – 06  
SC - 01  
ST - 00  
OBC – 03  
EWS – 01  
Total – 11 | Prof. Rose Neimbiakkim  
rosenembiakkim@ignou.ac.in  
011-29571695 | MA in Social Work / MSW Degree from a University recognized by UGC |
| 26. | School of Translation Studies (SOTST) | Translation Studies (PHDTT) | GEN – 03  
SC - 00  
ST - 00  
OBC – 00  
EWS – 00  
Total – 03 | Dr. Jagdish Sharma  
Dr. Rajendra P. Pandey  
jagdishsharma@ignou.ac.in  
rajendrapandey@ignou.ac.in  
011-29571625  
011-29571628 | Post- Graduate Degree in Translation Studies or allied Subjects viz., Literature, Linguistics |
| 27. | School of Vocational Education and Training (SOVET) | Vocational Education and Training (PHDVE) | GEN – 05  
SC - 01  
ST - 00  
OBC – 02  
EWS – 00  
Total – 08 | Dr. R. S. P Singh  
rpsingh@ignou.ac.in  
011-29571645 | Master’s Degree in Economics, Commerce, Management, Education, Agriculture Extension or Extension Education, Environmental Sciences. |
| 28. | School of Foreign Languages (SOFL) | French (PHDFL) | GEN – 02  
SC - 00  
ST - 00  
OBC – 00  
EWS – 00  
Total – 02 | Dr. Deepanwita Srivastava  
deepan@ignou.ac.in  
011-29571636 | MA/MPhil in French from an Indian or Foreign University |
Appendix- III

Discipline wise Specific Syllabus for Entrance Test

1. Ph. D. in Anthropology (PHDAN)

Anthropology and Methods of Research
*Introducing Anthropology:* Defining Anthropology, Meaning, Scope, history, Branches of Anthropology, Emerging Frontiers in Anthropology
*Field Work Tradition in Anthropology:* Field Work and its Relevance, Ethnography, Techniques, Methods and Methodology, Genealogy and Pedigree
*Research Design:* Review of Literature and Statement of Research Problem, Theory, Research Design
*Data Collection Techniques:* Primary Data, Secondary Data, Biological Methods, Archaeological Methods
*Statistical Analysis:* Collection and Presentation of Data, Measures of Central Tendency and Dispersion, Statistical Distribution, Using SPSS for Data Analysis Contents

Physical Anthropology
*Introduction to Physical Anthropology:* Definition and Scope, Relationship with Other Disciplines, Applied aspects of Physical Anthropology
*Human Evolution:* Principles of Evolution, Theories of Organic Evolution, Synthetic Theory, Palaeoanthropology
*Primate Study:* Living Primates, Primate Behaviour.
*Biological Diversity:* Concept of Race, Characteristic, Criteria of Biological Diversity, Racial Classification
*Human Genetics:* Human Genetics, Methods in Human Genetics, Population Genetics, Aberrations in Chromosomes
*Human Growth and Development:* Principles of Growth, Methods and Influencing Factors, Human Constitution and Physique, Reproductive Biology
*Ecological Anthropology:* Fundamentals of Ecology, Adaptation to Environment, Epidemiological Anthropology

Social Anthropology
*Introduction to Social Anthropology:* Social Anthropology: Nature and Scope, Philosophical and Historical Foundations of Social Anthropology, Relationship of Social Anthropology with Allied Disciplines
*Society and Culture:* Concept of Society and Culture, Social Groups, Social Identity and Movements, Social Change in Indian Context
*Anthropological Theories:* Classical Theories, Functionalism, Structural Functionalism and Neo-Functionalism, Social Organisation and Dynamic Theories of Structure, Culture and Personality, Marxism, Structuralism, Feminism, Post-Modernism and Post-Colonialism
*Kinship, Marriage and Family:* Kinship, Descent and Alliance Theories, Marriage, Family, Kinship, Family and Marriage in India

Economic and Political Organisations: Concepts and Definitions, State and Stateless Societies: Political Institutions, Production, Consumption and Exchange, Political Power and Distribution of Resources

Archaeological Anthropology

Introduction to Archaeological Anthropology: Definitions and Scope, History and Development, Interdisciplinary Relations

Tool types and techniques in Archaeology: Space, Tool Families, Tool-Technologies, Household and Decorative Objects

Geological Framework: Time and Space, Recent Period, Human Palaeontology

Dating Methods: Relevance of Dating, Relative and Absolute dating

Lithic Cultures: Palaeolithic, Mesolithic and Neolithic. Evidence of palaeolithic culture in India

*Indus valley civilization.*
2. PhD in Economics (PHDEC)

The syllabus includes topics from Microeconomics, Macroeconomics and Research Methodology.

**Microeconomics**
Consumer Behavior: Theory of Demand, Recent developments of Demand theory
Producer Behavior: Theory of Production, Theory of Cost

Price and Output Determination: Perfect Competition, Monopoly, Monopolistic Competition, Collusive and non-Collusive Oligopoly, Alternative theories of Firm


General Equilibrium

Economics of Uncertainty: Choice in Uncertain Situations, insurance Choice and Risk
Game Theory: Cooperative and non-Cooperative games

**Macroeconomics**
Classical and Keynesian Approaches, neoclassical Synthesis, Economic Growth- Solow Model, Endogenous Growth Model, Rational Expectations,
Inter-temporal decision-making- Ramsey Model, Overlapping generations Model, Money and the Role of Monetary Policy,
Business Cycles- Traditional Theories, Real Business Cycles

Unemployment- Traditional Theories, Search Theory, Nominal and Real Rigidities, New Keynesian Theories of Unemployment

Open-Economy: Flexible and Fixed Exchange Rate Systems, Sluggish Price Adjustment

**Research Methodology**
Approaches to Social Enquiry, Research Process, Hypothesis: Its Types and Sources, The Nature, Sources and Types of Data, Measurement Scales of Variables

Descriptive Statistics and Data Presentation, Correlation and Regression, Probability and Probability Distributions

Sampling Theory- Sampling Distribution, Statistical Inference
Measurement of Inequality, Construction of Composite Index

Introduction to Differential Calculus- Functions, Limit and Continuity, Differential Calculus Partial and Total Differentiation

Extreme Values and Optimisation- maxima and Minima, Unconstrained Optimisation, Constrained Optimisation

Integral Calculus and Economic Dynamics: Integration and Applications of Economic Dynamics, Difference Equations and Economic Dynamics

Linear Algebra and Economics Applications- Vectors and Matrices, Input-Output Analysis, Linear Programming.

***
3. PhD in Library & Information Science (PHDLIS)

Section - A

1. Introduction to Research Methodology
   - Fundamentals of research
   - Types of research
   - Research methods – quantitative and qualitative
   - Research Tools,
   - Research design
   - Ethical issues in research (IPR, plagiarism)
   - Research Communication (report writing, style manuals, web enabled citation management tools)
   - Methods and techniques of Reviewing (book review, literature review,

Section – B

1. Information, Communication and Society
2. Information Sources, Systems and Services
3. Information Processing and Retrieval
4. ICT Applications
5. Recent Trends in LIS

***
4. PhD in Political Science (PHDPS)

I Research Methodology
Methodology/Framework: Systems, Marxian and Post–Modern approaches, Inter–Disciplinary approach

II. Political Theory & Thought

III. India: State and Society
Introduction: State, Society and Politics Interface (Conceptual and Theoretical Aspects)
Working of the Indian Constitution
Indian State: India’s Political Economy, Nature of the Indian State, Models of Development, Development in India- Regional Variations
Social Movements: Identity-Based Movements: Caste, Religion, Gender, Tribe, Region, Class Movements: Farmers and Working Classes
Democracy in India: Electoral Democracy (Methodology, Issues and Debates)

IV. Globalization and International Relations
Major theories of IR International Peace and Cooperation:National Sovereignty and Humanitarian Intervention, Human Security and Human Development Agenda, Environment and Sustainability
India in the Emerging World Order: India’s Neighborhood, India and Great Powers, India and the Developing World

***
5. **PhD in Psychology (PHDPC)**

The syllabus is based on what is covered at the Master’s level in psychology. The outline of syllabus is as follows:

1. **Research Methodology (50%)**

   Introduction to research in psychology, definition, constructs and variables, steps in psychological research, problem and hypothesis, type 1 and type 2 errors; Types of research: experimental, non experimental, field experiments, field studies, survey research; Research designs; Methods of data collection including interview, observation, objective tests, questionnaire; Test Construction; Reliability and validity; Sampling and sampling techniques; Qualitative and quantitative approach to research; Methods of data collection in qualitative research; Ethics in research; Psychological statistics, levels of measurement, descriptive and inferential statistics, measures of central tendency and measures of variability; Correlation and Regression; Parametric and nonparametric statistics and their various techniques for statistical analysis; Normal Distribution Curve.

2. **Specialisation (50%)**

   **A: Industrial and Organisational Psychology**
   Introduction to industrial and organisational psychology; Human resource management and human resource development; Recruitment and Selection; Training and training methods; Performance appraisal; Leadership; Diversity and diversity management; Accidents and Industrial safety; Workplace behaviour and ethical issues; Workplace violence and harassment; Conflict and conflict management; Motivation and theories of motivation; Personality and Attitude in the context of organization; Job Satisfaction; Team, team work and team building; Organisational Behaviour and Organisational development, Organisational Change, Organisational culture and climate; Management by objectives; Organisational citizenship behaviour; Corporate social responsibility; Stress and Stress management.

   **OR**

   **B: Counselling Psychology**
   Introduction to counselling, guidance and psychotherapy; Career counselling and guidance; Stages of counselling and counselling relationship; Counselling with regard to various
developmental stages; Counselling for persons with HIV/ AIDS, Cancer and other terminal illnesses; Assessment in Counselling; School counselling
Multicultural counselling; Learning Disability; Behavioural problems of children; Eating Disorders; Substance abuse; Anxiety Disorder; Art, Drama and Play therapy; Psychotherapies; Family counselling; Ethics in Counselling

OR

C: **Clinical Psychology**
Concept of Abnormality, paradigms and perspectives of psychopathology; Personality and Personality disorders; Schizophrenia; Mood disorders; Eating Disorders; Anxiety and Anxiety Disorders; Psychosomatic disorders; Substance abuse; Prevention of mental disorders; Diagnosis and tools for diagnosis including case history, Mental Status Examination, intelligence assessment, personality assessment, DSM V; Introduction to Psychotherapy, Psychoanalysis, Behaviour therapy, Humanistic and Existential therapy, Person centered therapy, Gestalt therapy, Cognitive therapy, Cognitive Behaviour therapy; Psychotherapeutic relation; Play therapy, Narrative therapy; Family therapy; Ethical issues.

***
6. PhD in Public Administration (PHDPA)

SECTION-I (Public Administration)


- Indian Administration—Organisation of the Union Government—Central Secretariat, Ministries and Departments, Cabinet Secretariat, Prime Minister’s Office, Constitutional bodies and Commissions, Regulatory Agencies, NITI Aayog.

- Organisation of the State Government—Secretariat, Role of Chief Secretary, Organisaton of Departments and Directorates.

- Personnel Administration— Bureaucracy, Classification of Services, Recruitment, Recruitment Agencies—Union Public Service Commission, State Public Service Commission, Training, Promotion, Performance Appraisal, Discipline, Morale, Staff Associations, Employer-Employee Relations, Pay Commissions.

- Financial Administration----Budget, Types of Budget, Enactment and Execution of Budget, Parliamentary Committees, Parliamentary Control over Public Expenditure, Audit, Role of Comptroller and Auditor General of India.

- Local government— Nature and Scope, 73rd and 74th Constitutional Amendments in India, Urban and Rural local bodies-Organisation and Functions, Finance, Committee
System, State and Local Government Relations and Challenges of Local Self-Government.

- Disaster Management, Sustainable Development, Social Audit, Corporate Governance, Corporate Social Responsibility, and Contemporary Issues in Governance.

Section II Research Methodology

- Meaning, Objectives and Types of Research
- Research Ethics
- Research Methods versus Research Methodology
- Research Methods in Social Sciences
- Research Design
- Hypotheses
- Methods of Data Collection
- Sampling Design
- Data Processing and Analysis
- Report Writing

***
7. PhD in Sociology (PHDSOC)

Section - A

1. Research Methodology
   - Logic of enquiry in social research
   - Logic of Theory Building
   - Issues of epistemology
   - Positivism and its critique
   - Comparative Method
   - Feminist Method
   - Participatory Method

2. Research Methods and Research Design
   - Types of Research
   - Methods of Research
   - Research Design
   - Techniques of Data Collections: Sampling, Interview, Case Study, Life History, Observation, Hypothesis, Correlation and regression.

Section - B

- Sociological concepts: social groups, social structure, community, association, culture, identity, tradition, modernity, social processes, social Institutions- family, marriage, kinship, state, religion
- Sociological Theories: Evolutionary- Functional, Marxian, Structural-Functional, Structural, Symbolic interactionism, Phenomenology, Post-Modernism
- Social stratification-castes, class, race, gender, ethnicity
- Types of societies: colonial, post colonial, simple, agrarian, Industrial, post industrial, knowledge society
- Social change: Theories of social change, social transformation, social movements, social development

***
8. PhD in Bio-Chemistry (PHDBC)

**PART-A: Research Methodology, Basic Science and General Aptitude paper:** Questions will be designed to test basic knowledge of English, Chemistry, Physics, Mathematics and Reasoning and mental ability. They may be designed to test domain knowledge as well as non-verbal reasoning capacity (e.g., by finding the odd one out in a series of abstract pictures). They may also be of quantitative type; designed to test the student’s ability to comprehend large numbers and do simple calculations.

Introduction of Research: Meaning and importance, Objectives, Nature and Types of Research, Areas of research in Biological Science.

Research Process, Formulation of a Research Problem (Hypothesis) and Considerations in selecting a Research Problem, Review of Literature, Objectives.

Elements in Research Methodology; Preparing Research Designs, Research Designs [(Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD)], Experimental Method, Types of Sample, Tools for Data Collection.

Processing and Analyzing Data, Data Analysis Methods-Qualitative and Quantitative, Reporting the Findings.


**PART-B: Subject specific paper**

1) **Cell biology:**

matrix, integrins, neurotransmission and its regulation. Regulation of hematopoiesis, differentiation and development.

2) **Biomolecules:**

4) **Molecular biology and Recombinant DNA technology:**
   Genes and chromosomes, Operon concept, DNA replication, DNA damage and repair mechanisms, homologous and site-specific recombination. Transcription of various types of RNAs and their processing and modifications. Transcription factors and machinery including RNA polymerases, formation of initiation complex, elongation and termination of transcription. Regulation of transcription: activators (enhancers) and repressors, Locus

5) Microbiology and Immunology :

Cell structure and components, characterization and classification of microorganisms. Cultivation of Bacteria, nutrition, physiology and growth of microbial cells, reproduction and growth, synchronous growth, continuous culture of microorganisms. Pure cultures and their characteristics. Fundamentals of control of microbial growth control by physical and biochemical agents. Production of mutants by chemical and physical agents and their characterizations. Host microbe interactions, endotoxins, exotoxins, capsular material. Enzymatic and other factors, tissue affinity, resistance and immunity. Viruses of bacteria, plant and animal cells: Structure, classification and life cycle, mycoplasma and viriods, diseases. Innate and adaptive immune system: Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and immunogenicity. B and T cell epitopes, structure and function of antibody molecules, generation of antibody diversity, monoclonal antibodies, antibody engineering, antigen-antibody interactions, MHC molecules, antigen processing and presentation, activation and differentiation of B and T cells, B and T cell receptors, humoral and cell-mediated immune responses, primary and secondary immune modulation, the complement system, Toll-like receptors, cell mediated effector functions, inflammation, hypersensitivity and autoimmunity, immune response during bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections, congenital and acquired immunodeficiencies, vaccines. Host-pathogen interaction.

Recognition and entry processes of different pathogens like bacteria, viruses and protozoans into animal and plant host cells, alteration of host cell behavior by pathogens,
virus-induced cell transformation, pathogen-induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.

6) **Tools and Techniques used in Biological research:**


7) **Genetics and Evolution**  

8) **Genomics and Proteomics**  
   **Introduction to Genomics:** Structure and organization of prokaryotic and eukaryotic genomes - nuclear, mitochondrial and chloroplast genomes; Computational analysis of sequences- finding genes and regulatory regions; Gene annotation; Similarity searches; Pairwise and multiple alignments; Alignment statistics; Prediction of gene function using homology, context, structures, networks; Genetic variation, polymorphism, deleterious mutation; Phylogenetics; Tools for genome analysis– PCR, RFLP, DNA fingerprinting, RAPD, Automated DNA sequencing; Linkage and pedigree analysis; Construction of genetic maps; Physical maps, FISH to identify chromosome landmarks. Human genome project-landmarks on chromosomes
generated by various mapping methods; BAC libraries and shotgun libraries preparation; Physical map-cytogenetic map, contig map, restriction map, DNA sequence; DNA sequencing and sequence assembly; Model organisms and other genome projects; Comparative genomics of relevant organisms such as pathogens and nonpathogens; Evolution of a pathogen. Taxonomic classification of organisms using molecular markers -16S rRNA typing/sequencing. DNA Microarray technology, cDNA and oligonucleotide arrays; Applications: Global gene expression analysis, Comparative transcriptomics, Differential gene expression; Genotyping/SNP detection; Detection technology; Computational analysis of microarray data. Proteomics: Outline of a typical proteomics experiment; Identification and analysis of proteins by 2D analysis; Spot visualization and picking; Tryptic digestion of protein and peptide fingerprinting; Mass spectrometry; ion source (MALDI, spray sources); analyzer (ToF, quadrupole, quadrupole ion trap) and detector; clinical proteomics and disease biomarkers; Prions; proteins in disease; Protein-protein interactions: Solid phase ELISA, pull-down assays (using GST-tagged protein), far western analysis, by surface plasmon resonance technique, Yeast two hybrid system, Phage display; Protein interaction maps; Protein arrays-definition, applications-diagnostics, expression profiling.

9) **Metabolism**


sickle cell anaemia, thalassemia and erythrocyte enzyme disorders. Inborn errors of metabolism - Phenylketonuria, alkaptonuria. Serum enzyme activities in diseases - Principle and assay of aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, acid phosphatase, streptokinase, asparaginase, a-hydroxybutyrate dehydrogenase, ceruloplasmin, y-glutamyl transpeptidase, creatine kinase and lactate dehydrogenase. Enzyme and isoenzyme as diagnostic tool, method for isoenzyme analysis. Organ and organ function tests: Normal structure and functions of liver, diseases of the liver, hepatitis types, cirrhosis, alcoholic liver disease, hepatic tumor and biliary tract diseases, liver function tests, disorders of bilirubin metabolism. Renal function tests and related disorders: Acute and chronic renal failure, urinary tract obstruction and analysis of urinary calculi.

***
9. PhD in Chemistry (PHDCHEM)

PART A
RESEARCH METHODOLOGY
1. Objectives of research
2. Research methods versus Research Methodology
3. Types of research: • Descriptive versus Analytical; • Applied versus Fundamental;
   • Quantitative versus Qualitative; • Conceptual versus Empirical
4. Literature Review: Methods and Importance
5. Research design: Need, Types and Features of research design
6. Formulating Research Problem
7. Collection and analysis of Data: Importance and Methods of data collection,
8. Data Analysis with Statistical Packages
9. Ethical issues in Research: Copyright, Intellectual Property Rights; Plagiarism

PART B
1. : Inorganic Chemistry
   1. Chemical periodicity
   2. Structure and bonding in homo- and heteronuclear molecules, including shapes of
      molecules (VSEPR Theory).
   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. Inner transition elements: spectral and magnetic properties, redox chemistry, analytical
      applications.
   7. Organometallic compounds: synthesis, bonding and structure, and reactivity.
      Organometallics in homogeneous catalysis.
   8. Cages and metal clusters.
   9. Analytical chemistry- separation, spectroscopic, electro- and thermoanalytical
      methods.
   10. Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport,
      electron- transfer reactions; nitrogen fixation, metal complexes in medicine.
   11. Characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer,
      UV-VIS, NQR, MS, electron spectroscopy and microscopic techniques.
   12. Nuclear chemistry: nuclear reactions, fission and fusion, radio-analytical techniques
      and activation analysis.
II: Physical Chemistry

1. Basic principles of quantum mechanics: Postulates; operator algebra; Model systems: particle-in-a-box, harmonic oscillator; Hydrogen atom, including shapes of atomic orbitals; orbital and spin angular momenta; tunneling.

2. Approximate methods of quantum mechanics: Variation principle; perturbation theory up to second order in energy; applications.

3. Atomic structure and spectroscopy: term symbols; many-electron systems and antisymmetry principle.


5. Chemical applications of group theory: symmetry elements; point groups; character tables; selection rules.

6. Molecular spectroscopy: Rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities – selection rules; basic principles of magnetic resonance.

7. Chemical thermodynamics: Laws, state and path functions and their applications; thermodynamic description of various types of processes; Maxwell’s relations; spontaneity and equilibria; temperature and pressure dependence of thermodynamic quantities; Le Chatelier principle; elementary description of phase transitions; phase equilibria and phase rule; thermodynamics of ideal and non-ideal gases, and solutions.


10. Chemical kinetics: Empirical rate laws and temperature dependence; complex ; steady state approximation; determination of reaction mechanisms; collision and transition state theories of rate constants; unimolecular reactions; enzyme kinetics; salt effects; homogeneous catalysis; photochemical reactions.

11. Colloids and surfaces: Stability and properties of colloids; isotherms and surface area; heterogeneous catalysis.

12. Solid state: Crystal structures; Bragg’s law and applications; band structure of solids.

13. Polymer chemistry: Molar masses; kinetics of polymerization.

14. Data analysis: Mean and standard deviation; absolute and relative errors; linear regression; covariance and correlation coefficient.
III. Organic Chemistry

1. IUPAC nomenclature of organic molecules including regio- and stereoisomers.
2. Principles of stereochemistry: Configurational and conformational isomerism in acyclic and cyclic compounds; stereogenicity, stereoselectivity, enantioselectivity, diastereoselectivity and asymmetric induction.
3. Aromaticity: Benzenoid and non-benzenoid compounds – generation and reactions.
5. Organic reaction mechanisms involving addition, elimination and substitution reactions with electrophilic, nucleophilic or radical species. Determination of reaction pathways.
7. Organic transformations and reagents: Functional group interconversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organometallic and enzymatic). Chemo, regio and stereoselective transformations.
11. Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatoms (O, N, S).
13. Structure determination of organic compounds by IR, UV-Vis, 1H &13C NMR and Mass spectroscopic techniques.

***
10. PhD in Geography (PHDGEOG)

PART - A

RESEARCH METHODOLOGY

Objectives of research; Research methods versus Methodology
Types of research: Descriptive vs. Analytical; Applied vs. Fundamental; Quantitative vs. Qualitative; Conceptual vs. Empirical
Literature Review: Methods and Importance
Research design: Need, Types and Features of research design, Formulating Research Problem
Sampling Techniques: Probability and Non-probability sampling
Collection and analysis of Data: Importance and Methods of data collection, Data Analysis with Statistical Packages
Use of Cartography, Remote Sensing, GIS and GPS in Geographical Research
Ethical issues in Research: Copy right, Intellectual Property Rights; Plagiarism

PART - B

GEOGRAPHY

Unit 1: Geographical Thought

Geography during the Ancient and Medieval Period, Foundations of Modern Geography: Contribution of German, French, British and American Schools; Conceptual and Methodological Developments during the 20th Century, Dichotomy between Systematic Vs. Regional Geography, Physical Vs. Human Geography, and Determinism Vs. Possibilism; Areal Differentiation and Spatial Organisation, Quantitative Revolution, Impact of Positivism, Humanism, Radicalism and Behaviouralism in Geography.

Unit 2: Geography of India

Physiography, Climate, Natural Resources: Vegetation, Soils, Water, Coastal and Marine, Mineral and Power; Agriculture, Agro-Climatic Regions, Irrigation, Major Industries and Industrial Regions, Population, Settlement Patterns, Urbanisation, Transport and Communication, Major Geographical Regions of India.

Unit 3: Methods and Techniques in Geography

Cartography, Remote Sensing, GIS and GPS: Map as a Tool in Geographical Studies, Techniques Showing Spatial Patterns of Distribution, Types of Maps: Composite, Choropleth, Isopleth and Chorochromatic; Accessibility and Flow Maps, Cartographic Representation of Data, Computer Applications in Cartography, Symbolisation and Generalisation; Principles of
Remote Sensing, GIS and GPS; EMR, Platforms and Sensors, Elements of Image Interpretation, Components of GIS, Data Structure, Applications of Remote Sensing, GIS and GPS in Geography.


**Unit 4: Physical and Human Geography**

**Geomorphology:** Fundamental Concepts, Endogenic and Exogenic Forces, Geosynclines and Mountain Building, Isostasy, Continental Drift and Plate Tectonics, Denudational Processes: Mass Wasting, Weathering and Erosion; Cycle of Erosion and Evolution of Landscape: Theories of Davis, Penck and King; Fluvial, Glacial, Aeolian, Karst and Coastal Landscapes.

**Climatology and Biogeography:** Composition and Structure of the Atmosphere, Insolation and Heat Budget of the Earth, Temperature, Precipitation, Atmospheric Pressure and General Circulation of Winds, Monsoons and Jet Streams, Stability and Instability of the Atmosphere, Air-Masses, Fronts, Cyclones, Koeppen's and Thornthwaite's Classification of World Climates, Hydrological Cycle, Flood and Drought, Air Pollution, Global Warming, Human Ecosystem, Bio-Diversity, Conservation and Management of Ecosystems.

**Oceanography:** Physical and Chemical Properties of Sea Water: Temperature and Salinity of the Oceans; Origin of Ocean Basins, Bottom Reliefs of Indian, Atlantic and Pacific Oceans, Ocean Deposits, Coral Reefs, Ocean Currents and Tides, Sea-Level Changes.

**Population Geography:** Distribution, Growth and Migration, Sex-Ratio, Literacy, Demographic Transition.

**Settlement Geography:** Site, Situation, Types, Size, Spacing and Internal Morphology of Rural and Urban Settlements, Urban Fringe, City Region, Umland, Settlement Systems, Primate City, Rank-Size Rule, Settlement Hierarchy, Christaller’s Central Place Theory.

**Economic Geography:** Recent Approaches in Economic Geography, Location of Economic Activities and Spatial Organisation of Economies; Classification of Economies; Sectors of Economy: Primary, Secondary, Tertiary; Landuse and Landcover, Natural Resources: Renewable and Non-Renewable; Conservation of Resources.

**Agricultural Geography:** Concept and Techniques of Delimitation of Agricultural Regions; Measurement of Agricultural Productivity and Efficiency; Crop Combinations and Diversification; Von Thunen's Model, Agricultural Regions of the World.

**Industrial Geography:** Classification of Industries, Weber's and Losch's Theories of
Industrial Location, Resources-Based and Footloose Industries.

**Geography of Transport and Trade**: Models of Transportation and Transport Cost, Inter-Regional and Intra-Regional Accessibility and Connectivity; Comparative Cost Advantages.

**Political Geography**: Global Strategic Views (Heartland and Rimland Theories), Geopolitics, Concept of Nation, State and Nation-State, Boundaries and Frontiers, Politics of World Resources, Geography and Federalism.

**Social Geography**: Social Structure and Social Processes, Elements of Social Geography, Ethnicity, Tribe and Caste, Concept of Social Well-Being, Environment and Culture, Concept of Culture: Areas and Cultural Regions, Dwelling Places as Cultural Expressions.

**Regional Planning**: Concept of Region, Types of Regions and Methods of Regionalisation, Regional Hierarchy, Regional Planning, Regional Planning in India, Concept of Development, Indicators of Development, Region

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11. PhD in Geology (PHDGY)

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SECTION A. RESEARCH METHODOLOGY

1. Research Methodology in Geology: Definition, outcome and importance of geological research; theory and philosophy of research methodology in context to geology; emerging areas and interdisciplinary research in geology; identifying and defining research problem; techniques involved in defining research problem and identifying gaps; sources of literature; implications of literature collection and its review. Preparation and planning for fieldwork; field kit and equipments; safety measures in field; field procedures and precautions taken during sampling; maintenance of field notebook; uses of topographical maps and satellite images; selection of traverses; recognition of geological features, rock types and stratigraphic contacts in field; use of clinometer compass, measurement of dip and strike of strata; measurements of geologic sections; uses of GPS; recording field observations in field notebook; geological mapping.

Data collection; sampling methods; data collection methods in sedimentology, palaeontology, stratigraphy, structural geology and tectonics, mineralogy, petrology, ore geology and hydrogeology; classification and presentation of data; role of statistics and computers in research; use of computer in data processing; methods of communicating and displaying analysed data; applications of Geographic Information System.

Thin section preparation; petrological and palaeontological microscopes; Ore microscopy; SEM microphotography; preparation of samples for geochemical and XRD analysis, heavy mineral separation; construction of lithologs; geophysical exploration methods, remote sensing data. Intellectual property rights, patents, copyright and related rights; ethics-plagiarism and integrity.

SECTION B. GEOLOGY COURSES

2. Physical Geology and Geomorphology: Composition of the crust and Earth as a whole; basic concepts and significance of geomorphology; relationship between landforms and geomorphic processes—fluvial, aeolian, glacial, and marine; soils; geomorphology of India; applications of geomorphology; mountain building; volcanoes and earthquake; seismic belts of India.
3. **Structural Geology and Tectonics:** Classification of folds and faults; Mechanism of folding; concept of stress and strain and their geological significance; joints and unconformities. Concept of plate tectonics; palaeomagnetism, polar wandering and reversal of Earth’s magnetic field; seafloor spreading, island arcs and mountain chains.

4. **Stratigraphy and Palaeontology:** Principles of stratigraphy, time scale and its divisions; stratigraphic classifications; stratigraphic nomenclature; stratigraphic correlation; facies concept in stratigraphy; marine transgression and regression; ice ages; broad stratigraphic subdivisions of India. Fossil and modes of fossilization; application of fossils in age determination; evolutionary trends and geologic distribution of Brachiopoda, Pelecypoda, Gastropoda, Cephalopoda, Trilobita, Echinoids, Graptolites and Corals; elementary idea about the origin of major groups of vertebrates; evolutionary history of Horse, Elephant and Man; plant life through geologic ages.

5. **Mineralogy:** Physical and optical properties of minerals; classification of minerals; mineralogy of silicates, polymorphism, isomorphism and pseudomorphism; solid solution and exsolution; X-ray crystallography; concept of symmetry; crystallographic classification.

6. **Petrology:** Generation and evolution of magma; Bowen’s reaction series; textures and classification of igneous rocks; phase equilibria: single, binary and ternary systems; silicate systems; genesis and tectonic setting of different magma types; cooling and crystallisation of magma. Sedimentation, lithification and diagenesis; structures and textures; classification of sedimentary rocks; depositional environments; sedimentation and tectonics; heavy minerals and their applications in provenance studies. Metamorphism and metamorphic processes; metamorphic differentiation; metamorphic facies; types of metamorphism and metamorphic rocks; metasomatism and anatexis.

7. **Georesources and Economic Geology:** Ore genesis; ore localisation and ore shoots; ore dressing and beneficiation; strategic, critical and essential minerals; national mineral policy; economic minerals of India; fossil fuels.

8. **Geochemistry:** Cosmic abundances of elements; geochemical classification and differentiation of the elements; trace element geochemistry; radiogenic and non-radiogenic isotopes; concept of geochemical and biogeochemical cycles and global climates.

9. **Applied Geology:**
   - **Engineering Geology:** Engineering properties of rocks; geological investigations, seismic parameters and remedial measures related to the construction of dams, bridges, highways and tunnels; mass movements with special emphasis on landslides and causes of hill slope instability.
   - **Mineral Exploration:** Principles and methodology of geological prospecting for economic minerals and rocks; sampling methods, methods for estimating reserve and resources, grade and tonnage calculation of the deposits; pathfinder elements; geochemical and geophysical methods; mining in India.
   - **Hydrogeology:** Hydrological cycle; hydrological properties of rock; distribution of surface and groundwater in the Earth’s crust; global water budget; movement of groundwater; aquifers.
classification and characteristics; Darcy’s law; Theis equation; water table; flow nets; groundwater provinces of India; groundwater quality and pollution; groundwater prospecting; desalination; springs and its types.

Environmental Geology: Environment and energy; non-conventional energy resources; geoenvironment; environmental hazards, instrumentation and analysis; disposal of municipal, domestic, hospital, solid and nuclear wastes; oil spills; environmental impact assessment (EIA); environmental legislation: national/international standards; application of remote sensing and GIS in environmental management.

Remote Sensing and GIS: Electromagnetic radiation; aerial photographs and their geometry; elements of photo and image interpretation; satellite remote sensing; global and Indian space missions, sensor and their characteristics; digital image processing techniques; geological applications of remote sensing, GIS and GPS.

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12. PhD in Statistics (PHDSTAT)

Part-A: Research Methodology

Meaning of research, Role of research in important areas, Process of research, Types of research, research approach, Significance of research, Research problem: Definition, Selection and necessity of research problem.

Primary and secondary data, Qualitative and quantitative data, Classification of measurement scales, Goodness of measurement scales, Scaling, Scale classification bases, Scaling techniques, Methods of collecting primary data, Merits and demerits of different methods of collecting primary data, Non response, Classification and tabulation of data.

Introduction to sampling, Advantages of sampling over complete enumeration, Probability and non-probability sampling, Sampling and non-sampling errors, Basic concepts of simple random sampling and design of experiments.

Measures of central tendency, Measures of dispersion, Probability distributions (Binomial, Poisson, Normal), Simple correlation and regression, Multiple and partial correlation., Testing of hypothesis (z, t, F and chi-square tests).

Part-B: Statistics

Sample space, Probability, Conditional probability, Independent events, Bayes theorem, Random variables, Distribution functions (Univariate and Bi-variate), Moments and moment generating function, Independent random variables, Marginal and conditional distributions, Characteristic function, Central limit theorem (i.i.d. case).

Standard discrete (Rectangular, Geometric, Negative binomial, Hyper-geometric) and continuous distributions (Uniform, Exponential, Beta, Gamma), Bivariate normal distribution, Sampling distributions (t, F, z, chi-square).

Properties of good estimators (unbiasedness, Consistency, Efficiency, Sufficiency, Complete and minimal Sufficient statistic), Exponential families, Methods of estimation (least square, maximum likelihood, method of moments, minimum chi-square), Mean square error, Minimum variance unbiased estimators, Rao-Blackwell theorem, Lehmann-Scheffe theorem, Cramer-Rao lower bound,

Basics of testing of hypothesis, Neyman-Pearson lemma, Most powerful and uniformly most powerful tests, Likelihood ratio tests, Unbiased test, Non-parametric tests for one or more
samples problems (Sign, Wilcoxon, Mann-Whitney, Kolmogorov Smirnov, Run, Kruskal Wallies test).

Gauss-Markov theorem, Estimability of parameters in linear models, BLUE.

Markov chains with finite and countable state space, Classification of states, Limiting behavior of n-step transition probabilities, Stationary distribution, Poisson process, Birth-and-death process.

Multivariate normal and its properties, Distribution of quadratic forms, Canonical correlation, Principle components analysis, Factor analysis, Classification and discriminant analysis.

Stratified sampling, Systematic sampling, Probability proportional to size sampling, Ratio, regression and product methods of estimation, Cluster sampling, Multi stage sampling, Two-phase sampling, Successive sampling

Analysis of variance and covariance, Completely randomised designs, Randomised block designs, Latin-square designs, Missing plot techniques, Orthogonality, BIBD, $2^k$ factorial experiments, Confounding.

Linear programming problem, Simplex methods, Duality, Assignment, Transportation problems, Queuing theory, Steady-state solutions of Markovian queuing models: M/M/1, M/M/1 with limited waiting space, M/M/C, M/M/C with limited waiting space. Elementary inventory models.

***
13. PhD in Food & Nutritional Science (PHDFN)

Research Methods and Biostatistics

Basic Concepts; Formulation of Research Problem; Design Strategies in Research – Descriptive Studies, Analytic Studies, Experimental studies, Intervention trials etc.; Methods of Sampling; Data Collection Tools and Techniques; Presentation and Summarization of Data; Graphical presentation of quantitative data; Measures of Disease Frequency and Association; Reference Values, Health Indicators and Validity of Diagnostic Tests; Measures of Central tendency; Measures of Variability; Measures of Relationship – Correlation, Hypothesis Testing – parametric and non-parametric tests;, Proportions, Relative risk, Odds ratio;

Advance Nutrition

Nutrition: Basic concepts and physiological requirements; Nutritional needs during the life cycle; Dietary Reference Intake: Basic Concept, Energy Requirement s, Protein and Amino Acid Requirement, Fat and Fatty Acid Requirements, Fat- Soluble Vitamins and Water- Soluble Vitamins, Minerals; Nutrition through the Life Cycle, Sports Nutrition, Nutrition during Special Conditions – Emergency, High altitude, space mission.

Clinical and Therapeutic Nutrition

Introduction to diet therapy and therapeutic nutrition; Adaptations of therapeutic diets; Nutritional management of fevers and infections; Nutrition in critical care; Nutritional management of patient with burns, Trauma, sepsis and surgery; Nutritional management of food allergies and food intolerance; Nutrition, diet and cancer; Nutrition care for weight management; Nutritional management of cardiovascular diseases; Nutritional management of metabolic disease; Nutritional management of gastrointestinal tract disorders; Nutritional management in pancreatic, gall bladder and liver diseases; Nutritional management of renal disease; Nutritional management of neurological disorders; Paediatric and geriatric nutrition.

Public Nutrition


Entrepreneurship and Food Service Management
History and Development of Food Service System; Planning a Food Service Unit; Setting up a Food Service Unit; Entrepreneurship and Food Service Management; Menu Planning; Food Purchasing and Storage; Quantity Food Production; Food Management: Records and Controls; Delivery and Service - Goals, Styles and Different Systems; Administrative Leadership; Staff Planning and Management; Personnel Functions: Work Productivity; Plant and Equipment Maintenance; Plant – Sanitation and Safety, Food Safety Management Systems: HACCP, risk analysis; Issues in Worker Safety and Security; Issues in Food safety, Standards and Quality control; Food Adulteration, Additives, Contaminants.

***
14. PhD in Home Science (PHDHC)

A. Elective Course: Community Resource Management and Extension (8 Credits)
Communication for Development (C4D) ICT for Development Gender and Development
Corporate Social Responsibility Capacity Building – Training, Advocacy and
Development Entrepreneurship and Innovations Programme Management and
Development Consumer Studies Sustainable Development – Policies and Programmes
Resource Management Extension Education Ergonomics and Design Learning outcomes:
• Building systematic, methodological and comprehensive gain in knowledge in the field
  of Community Resource Management and Extension. • Enhancing research skills in the
  areas of: participatory and innovation communication strategies, resource management,
  product development; extension management and sustainable development of
  communities. • Preparing a cadre of professionals for planning and implementing various
  programmes in the development sector

B. Compulsory Course: Research Methodology (8 Credits) Introduction to Research
Ethics in Research Research Methods and Approaches Conceptualization and Research
Theory building Research Design – Qualitative and Quantitative Designing Research
Proposal Methods of Sampling, Techniques of Data Collection Tool Construction –
Reliability, Validity and Standardisation Statistical Methods (including Hypothesis
Testing – parametric and non-parametric tests) Data Analysis, Interpretation and Report
Writing Scientific Writing and Publishing Learning outcomes: • Developing research
competencies in the field of Home Science. • Enhancing analytical abilities and
strengthening research through research on community mobilization, participatory
development, development communication extension and resource management. •
Raising standards of the profession of Home Science through quality research and at the
same time promoting responsible citizenship.

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15. PhD in Commerce (PHDCOM)

Course 1 : Research Methodology (8 Credits)

1. **Theory of Research** : Meaning and Definition of Research, Types of Research, Research Approached (Scientific, Historical, Descriptive, Comparative, Institutional), Criteria of Good Research, Research and Business Decisions, Research Applications in Functional Areas of Business.


Technique of Collecting Qualitative Data (PRA-Participatory Rural Appraisal, RRA - Rapid Rural Appraisal Case Study), Tools of Collecting Qualitative Data (Social Mapping Resource Mapping, Wealth Ranking of the House - holds, Preference Ranking, Focus Group Discussion etc.), Formatting and Processing of Qualitative Data

Sampling Techniques and Sample Design (Methods, Selection of Appropriate Methods and Sampling Criteria), Sampling Tests (Z test, T test, F test). Editing,, Coding, Classification and Tabulation Diagrammatic and Graphic Presentation

3. **Analysis of Data (Statistical Application in Research)**

Statistics and Business Research
Probability Theory
Probability Distributions
Percentages and Ratios
Measures of Central Tendency
Measures of Variability
Correlation and Regression
Measurement of Trend
Association of Attributes
Construction of Indices
Hypothesis Testing
Scaling Technique
1. Accounting: Information for Decision Making
   Accounting Information: A Means to an End User’s Perspective - Types of Accounting Information
   Integrity of Accounting Information: Institutional Features - Professional Organizations - Competence, Judgment, and Ethical Behavior

2. Presentation and Reporting of Accounting Information
   Reporting the Results of Operations: Developing Predictive Information - Reporting Irregular Items Continuing Operations - Discontinued Operations, Extraordinary Items - Changes in Accounting Principles - Earnings per Share (EPS) - Basis and Diluted Earning per Share

4. **Financial Statement Analysis**


*Tools of Analysis:* Trend Percentages, Component Percentages, Ratios, Standards of Comparison, Quality of Earnings, Quality of Assets, and the Relative Amount of Debt


5. **Accounting Standards**


6. **Global Business and Accounting**


7. **Management Accounting**

An overview – Concepts and uses - Management Accounting Decision Making Authority - Management Accounting’s Role in Decision Making - Management Accounting’s Role in Performance Evaluation and Rewards

8. **Costing System and Analysis**

*Activity Based Costing System:* Introduction - Traditional manufacturing Costing System - Activity Based Costing (ABC) and Activity Based Management (ABM) System - Cost of Resource Capacity - ABC for Marketing, Selling and Distribution Expenses - ABC for Service Companies

Revenue and Profit Variance Analysis: Introduction - Sales Variances - Profit Variances - Actual Profit and Budgeted: Reconciliation - Variance Reporting - Disposition of Variances

9. Responsibility Accounting
   Introduction – Meaning and Objectives – Types of Responsibility Centres

Reference text books:


Taxation

Direct Taxation – Law and Practice

2. Tax Planning: Concept of tax planning; Tax planning with reference to setting up a new business; locational aspects; nature of business; tax holiday, etc. - Tax planning with regard to specific management decisions such as mergers and takeovers; location of undertaking; introduction of voluntary retirement; tax planning with reference to financial management decisions such as borrowing or investment decision; reorganization or restructuring of capital decisions - Tax planning with respect to corporate reorganization; tax planning with reference to employees’ remuneration - Tax Planning vis-à-vis important provisions of wealth-tax including court rulings and legislative amendments.
3. **Tax Management:** Return and procedure for assessment; special procedure for assessment of search cases, e-commerce transactions, liability in special cases; collection and recovery of tax; refunds, appeals and revisions; penalties imposable, offences and prosecution.

**Indirect Taxation – Law and Practice**

4. **Indirect Taxes:** Special features of indirect tax levies – all pervasive nature, contribution to Government revenues; constitutional provisions authorizing the levy and collection of duties of central excise, customs, service tax, central sales tax and VAT.

5. **Central Excise:** Basis of chargeability of duties of central excise – goods, manufacture, classification and valuation of excisable goods, assessment procedure, exemption, payment, recovery and refunds of duties. Clearance of excisable goods; Central Excise Bonds; maintenance of accounts and records and filing of returns. CENVAT; Duties payable by small scale units. Set-off of duties – concept, meaning and scheme; Central Excise Concessions on exports; search, seizure and investigation; offences and penalty.

6. **Custom:** Levy of and exemption from, customs duties – specific issues and case studies; assessment and payment duties; recovery and refund of customs duties; drawback of duties; Confiscation of goods and conveyances and imposition of penalties; search, seizure and arrest, offence and prosecution provisions - Adjudication, Appeal and Revision; Settlement of Cases.

7. **Service Tax:** Introduction; Genesis of service tax in India; Constitutional Provisions; Definition of service; Education Cess and Secondary and Higher Education Cess

8. **Tax Planning and Management:** Tax Planning, Tax Management, Tax Avoidance and Tax Evasion

**Reference text books:**

1. Dr. Vinod Kumar Singhania & Dr. Monica Singhania, (2014), Direct Taxes Planning and Management, Taxmann, New Delhi
2. Dr. Vinod Kumar Singhania & Dr. Monica Singhania, (2014), Income Tax including Central Sales Tax, Taxmann, New Delhi

**Area 2 – International Business**


4. Cross Cultural Management – Hofstede and other studies related to Cross Cultural Management

5. Introduction to Globalization – Concept, Major forces, Effects of Globalization on the world economy and developing countries, Globalization strategies of Indian Companies, Cross border Mergers and Acquisitions

6. International Investment – Concept, Types of International Investment, FDI and Developing Countries, Determinants of FDI, Recent Trends in FDI flows, Trade Related Investment Measures, Multilateral Investment Agreements.


12. Regional Economic Groupings – Forms of Regional Groupings, Rationale and Impact of Regional Economic Groupings, Major Regional Economic Groupings - European Union (EU), North American Free Trade Agreement (NAFTA), Association of South etc. East Asian Nations (ASEAN), South Asian Association for Regional Corporation (SAARC)


on Buying Behaviour, Scope for Indian Brands, Functions and Importance of Packaging, Factors Influencing Packaging Decision, Special Considerations in International Marketing.


17. **International Marketing Communication** – Promotion Mix, Objectives and Role of International Marketing Communication, Key Issues in International Marketing Communication, Major Marketing Promotion Tools.


20. **Emerging Trends and Issues in International Marketing** – E-Marketing, Green Marketing, Digital Marketing, Multilevel Marketing (MLM), Web-based Marketing, and Network Marketing etc.

Further Readings

- WTO Report
- UNCTAD Report
- World Investment Report
- World Economic Survey, etc.

Area 3 – Banking and Finance

1. **Commercial Banks**: Overview of Commercial Banking in India; Role and Functions of Commercial Banks; Indian Banking in Pre,Nationalization and Post,nationalization Phases.

2. **Banking Sectoral Reforms**: Banking Sector Reforms and their Implications on Indian Banking Sector; Changing Role of Indian Banks; Reforms and Restructuring of Banks;
Management of Private Sector Banks and Public Sector Banks; Management of Banks in Rural Areas.

3. **Basic Banking Services**: Opening of accounts for companies, trusts, societies, government and public bodies; Importance of AML.

4. **Credit concepts**: Principles of lending; Various credit Products/ Facilities - working capital and term loans; Credit Appraisal Techniques; Approaches to lending; Credit Management, credit monitoring, NPA Management; Credit Risk Analysis Framework.

5. **Documentation**: Different types of documents; Documentation Procedures; Stamping of documents Securities; Types of collaterals and their characteristics; Priority Sector Lending - Sectors, Targets and Issues/Problems.

6. **Recent Developments**: Agriculture/SMEs/SHGs/SSI/Tiny Sector; Financing New Products & Services: Factoring, Securitization, bancassurance, Mutual Funds, Merchant Banking, Hire Purchase, Securitization, Venture Capital, Leasing and Depository, Credit Cards/Home Loans/Personal Loans/Consumer Loans; IT Application in Banking.

7. **Credit Rating in India**: Concept and reasons of credit rating; Credit rating institutions in India, Limitation of Credit Rating.

8. **Reforms in Banking and Finance**: Reports of the committees; Chakravarty committee, Narsimham Committee I & II: FDI in Banking Sector.

9. **International Banking**: An Overview; Rationale and Scope of International Banking Regulation; Capital Adequacy, loan loss provisioning and other Regulatory Controls.

10. **International Financial System**: An overview; Foreign Exchange Markets; Exchange rate determination; International party theory and Fisher effect; Foreign Exchange Risk Management.

11. **Financial Institutions**: Role of FDI, NBFCs and other International Financial Institutions

12. **Financial Markets**: Structure; Institutions and Operation Mechanism; Money Market in India; Importance; Feature and Instruments; Capital Market in India, New Issues Market and Secondary Market (Stock Exchanges); salient features and operation, changing scenario of Indian Stock Market.

13. **Valuation of Securities**: Equity shares and Bonds valuation models; CAPM, Arbitrary pricing theory.
14. **Corporate Valuation**: Approaches to Corporate Valuation; Restructuring; merger, acquisition and disinvestment leveraged buy-outs.

**References**


Shapiro Alan C., Multinational Financial Management, Prentice Hall of India Ltd., New Delhi


Damodaran on Valuation: Security Analysis for Investment and Corporate Finance (Wiley Finance)


Area 4: MARKETING MANAGEMENT

1. Defining Marketing for the 21st century
   The new marketing realities: Marketing in 21st century, Markets: Consumer and Organisational markets, Strategic planning & the marketing environment ,Current issues in marketing ,Marketing research ,Buyer behaviour ,Segmentation, targeting and positioning,Value capture, Value creation ,Value delivery ,Value communication, Major Societal Forces,New Consumer Capabilities, New Company Capabilities, Integrated Marketing, Internal Marketing, Performance Marketing, Connecting with Customers, Shaping the Market Offerings.
   Creating Customer Value: Satisfaction and Loyalty, Customer Perceived Value (CPV), Total Customer Satisfaction, Monitoring Satisfaction, Maximizing Customer Lifetime Value (CLV), Cultivating Customer Relationships.

2. Marketing Decisions


3. Marketing research
Introduction to Marketing Research, Qualitative and quantitative research methods, Sampling methods, Questionnaire design, reliability and validity. Online survey method, Data preparation and data presentation (graphing), Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA), Cluster Analysis, Factor analysis, Presenting research information

4. Emerging Trends in marketing: Rural Marketing, Green marketing, Experiential marketing, Digital Marketing, e-business, Online marketing, Online retailing, Neuroscience and consumer, Sports Marketing, Media marketing and advertising, Brand Management, Innovation and marketing

Reference Books
- Marketing Management by Arum Kumar and N Meenakshi
- The Rural Marketing Book by Kashyap Raut
- Marketing Management a south Asian Perspective by Philip Kotler, Kevin Lane keler, Abraham koshi and Mithileshwar Jha, Pearson Prentice Hall, 2009
- Research Methodology, Concepts and cases by Deepak Chawla and Neena Sondhi, Vikas Publishing house private limited
Area 5: Entrepreneurship and Small Business Management

1. **Entrepreneurship and economic development**
   
   **Entrepreneurship theory and literature**: Entrepreneurship in India and abroad, Entrepreneurial motivation (socio-economic factors in entrepreneurship development, basic skills in entrepreneurship), Entrepreneurial environment, Entrepreneurship development Programmes, Entrepreneurial functions, Analysis of barriers in entrepreneurship development, Analysis of success factors of entrepreneurship development.

   **Entrepreneurship’s Importance**: Economic impact of entrepreneurial firms, Entrepreneurial Firms’ impact on society, Entrepreneurial Firms’ impact on larger firms, Entrepreneurial Firms’ impact on overall economic development of a nation Entrepreneurship development.

2. **Creativity and Innovation in business**
   
   Encouraging creativity at the firm level, protecting ideas from being lost or stolen, IPR, Creation of effective innovation, Market dynamics and new technology, Diffusion and adoption of innovations, Marketing and sales of technology based products and services.

3. **Enterprise creation**
   
   Screening of ideas, opportunity identification and selection, moving from an idea to an entrepreneurial firm, New enterprise creation: Conceptual and analytical tools to understand, analyze and manage critical aspects of new enterprise, Business plan preparation and Analysis, feasibility analysis of business (product/service feasibility, industry/market feasibility, organizational feasibility and Financial feasibility analysis, Industry and competitor analysis), Business crisis, Family business management, Small and medium enterprises (threats and opportunities),

   **Developing an effective Business models**: The importance of business models, How businessman models emerge, potential fatal flaws of business models.

4. **Enterprise Management**
   
   **Small and medium enterprise (managing and growing entrepreneurial firm)**: Essentials of management principles, its application on enterprise management, planning, importance and application of planning in an organisation, strategic planning and its application.
Human resource Management: recruitment, selection and induction of key employees, training and development, performance appraisals, application of exit interviews etc., Board of directors, Professional advisers, lenders and investors, other professionals.

Organisation Behaviour: Motivation and behavior, designing Motivating jobs, perception, personality, Stress and behavior, Group behavior, Intergroup relations, conflict and its impact on organization, Leadership in organisation, followership, transaction analysis, analysis and application of leadership styles, Organisation structure and design, Organisational change and development, organizational culture and climate.

Controlling (PERT, CPM and other emerging methods to establish control in an organization. Managing human resources and organization development and dynamics, Personnel and Industrial relations, Sources of capital and capitalization process, Venture capitals, Angel investors etc, Intrapreneurship.

5. Micro business development
What are micro businesses, Role of Government in micro business development, Importance of micro businesses in an economy ,Micro finance , Self help groups, Direct funding from financial institutions.

6. New Age entrepreneurship
Agri- entrepreneurship, Edu-preneurship (education/academic entrepreneurship), Technopreneurs (nano technology, bio technology)

7. Social Entrepreneurship
Social entrepreneurship, social entrepreneurs as change agents, financial sustainability Social entrepreneurship in India and abroad

8. Women Entrepreneurship
State of women Entrepreneurship in India. Barriers to women Entrepreneurship development.

9. Business ethics
Corporate Social responsibility
Corporate governance

10. Succession Planning
Business growth and need of succession Planning in India. Its role and importance in expansion management.

Reference Books:

- Small Business Management and Entrepreneurship by David Stokes, Nicholas Wilson
- Think and Grow Rich by Napoleon Hill an e-book
- Entrepreneurship and small business management by Norman M Scorborough
- Entrepreneurial Development By Vasant Desai
- Entrepreneurship and entrepreneurial Development by M. Gangadhar Rao
- Organisational Behaviour By Jit S Chandan, Vikas publishing house Private Limited

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16. PhD in Management (PHDMGMT)

The question paper will have the following two parts:

1) Research Methodology

The question paper will be objective type and will be of 3 hours duration. The total number of marks will be 100 and each part will have a weightage of 50%.

Part 1
Research Methodology


   Research Process


4. Qualitative and Quantitative Research: Qualitative research – Quantitative research – Concept of measurement, causality, generalization, replication. Merging the two approaches.


7. Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association.


10. Use of tools/techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism

Part 2

I
Managerial Economics – Demand Analysis
Production Function
Cost – Output Relations
Market Structures
Pricing Theories
Advertising
Macro – Economics
National Income Concepts
Infrastructure – Management and Policy
Business Environment
Capital Budgeting

II

III
Concepts and perspectives in HRM; HRM in changing environment.
Job analysis – Job Description.
Selecting Human Resources.
Induction, Training and Development.
Exit policy and Implications.
Performance Appraisal and Evaluation.
Potential Assessment.
Job Evaluation.
Wage Determination.
Industrial Relations and Trade Unions.
Dispute Resolution and Grievance Management.
Labour Welfare and Social Security Measures.

IV
Valuation Concepts and Valuation of Securities.
Capital Budgeting Decisions – Risk Analysis.
Capital Structure and Cost of Capital.
Dividend Policy – Determinants.
Long – Term and Short – Term Financing Instruments.
Mergers and Acquisitions.

V
Marketing Environment and Environment Scanning; Marketing Information Systems and Marketing Research; Understanding Consumer and Industrial Markets; Demand Measurement and Forecasting; Market Segmentation – Targeting and Positioning;
Product Decisions, Product mix, Product Life Cycle; New Product Development; Branding and Packaging; Pricing Methods and Strategies.
Promotion Decisions – Promotion mix; Advertising; Personal Selling; Channel Management;
Vertical Marketing Systems; Evaluation and Control of Marketing Effort; Marketing of Services;
Customer Relation Management; Uses of Internet as a Marketing Medium – Other related issues like branding, market development, Advertising and retailing on the net. New issues in Marketing.

VI
Role and Scope of Production Management; Facility Location; Layout Planning and Analysis;
Production Planning and Control – Production Process Analysis; Demand Forecasting for Operations; Determinants of Product mix; Production Scheduling; Work measurement; Time and Motion Study; Statistical Quality Control. Supply Chain Management and Materials Management
Role and Scope of Operations Research; Linear Programming; Sensitivity Analysis; Duality;
Transportation Model; Inventory Control; Queueing Theory; Decision Theory; Markov Analysis;
PERT / CPM.

VII
Probability Theory; Probability distributions – Binomial, Poisson, Normal and Exponential;
Correlation and Regression analysis; Sampling theory; Sampling distributions; Tests of Hypothesis; Large and small samples; t z, F, Chi – square tests.
Use of Computers in Managerial applications; Technology issues and Data processing in organizations; Information systems; MIS and Decision making; System analysis and design;
Trends in Information Technology; Internet and Internet – based applications.
VIII
Concept of Corporate Strategy; Components of Strategy Formulation; Ansoff’s Growth Vector; BCG Model; Porter’s Generic Strategies; Competitor Analysis; Strategic Dimensions and Group Mapping; Industry Analysis; Strategies in Industry Evolution, Fragmentation, Maturity, and decline. Competitive strategy and Corporate Strategy; Transnationalization of World Economy; Managing Cultural Diversity; Global Entry Strategies; Globalisation of Financial System and Services; Managing International Business; Competitive Advantage of Nations; RTP and WTO.

IX
Concepts – Types, Characteristics; Motivation; Competencies and its development; Innovation and Entrepreneurship; Small business – Concepts Government policy for promotion of small and tiny enterprises; Process of Business Opportunity Identification; Detailed business plan preparation; Managing small enterprises; Planning for growth; Sickness in Small Enterprises; Rehabilitation of Sick Enterprises; Intrapreneurship (Organisational Entrepreneurship).

X
Ethics and Management System; Ethical issues and Analysis in Management; Value based organisations; Personal framework for ethical choices; Ethical pressure on individual in organisations; Gender issues; Ecological consciousness; Environmental ethics; Social responsibilities of business; Corporate governance and ethics.

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17. PhD in Education (PHDES)

(A) Methodology of Educational Research

Sources of acquiring Knowledge, Meaning and Scope of Educational Research, Meaning and steps of Scientific Method, Characteristics of Scientific Method (Replicability, Precision, Falsifiability and Parsimony), Types of Scientific Method (Exploratory, Explanatory and Descriptive), Aims of research as a scientific activity: Problem-solving, Theory Building and Prediction, Types of research (Fundamental, Applied and Action research), Ethical considerations in Research

Criteria and sources of identifying the research problem, Survey, review and importance of related literature, Selection, definition and evaluation of research problem, Writing Objectives

Hypotheses - Concept, Sources, Types (Research, Directional, Non-directional, Null), Formulating Hypothesis, Characteristics of a good hypothesis, Concept of Universe and Sample, Characteristics of a good Sample, Techniques of Sampling (Probability and Non-probability Sampling), Tools of Research - Validity, Reliability and Standardisation of a Tool, Types of Tools (Rating scale, Attitude scale, Questionnaire, Aptitude test and Achievement Test, Inventory), Techniques of Research (Observation, Interview and Projective Techniques)

Variables: Meaning of Concepts, Constructs and Variables, Types of Variables (Independent, Dependent, ExTRANeOUS, Intervening and Moderator)

Tools and techniques of data collection - Characteristics of a good research tool Types of research tools and techniques and their use

Major Approaches to Educational Research - Quantitative Research, Qualitative Research and Mixed Methods Research

Methods of Educational Research - Historical research, Descriptive research, Experimental research, Ex post facto research

Statistical Analysis of Data: Types of Measurement Scale (Nominal, Ordinal, Interval and Ratio), Quantitative Data Analysis - Descriptive data analysis (Measures of central tendency, variability, fiduciary limits and graphical presentation of data), Testing of Hypothesis (Type I and Type II Errors), Levels of Significance, Power of a statistical test and effect size, Parametric Techniques, Non-Parametric Techniques, Inferential data analysis, Use and Interpretation of statistical techniques: Correlation, t-test, z-test, ANOVA, ANCOVA, Chi-square (Equal Probability and Normal Probability Hypothesis). Qualitative Data Analysis - Data Reduction and Classification, Analytical Induction and Constant Comparison, Concept of Triangulation

Writing Research Report - Meaning and scope, Format of research reports, Presentation Dissemination
(B) Subject Specific Areas:

(i) Philosophical and Sociological Foundations of Education

Relationship of Education and Philosophy, Indian and Western Schools of Philosophy and their educational implications; Contributions of Vivekananda, Tagore, Gandhi and Aurobindo to Indian Education; National values as enshrined in the Indian Constitution, and their educational implications; Philosophical Inquiry in Education, Nature and Scope, Steps, Philosophical inquiry of current educational issues.

Education as a social sub-system-specific characteristics: Education and its relationship with modernization and democracy; Education and its relationship with the home, community; Socialization of the child; Meaning and nature of social change: Education as related to social equity and equality of educational opportunities; Constraints on social change in India; Education of the socially and economically disadvantaged sections of the society including students with special needs. Social mobility.

(ii) Learner, Learning Process and Assessment

Growth and Development: Concept and principles, Social, emotional and cognitive development. Individual differences. Personality - Definitions and theories (Freud, Carl Rogers, Gordon Allport, Max Wertheimer, Kurt Koffka), learning styles and their implications on individual in succeeding in his/her learning; Motivation - concept; determinants and types, implications of motivation on learning; Group dynamics and role of teacher in developing positive class room climate. Mental health and mental hygiene.

Approaches to Intelligence from Unitary to Multiple: Concepts of Social intelligence, multiple intelligence, emotional intelligence Theories of Intelligence by Sternberg, Gardner, Assessment of Intelligence, Concepts of Problem Solving, Critical thinking, Metacognition and Creativity.

Principles and Theories of learning: Behaviouristic, Cognitive and Constructivist theories of learning, Factors affecting learning, learning environment, Concept of social cognition, understanding social relationship and socialization goals.

Assessment – Meaning, nature, perspectives (assessment for Learning, assessment of learning and Assessment as Learning) - Types of Assessment - Placement, diagnostic, formative, summative, Criterion-referenced and Norm-referenced. Relation between objectives and outcomes, Assessment of Cognitive (Anderson and Krathwohl), Affective (Krathwohl) and Psychomotor domains (R.H. Dave) of learning.; Issues in Assessment and Evaluation.

(iii) Curriculum Studies

Concept and Principles of Curriculum, Strategies of Curriculum Development, Stages in the Process of Curriculum development, Foundations of Curriculum Planning - Philosophical Bases (National, democratic), Sociological basis (socio cultural reconstruction), Psychological Bases (learner’s needs and interests), Bench marking and Role of National level Statutory Bodies - UGC, NCTE and University in Curriculum Development


Instructional System, Instructional Media, Instructional Techniques and Material in enhancing curriculum Transaction, Approaches to Evaluation of Curriculum : Approaches to Curriculum and Instruction (Academic and Competency Based Approaches), Models of Curriculum Evaluation: Tyler’s Model, Stakes’ Model, Scriven’s Model, Kirkpatrick’s Model

Meaning and types of Curriculum change, Factors affecting curriculum change, Approaches to curriculum change, Role of students, teachers and educational administrators in curriculum change and improvement, Scope of curriculum research and Types of Research in Curriculum Studies.

(iv) Educational Management, Administration and Leadership

Educational Management and Administration – Meaning, Principles, Functions and importance, Institutional building, POSDCORB, CPM, PERT, Management as a system, SWOT analysis, Taylorism, Administration as a process, Administration as a bureaucracy, Human relations approach to Administration, Organisational compliance, Organisational development, Organisational climate

Leadership in Educational Administration: Meaning and Nature, Approaches to leadership: Trait, Transformational, Transactional, Value based, Cultural, Psychodynamic and Charismatic, Models of Leadership (Blake and Mouton’s Managerial Grid, Fiedler’s Contingency Model, Tri-dimensional Model, Hersey and Blanchard’s Model, Leader-Member Exchange Theory.

Concept of Quality and Quality in Education: Indian and International perspective, Evolution of Quality: Inspection, Quality Control, Quality Assurance, Total Quality Management (TQM), Six sigma, Quality Gurus: Walter Shewart, Edward Deming, C.K Pralhad

Change Management: Meaning, Need for Planned change, Three-Step-Model of Change (Unfreezing, Moving, Refreezing), The Japanese Models of Change: Just-in-Time, Poka

(v) Educational Technology and ICT

Concept of Educational Technology (ET) as a Discipline: (Information Technology, Communication Technology, Information and Communication Technology (ICT) and Instructional Technology, Application of Educational Technology in formal, non-formal (Open and Distance Learning), informal and inclusive education systems, Overview of Behaviourist, Cognitive and Constructivist Theories and their implications to Instructional Design (Skinner, Piaget, Ausubel, Bruner, Vygotsky), Relationship between Learning Theories and Instructional Strategies (for large and small groups, formal and non formal groups )

Systems Approach to Instructional Design, Models of Development of Instructional Design (ADDIE, ASSURE, Dick and Carey Model Mason’s), Gagne’s Nine Events of Instruction and Five E’s of Constructivism, Nine Elements of Constructivist Instructional Design, Application of Computers in Education: CAI, CAL, CBT, CML, Concept, Process of preparing ODLM, Concept of e learning, Approaches to e-learning (Offline, Online, Synchronous, Asynchronous, Blended learning, mobile learning)

Emerging Trends in e-learning: Social learning (concept , use of web 2.0 tools for learning, social networking sites, blogs, chats, video conferencing, discussion forum), Open Education Resources (Creative Common, Massive Open Online Courses; Concept and application), e-Inclusion - Concept of e-Inclusion, Application of Assistive technology in E learning , Quality of e-Learning – Measuring quality of system: Information, System, Service, User Satisfaction and Net Benefits (D&M IS Success Model, 2003), Ethical Issues for e-Learner and e-Teacher - Teaching, Learning and Research.

Use of ICT in Evaluation, Administration and Research: E portfolios, ICT for Research - Online Repositories and Online Libraries, Online and Offline assessment tools (Online survey tools or test generators) – Concept and Development.

(vi) Inclusive Education

Inclusive Education under Sarva Shiksha Abhiyan (SSA), Features of UNCRPD (United Nations Convention on the Rights of Persons with Disabilities) and its Implication


Barriers and Facilitators in Inclusive Education: Attitude, Social and Educational, Current Status and Ethical Issues of inclusive education in India, Research Trends of Inclusive Education in India

(vii) Educational Guidance and Counselling


Types of Guidance and Group Guidance: Types of Guidance-Educational, Vocational/Career and Personal, Individual guidance and group guidance; advantages of group guidance, Group guidance techniques-class talk, career talk, orientation talk, group discussion, career conference, career corner, bulletin board, role play.

Understanding Counselling - Meaning and nature of counselling, Misconceptions about Counselling, Scope of counselling, Goals of counselling: resolution of problems, modification of behaviour, promotion of mental health. Relationship between guidance and counselling: place of counselling in the total guidance programme Counselling Process and Counselling Relationship - Stages of the counselling process, Counselling Techniques-person centred and group centred, cognitive interventions, behavioural interventions, and systematic interventions strategies. Theories of Counselling, Skills and qualities of an effective counsellor, Professional ethics

Types and Areas of Counselling - Uses of group process in counselling, Process of group counselling, Areas of counselling: family counselling, parental counselling, adolescent counselling, counselling of girls, counselling of children belonging to special groups, Peer counselling: Its concept and the relevance to the Indian situation, Steps and skills in group counselling process.
(viii) **Teacher Education**

- Development of Teacher Education in India, NCTE Curricular Frameworks for Teacher Education; Objectives and organization of curriculum of teacher education at various levels; Agencies involved in Pre-service and In-service teacher education; Teacher education through Open and Distance Education; Quality assurance in Teacher Education Programme.
- Meaning, Nature and Scope of Teacher Education; Types of Teacher Education Programmes, The Structure of Teacher Education Curriculum and its Vision in Curriculum Documents of NCERT and NCTE at Elementary, Secondary and Higher Secondary Levels, Organization of Components of Pre-service Teacher Education Transactional Approaches (for foundation courses) Expository, Collaborative and Experiential learning.

Understanding Knowledge base of Teacher Education from the view point of Schulman, Deng and Luke and Habermas, Meaning of Reflective Teaching and Strategies for Promoting Reflective Teaching, Models of Teacher Education - Behaviouristic, Competency-based and Inquiry Oriented Teacher Education Models

Concept, Need, Purpose and Scope of In-service Teacher Education, Organization and Modes of In-service Teacher Education, Agencies and Institutions of In-service Teacher Education at District, State and National Levels (SSA, RMSA, SCERT, NCERT, NCTE and UGC), Preliminary Consideration in Planning In-service teacher education programme (Purpose, Duration, Resources and Budget)

Concept of Profession and Professionalism, Teaching as a Profession, Professional Ethics of Teachers, Personal and Contextual factors affecting Teacher Development, ICT Integration, Quality Enhancement for Professionalization of Teacher Education, Innovation in Teacher Education.

(ix) **Adult Education**

- Adult Education – Basic concepts and meaning. Adult and Continuing Education -- Pre and Post Independent India, Extension Education and Services in India -- Phases and Movements, Adult Education Perspectives: Asian, Latin American, European and American perspectives
- Need, concept, types and characteristics of Lifelong Learning programmes in India, Opportunities for Lifelong Learning and Extension, Agencies in Lifelong Learning in and outside India, Comparative Studies in Adult Education: Parameters, Trends and Analysis Theoretical and Functional bases of Adult Education -- Liberal, Behaviouristic, Progressive, Humanistic, Radical and Analytical approaches of Adult Education, Social and educational perspectives of Tagore, Gandhi, Vivekananda, Radhakrishnan, Ambedkar and other Indian thinkers

Androgogy and Pedagogy -- Issues of marginalization and pedagogy of women, tribals, minorities, transgender, aged and persons with disability, Attributes and distinctive features of adult learning and development, Individual Vs. Group learning approaches in Adult Education, Experiences and learning from agriculture, home science, community
health and technology, Learning needs of diverse group of adult learners, Recognition of prior learning --Resolving the dilemmas of institutional and non-institutional learning, Theories of adult learning, Professionalization of adult education

Policy Planning and Implementation of Adult Education in India – Five Year Plans, Implementing Agencies – Role of Government Departments, Role of Universities, Colleges and Students, Role of NGOs, Role of Local Bodies, Community and individuals, Understanding Networking in Adult Learning, National Literacy Mission; Objectives, strategies, TotalLiteracy Campaigns, Post-Literacy Campaigns and Continuing Education programmes, Operationalization of the concept of vocational education in adult, continuing education and Lifelong Learning through state supported structures like Jan Shikshan Sansthan (JSS) and non state supported structures of Industrial and Business houses, Population Education: Concept and paradigm shift Development and its indicators, Millennium Development Goals (MDGs), Sustainable Development Goals (SDGs), Building learning communities -- Towards a learning society

Note: Weightage for Methodology of Educational Research (50%) and Subject Specific Areas (50%)
18. PhD in Gender & Development Studies (PHDGD)

Course I (8 credits) Concepts and Theories for PhD in Gender and Development Studies

1. Concepts and Theories
   Goals and Praxis of Gender and Development, History of Feminists Movement and Formation of Patriarchy, Emergence of Gender and Development Studies in India, Gender Sensitive Planning and Policy Making, Gender Mainstreaming, Gender Analysis, Gender Auditing and Gender Budgeting, Gender and Democracy, Gender Justice, Gender Equality and Equity.

2. The Development Debate
   Changing Notions of Development, Development and Post Development Theories, Critique of Development theories from a Gender Perspective, Development and Underdevelopment (Dependency Theory and its Critiques); WAD/WID/GAD, Power and Decision Making, Gender and Empowerment, Gender and Poverty, HDI, GDI, GEM - Approaches and Indicators.

3. Gender and Livelihoods

4. Gender and Work

5. Demographic, Nutrition and Health Dimensions
   Demographic Characteristics (Sex ratio, Population distribution, Census Enumeration and the debates on Indian Census), Gender Based Violence, Migration, Gender and Health (Nutritional Needs, Occupational Health) Poverty and Food Security, Basic Needs and Development Goals
6. Gender and Culture
Debates in Gender and Culture, Construction of Gender, Formation of Patriarchy, Nature of Indian Patriarchy, Variations in the Theories of Femininity and Masculinity: Cross-Cultural Perspectives, Gender Roles, Gender Ideology, Issues of Ethnicity and Multiculturalism; Communitarianism, Recent debates in Gender and Literature: Post-structuralism; Post-colonialism; Post-feminism; Feminist Futures; Eco Feminism and Environmental Humanisms, Communication, Media and Gender Debates, Changing Gender Roles and Identities: Sexualities and Queer issues; Recent debates on Gender, Education and Social Development, Social Equity and Distributional Aspects of Development in Education and Health.

7. Case Studies and Selected Readings

Course II

Research Methodology in Gender and Development Studies (8 credits)

1. Researching Gender- I
Debates in the difference between Social and Natural Science, Positivism, Empiricism, Rationalism, Realism, Post Empiricism, Feminist Critique of Positivism, Feminist Epistemology, Stand Point Theory; Gendered Ontology and Changing terms of Societal Inquiry: Liberalism, Marxism, Hermeneutics, Feminism, Post- Modernism, Post- Colonialism and Post-structuralism, Gender and Ethnographic Cultural Studies, Life Histories and Narratology, Gender and Discourse Analysis

2. Researching Gender- II
Quantitative and Qualitative Research, Feminist Paradigms, Feminist Research Methods and Ethics, Situating Differences, Interdisciplinary Methods in Feminist Research.

3. Research Design, Types and Strategies
Research Design, Exploratory Studies, Surveys, Historical, Experimental, Ethnographic and Case Studies; Types of Research- Fundamental, Applied Research,
Action Research, Experimental, Ex-Post Facto Research, Descriptive, Correlational Research, Participatory Research, Special Approaches for Studying Gender-Sensitive Problem-Centred, Policy Relevant and Action Oriented Research, Linking Policy and Research as Strategies for Advocacy

4. **Sampling**
   Definition of Population, Sample, Merits and Demerits of Sampling; Probability Sampling: Random Sampling, Multi-stage Sampling, Cluster Sampling, Non-Probability Sampling, Purposive Sampling, Convenience Sampling, Quota Sampling; Sampling Designs for Various Types of Research; Critical Review of Sampling Design of Different Research Studies.

5. **Tools and Techniques of Research**
   Questionnaire, Interview (Media and Internet), Scaling, Measurement, Focus Group Discussions, Observation, Narration, Gender Analysis Matrix and Impact Flow Chart

6. **Selected Studies in Gender and Development**
   Factors Determining and Influencing Gender and Development; Gender Division of Labour, Time use Survey and Management; Women’s Status and Challenges; Household allocation of Resources; Access to Natural Resources; Time Scale for Rural Households; Value Added Analysis for Households: Production/Goods/Resources, Household Decision Making.

7. **Data Analysis**
   Quantitative Data Analysis; Parametric Tests used for Quantitative Data Analysis; Qualitative Data Analysis, Non-Parametric Tests used for Analysis of Qualitative Data; Presentation of Data (Tables, Graphs etc.); Interpretation of Data.

8. **Preparing and Presenting Research Reports**
   Evaluation Research; Report Writing/Paper Presentation, Bibliography/References/Citations; Research Ethics; Research Proposals Seeking Grants; Research Funding Sources

***
19. **PhD in Journalism & Mass Communication (PHDJMC)**

- Media and Society - functions, role, access and interaction. Contemporary developments in the media as an institution.
- Concepts and models of various communication settings: Communication: Concept & Process; Models of Communication; Theories of Mass Communication.
- Different Schools of thoughts - related communication discipline: Media Content: Information, Education & Entertainment; Functions of Media; Impact of Media; and Media Economics and Finance.
- Mass Audience; Access to Media; Mass Media Policies. Health & Education; Gender and Media; Media and Environment; Media & Human Rights.
- Mass Communication and Culture; New Media, Networked Society – New Theory; Media Economics, Ownership, Control and Governance; The Production of Media Content; Media Content: Issues, Concepts and Method of Analysis.
- Children and Media Violence: Social learning Theory/Social Cognition (Bandura); Disinhibition and Cue Theory (Berkowitz); and Arousal Theory / Excitation Transfer (Tannenbaum and Zillman).
- “Middle Range” Theories (Selections): Uses and Gratifications; Agenda Setting by the Media; Cultivation of Perceptions of Reality (George Gerber); Limited and Selective Influences Theory.
- Overview of communication research paradigms: philosophical assumptions of positivism, interpretivism, critical paradigms. What is scientific? Logic of scientific reasoning: Terms, propositions, arguments; deductive and inductive reasoning in research.
• Research design: Quantitative
  Variables: Types of variables; unit of analysis; exploratory, explanatory and predictive research. Measurement: conceptual and operational definitions; levels of measurement: nominal, ordinal, interval, ratio; basic understanding of reliability and validity. Sampling: why sample? Samples and population of interest; sampling design: probability and non-probability sampling; factors affecting choice of sampling design; sample size and determining sample size; stages of quantitative research

• Data collection methods: Quantitative
  Experimentation: Logic of experimentation: testing causal relationships; random assignment; internal and external validity; sampling in experiments; experimental designs; field experiments. Survey research: General features of survey design; strengths and limitations; survey research designs: cross-sectional and longitudinal. Questionnaire construction: Steps leading to construction of questionnaire; content and format; leading and loaded questions; pre-testing questionnaires; tabulating data.

• Data analysis: Quantitative
  Introduction to statistics, Measures of central tendency: Mean, median, mode; when to use them. Measures of dispersion: range, semi-quartile range, standard deviation. Non-parametric and parametric statistical tests: location of scores and standardized distributions. Introduction to probability; Probability and samples: The distribution of sample means; Hypothesis testing procedure

***
20. **Ph.D. in Dairy Science and Technology (PHDDR)**


Chemistry of the principal constituents of milk, i.e. water, lactose, lipids, proteins (including enzymes), salt and vitamins. Food Fermentation. Dairy starter cultures and their evaluation. Important analytical techniques in microbiology. New Food pathogens. Different processing treatments given to milk during its processing for fluid milk supply and manufacturing of different products. Chemistry and Microbiological during manufacture of dairy products.


**RESEARCH METHODOLOGY:**

Information technology; library resource; internet databases and other packages; literature survey; web based resources and open access journals; digital libraries, manual collection; peer-review process, concept of impact factor and citation index; application of common softwares in food science research. Ethical issues; Plagiarism; Patenting Laws; Indian Patenting Act/International Protocols for technology transfer. Basic concepts of research; type and nature of research; research problem and objectives; formulation of hypotheses, types of hypotheses, methods of testing hypotheses; characteristics of good research problem; sources of research problem; errors in selecting a research problem; methods of research (Experimental, Survey, Observation, Case study, Historical and comparative methods); major emerging areas and interdisciplinary research. Designing research proposal and study; hypothesis; defining research problem, framing objective; Design strategies in research- experimental design: descriptive study, analytic study, experimental study, intervention trials; Safety issues- chemical hazards and their management. Methods of sampling; Data collection; tools and techniques; Data analysis and interpretation: Multivariate data analysis techniques, such as PCA, Cluster analysis, etc., data presentation and summarization of data; graphical presentation. Writing and publishing thesis/research paper; Editing and checking thesis/research paper for plagiarism. Formulating a Project proposal for funding. ***
21. PhD in Development Studies (PHDDV)

COURSE 1: DEVELOPMENT STUDIES: AN OVERVIEW (8 CREDITS)

BLOCK 1: DEVELOPMENT: AN OVERVIEW

Unit 1: Introduction to Development: Why Development? Objectives and Scope of Development; development and growth; Development Ethics: Gandhi, Lebret, Myrdal and other ethical concepts

Unit 2: Dimensions of Development: Economic, Political, Social, Human, Cultural, Gender and Ethical Dimensions

Unit 3: Development Paradigm: Inclusive Development, Sustainable Development, Good Governance, International Relationship, Women Empowerment and Participatory Development Paradigms

Unit 4: Actors of Development: Markets, State and other Heterogeneous Actors such as international organization, and CVOs

BLOCK 2: DEVELOPMENT THEORIES

Unit 1: Classical and Neo-Classical Theories and Marxian theory

Unit 2: Developmentalist Theories: Balanced and Unbalanced Growth theories, Rostow’s Stages of Economic Growth, Gunnar Myrdal theory

Unit 3: Heterogeneous Theories: Modernization theory, Human Capital Theory, Neo- Liberal Theory and Dependency Theories

BLOCK 3: EDIFICES OF DEVELOPMENT

Unit 1: Development Governance: meaning and scope of development governance; functions and components; features of good governance; attributes and challenges of good development governance

Unit 2: Development Administration: concept and meaning of development administration, scope of development administration, features of good development administration, and challenges of development administration

Unit 4: Development Management: meaning and concept of development management, aim and scope of development management; development management cycle and requisites of effective development management
BLOCK 4: DEVELOPMENTAL ISSUES AND CHALLENGES-I

Unit 1: Economic Challenges: Poverty, Inequality, Inflation and Unemployment, Population and Development

Unit 2: Social Challenges: Conflict and Development, Displacement and Development, Marginalization, Social Disparities and Inclusion, Education and Health

Unit 3: Emerging Challenges: Globalization, Climate change, Social Clustering, Regional Development

BLOCK 5: DEVELOPMENT ISSUES AND CHALLENGES-II

Unit 1: Agriculture and Development: Role of agriculture, Issues and Challenges of agriculture, Measures to improve agriculture

Unit 2: Industry and Development: Role of industry in development, Issues and Challenges of industrial Development, Industrial Development measures

Unit 3: Service Sector and Development: Role of Service Sector in Development, Issues and challenges of service sector, measures to strengthen service sector.

Unit 4: Informal Sector and Development: role of informal sector in development, measures to formalize the informal sector and challenges of informal sector

BLOCK 6: INDIAN DEVELOPMENT

Unit 1: Urban Development in India: Urbanization, Issues and Challenges of Urbanization, Smart Cities

Unit 2: Rural Development in India: Components of Rural Development, Models of Rural Development, Issues and Challenges of Rural Development, Smart Village, Rural Development measures

Unit 3: Planning and Development in India: Impact of planning before and after liberalization and NITI Aayog

Unit 5: Globalization and Development in India: Globalization and its impact on the development in India
REFERENCES

Bright Singh D(1966): Economics of Development With Special Reference to India, Asia Publishing House, New Delhi.
Gant, G.F (1979): Developement Adminstration: Concept, Goals and Methods, Madison, University of Wisconsin Press.


**COURSE 2: RESEARCH METHODOLOGY IN DEVELOPMENT STUDIES (8 CREDITS)**
<table>
<thead>
<tr>
<th>BLOCKS</th>
<th>UNITS</th>
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| Block-1 Fundamentals of Social Science Research | 1. Social Science Research - An Overview  
2. Component of Social Science Research  
3. Research Designs  
4. Research Project Formulation |
| Block-2 Development Research                | 1. Basic of Development Research  
2. Methods of Development Research  
3. Development Research Applications |
| Block-3 Measurement and Sampling            | 1. Measurement  
2. Scales and Tests  
3. Reliability and Validity  
4. Sampling |
| Block-4 Data Collection and Analysis-1      | 1. Quantitative Data Collection Methods and Devises  
2. Qualitative Data Collection Methods and Devises  
3. Overview of Statistical Tools |
| Block-5 Data Collection and Analysis-2      | 1. Data Sources - Uses and Limitations  
2. Data Processing and Analysis Report Writing  
3. Report Writing  
4. Use of Computer in Data Analysis |

***
22. PhD in Computer Science (PHDCS)

PART – 1 (Research Methodology)


PART – 2 (Computer Science)

1. Computer System Architecture

Data Representation: Data Types, Number Systems and Conversion, Complements, Fixed Point Representation, Floating Point Representation, Error Detection Codes, Computer Arithmetic - Addition, Subtraction, Multiplication and Division Algorithms.

Register Transfer and Microoperations: Register Transfer Language, Bus and Memory Transfers, Arithmetic, Logic and Shift Microoperations.

Basic Computer Organization and Design: Stored Program Organization and Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output, Interrupt.


Microprogrammed Control: Control Memory, Address Sequencing, Design of Control Unit.

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC Computer, CISC Computer.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing Array Processors.

Memory Hierarchy: Main Memory, Auxillary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.


2. Discrete Structures and Optimization

Mathematical Logic: Propositional and Predicate Logic, Propositional Equivalences, Normal Forms, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference.


Graph Theory: Simple Graph, Multigraph, Weighted Graph, Paths and Circuits, Shortest Paths in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits, Planner graph, Graph Coloring, Bipartite Graphs, Trees and Rooted Trees, Prefix Codes, Tree Traversals, Spanning Trees and Cut-Sets.

Boolean Algebra: Boolean Functions and its Representation, Simplifications of Boolean Functions.


3. Programming Languages and Computer Graphics


Elementary Data Types: Properties of Types and Objects; Scalar and Composite Data Types.
Programming in C: Tokens, Identifiers, Data Types, Sequence Control, Subprogram Control, Arrays, Structures, Union, String, Pointers, Functions, File Handling, Command Line Arguments, Preprocessors.

Object Oriented Programming: Class, Object, Instantiation, Inheritance, Encapsulation, Abstract Class, Polymorphism.

Programming in C++: Tokens, Identifiers, Variables and Constants; Data types, Operators, Control statements, Functions Parameter Passing, Virtual Functions, Class and Objects; Constructors and Destructors; Overloading, Inheritance, Templates, Exception and Event Handling; Streams and Files; Multifile Programs.

Web Programming: HTML, DHTML, XML, Scripting, Java, Servlets, Applets.

Computer Graphics: Video-Display Devices, Raster-Scan and Random-Scan Systems; Graphics Monitors, Input Devices, Points and Lines; Line Drawing Algorithms, Mid-Point Circle and Ellipse Algorithms; Scan Line Polygon Fill Algorithm, Boundary-Fill and Flood-Fill.

2-D Geometrical Transforms and Viewing: Translation, Scaling, Rotation, Reflection and Shear Transformations; Matrix Representations and Homogeneous Coordinates; Composite Transforms, Transformations Between Coordinate Systems, Viewing Pipeline, Viewing Coordinate Reference Frame, Window to View-Port Coordinate Transformation, Viewing Functions, Line and Polygon Clipping Algorithms.

3-D Object Representation, Geometric Transformations and Viewing: Polygon Surfaces, Quadric Surfaces, Spline Representation, Bezier and B-Spline Curves; Bezier and B-Spline Surfaces; Illumination Models, Polygon Rendering Methods, Viewing Pipeline and Coordinates; General Projection Transforms and Cipping.

4. Database Management Systems

Database System Concepts and Architecture: Data Models, Schemas, and Instances; Three-Schema Architecture and Data Independence; Database Languages and Interfaces; Centralized and Client/Server Architectures for DBMS.

Data Modeling: Entity-Relationship Diagram, Relational Model - Constraints, Languages, Design, and Programming, Relational Database Schemas, Update Operations and Dealing with Constraint Violations; Relational Algebra and Relational Calculus; Codd Rules.
SQL: Data Definition and Data Types; Constraints, Queries, Insert, Delete, and Update Statements; Views, Stored Procedures and Functions; Database Triggers, SQL Injection.

Normalization for Relational Databases: Functional Dependencies and Normalization; Algorithms for Query Processing and Optimization; Transaction Processing, Concurrency Control Techniques, Database Recovery Techniques, Object and Object-Relational Databases; Database Security and Authorization.


Data Warehousing and Data Mining: Data Modeling for Data Warehouses, Concept Hierarchy, OLAP and OLTP; Association Rules, Classification, Clustering, Regression, Support Vector Machine, K-Nearest Neighbour, Hidden Markov Model, Summarization, Dependency Modeling, Link Analysis, Sequencing Analysis, Social Network Analysis.

Big Data Systems: Big Data Characteristics, Types of Big Data, Big Data Architecture, Introduction to Map-Reduce and Hadoop; Distributed File System, HDFS.
NOSQL: NOSQL and Query Optimization; Different NOSQL Products, Querying and Managing NOSQL; Indexing and Ordering Data Sets; NOSQL in Cloud.

5. **System Software and Operating System**

System Software: Machine, Assembly and High-Level Languages; Compilers and Interpreters; Loading, Linking and Relocation; Macros, Debuggers.

Basics of Operating Systems: Operating System Structure, Operations and Services; System Calls, Operating-System Design and Implementation; System Boot.


CPU Scheduling: Scheduling Criteria and Algorithms; Thread Scheduling, Multiple- Processor Scheduling, Real-Time CPU Scheduling.

Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance and Detection; Recovery from Deadlock.

Memory Management: Contiguous Memory Allocation, Swapping, Paging, Segmentation, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files.
Storage Management: Mass-Storage Structure, Disk Structure, Scheduling and Management, RAID Structure.


Virtual Machines: Types of Virtual Machines and Implementations; Virtualization.


6. Software Engineering


Software Quality: McCall’s Quality Factors, ISO 9126 Quality Factors, Quality Control, Quality Assurance, Risk Management, Risk Mitigation, Monitoring and Management (RMMM); Software Reliability.

Estimation and Scheduling of Software Projects: Software Sizing, LOC and FP based Estimations; Estimating Cost and Effort; Estimation Models, Constructive Cost Model (COCOMO), Project Scheduling and Staffing; Time-line Charts.


Software Configuration Management: Change Control and Version Control; Software Reuse, Software Re-engineering, Reverse Engineering.

7. Data Structures and Algorithms

Data Structures: Arrays and their Applications; Sparse Matrix, Stacks, Queues, Priority Queues, Linked Lists, Trees, Forest, Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree, B Tree, B+ Tree, B* Tree, Data Structure for Sets, Graphs, Sorting and Searching Algorithms; Hashing.

Performance Analysis of Algorithms and Recurrences: Time and Space Complexities; Asymptotic Notation, Recurrence Relations.

Design Techniques: Divide and Conquer; Dynamic Programming, Greedy Algorithms, Backtracking, Branch and Bound.

Lower Bound Theory: Comparison Trees, Lower Bounds through Reductions.


Complexity Theory: P and NP Class Problems; NP-completeness and Reducibility.


8. Theory of Computation and Compilers


Regular Language Models: Deterministic Finite Automaton (DFA), Non-Deterministic Finite Automaton (NDFA), Equivalence of DFA and NDFA, Regular Languages, Regular Grammars, Regular Expressions, Properties of Regular Language, Pumping Lemma, Non-Regular Languages, Lexical Analysis.


Unsolvable Problems and Computational Complexity: Unsolvable Problem, Halting Problem, Post Correspondence Problem, Unsolvable Problems for Context-Free Languages, Measuring and Classifying Complexity, Tractable and Intractable Problems.


Semantic Analysis: Attribute Grammar, Syntax Directed Definitions, Inherited and Synthesized Attributes; Dependency Graph, Evaluation Order, S-attributed and L-attributed Definitions; Type-Checking.


9. **Data Communication and Computer Networks**

Data Communication: Components of a Data Communication System, Simplex, Half-Duplex and Duplex Modes of Communication; Analog and Digital Signals; Noiseless and Noisy Channels; Bandwidth, Throughput and Latency; Digital and Analog Transmission; Data Encoding and Modulation Techniques; Broadband and Baseband Transmission; Multiplexing, Transmission Media, Transmission Errors, Error Handling Mechanisms.


IPv4 Structure and Address Space; Classful and Classless Addressing; Datagram, Fragmentation and Checksum; IPv6 Packet Format, Mapping Logical to Physical Address (ARP), Direct and Indirect Network Layer Delivery; Routing Algorithms, TCP, UDP and SCTP Protocols; Flow Control, Error Control and Congestion Control in TCP and SCTP.

World Wide Web (WWW): Uniform Resource Locator (URL), Domain Name Service (DNS), Resolution - Mapping Names to Addresses and Addresses to Names; Electronic Mail Architecture, SMTP, POP and IMAP; TELNET and FTP.


Mobile Technology: GSM and CDMA; Services and Architecture of GSM and Mobile Computing; Middleware and Gateway for Mobile Computing; Mobile IP and Mobile Communication Protocol; Communication Satellites, Wireless Networks and Topologies; Cellular Topology, Mobile Adhoc Networks, Wireless Transmission and Wireless LANs; Wireless Geolocation Systems, GPRS and SMS.


10. **Artificial Intelligence (AI)**

Approaches to AI: Turing Test and Rational Agent Approaches; State Space Representation of Problems, Heuristic Search Techniques, Game Playing, Min-Max Search, Alpha Beta Cutoff Procedures.


Natural Language Processing: Grammar and Language; Parsing Techniques, Semantic Analysis and Pragmatics.


Fuzzy Sets: Notion of Fuzziness, Membership Functions, Fuzzification and Defuzzification; Operations on Fuzzy Sets, Fuzzy Functions and Linguistic Variables; Fuzzy Relations, Fuzzy Rules and Fuzzy Inference; Fuzzy Control System and Fuzzy Rule Based Systems.

Genetic Algorithms (GA): Encoding Strategies, Genetic Operators, Fitness Functions and GA Cycle; Problem Solving using GA.

Artificial Neural Networks (ANN): Supervised, Unsupervised and Reinforcement Learning; Single Perceptron, Multi Layer Perceptron

**Question Paper Pattern for PHDCS Entrance Exam**

(i) Question Paper consists of 100 MCQ’s comprising two parts (Part I: Research Methodology, 50 MCQ’s of 50 marks and Part II: Computer Science, 50 MCQ’s of 50 marks)

(ii) Both, Part I and Part II are compulsory.

(iii) Use of Scientific Calculator/ any Calculator will be allowed.

(iv) For each correct answer 1 mark will be awarded.

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23. PhD in Law (PHDLE)

Part A - Research Methodology

1. (a) Nature of Research
   - What is Research?
   - Relevance of Legal Research
   - Objective of Legal Research.
   - Need for Legal Research and Importance of inter-disciplinary approach.
   - Significance of Legal Research in India.
   - Legal Research as a profession in India.

(b) Types of Research
   - Doctrinal or Traditional Research.
   - Non-doctrinal or Empirical Research.
   - Descriptive and Analytical Research.
   - Applied and Fundamental Research.
   - Qualitative and Quantitative Research.
   - Law Reform Research.
   - Historical Research.
   - Sociological Research.

2. Research Processes
   - Identification of Research Problems.
   - Review of Literature.
   - Selection of a Research Problem
   - Formulation of a Hypothesis.
   - Research Design.
   - Hypothesis.

3. Research Methods and tools for collection of data

1) Primary Data method.
   - Experimental and Participatory/Scientific Method.
   - Case Study Method.
   - Survey Method.
   - Discussion Method.
   - Observation Method.
   - Interview Method.
   - Mail Survey Method.
   - Questionnaire (Open ended and Close ended)
   - Pilot Study Method.

2) Secondary Data Method.
   - Case Law Method.
   - Cumulative Record Cards.
3) Tabulation and Evaluation of Data.

4. Sampling

- Advantages and Limitations of Sampling.
- Theoretical basis of Sampling
  - Probability and Non-probability Sampling
- Classifications of sampling
  - Simple Random Sampling
  - Stratified Sampling
  - Cluster Sampling
  - Systematic Sampling
  - Non-random sampling
  - Purposive Sampling
  - Convenience Sampling
  - Judgment Sampling
- Sampling and Non-sampling Error.

5. Analysis and Interpretation of Data

- Application of Content Analysis in Legal Research.
- Analysis of aggregate Data.
- Data Interpretation.
- Legal input Analysis, the ideal and the practicable.
- Data Processing - Summarizing of data, Codification and Tabulation.
- Writing a Research Report - Types, Contents and steps involved in drafting of a Report.

6. Scientific Tools in Research

- Jurimetrics.
- Use of SPSS and other packages in Legal research.
- Avoiding/Detecting plagiarism.
- Writing the research report/Bibliography/Presentation styles

7. Other Legal Research Strategies:

- Legislative materials including subordinate legislation, notification and policy statements.
- Decisional material including foreign decisions; methods of discovering the "rule of the case" - tracing the history of important cases and also to ensuring that the case had not been overruled.
- Survey of juristic literature/ writings and its importance in selecting research problem.
- Compilation of list of reports used or special studies conducted relevant to the problem.
- Mode of Citation and Bibliography: Author-date System, Footnote and Endnote System, Citing for the First Time, Subsequent citing, List of Abbreviations Used in Citation, Bibliographical Entries, The Blue book - A Uniform System of Citation.
Part B – Law

1. Constitutional Law of India
   - Preamble
   - Fundamental Rights and Duties.
   - Directive Principles of State Policy.
   - Judiciary.
   - Executive.
   - Union State Legislative Relations.
   - Amendment to the Constitution of India.
   - Writ Jurisdiction.

2. Legal Theory
   - Nature and Source of Law.
   - Positivism, Natural Law Theory, Sociological Jurisprudence.
   - Theories of punishment.
   - Rights and Duties.
   - Concepts of Possession and Ownership.
   - Judicial Process and Social Transformation.
   - Judicial Activism.
   - Social Justice.

3. Public International Law
   - Nature of International Law and its relationship with municipal law.
   - Sources of International law
   - Recognition of states and governments.
   - United Nations.
   - Settlement of International Disputes.
   - Human rights.

4. Law of Contracts: General Principles
   - Essentials of a valid contract.
   - Offer, acceptance and consideration.
   - Capacity to Contract: Minor’s contract.
   - Elements vitiating contract: Mistake, fraud, misrepresentation, public policy, coercion, undue influence, frustration of contract.
   - Remedies for breach of contract: Damages.
5. Law of Crimes: General Principles

- Nature and Definition of Offence.
- General Exceptions
- Common Intention and Common Object.
- Criminal Attempt, Conspiracy and Abetment.
- Offences against Women and Child

6. Law of Torts

- Foundation of Tortuous Liability.
- General Defences to an action of Tort.
- Vicarious Liability
- Remoteness of Damages.
- Negligence
- Absolute and Strict Liability.

7. Environmental law

- Concept of Environment- Meaning of Environment and Environmental Pollution
- Environment law for the Prevention and Control of Environmental Pollution in India:
  - The Water (Prevention and Control of Pollution) Act 1974;
  - The Air (Prevention and Control of Pollution) Act 1981;
  - Wildlife protection Act,1972
- International Development for protection of Environmental Pollution.
- Remedies for Environmental Protection: Civil, Criminal and Constitutional.
- Environmental impact assessment and control of Hazardous wastes.

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24. PhD in Nursing (PHDNS)

Syllabus for entrance test is based on M.Sc Nursing curriculum with following details:
Research Methodology and Statistics 50 Marks
Nursing management 20 Marks
Nursing Education 20 Marks
Specialization area of Nursing 10 Marks
(Medical Surgical Nursing/Pediatric Nursing /Obstetric and Gynecology Nursing/
Community Health Nursing/Mental Health and psychiatric Nursing)

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25. Ph.D. in Social Work (PHDSW)

**Part –A: Research Methodology**
- Basics of research in social work
- Research methods in social work
- Tools and methods of data collection
- Data processing and analysis

**Part –B: Social Work**
- Origin and Development of Social Work
- Professional Social Work: Indian Perspectives
- Basic Social Science Concepts
- Social Work and Social Development
- Social Work Practicum and Supervision
- Social Work Research
- Social Work Practicum
- Case Work and Counseling: Working with Individuals
- Social Group Work: Working with Groups
- Community Organization Management for Community Development

***
26. PhD in Translation Studies (PHDTT)

- **Research Methodology**
  - Definitions of Research
  - Objectives of Research
  - Types of Research
  - Significance of Research
  - Preparing Research proposal
  - Research Approaches
  - Stages of Report writing
  - Using Library resources
  - Style Sheets
  - Data collection and Data Analysis

- **Translation Studies**
  - Meaning, Definitions, Nature and Scope of Translation
  - History of Translation: Western & Indian
  - Translation Studies: Development of Discipline
  - Colonial Translation and Post Colonial Translation
  - Thinkers of Translation: Nida, J.C. Catford, George Steiner, Itamar E Zohar, Andre Lefevere

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**Note:**
- Nature of Questions-Multiple Choice Questions
- Total Number of Questions-100, (50 Questions on Research Methodology, 50 Questions on Translation Studies)
- There shall be no Negative Marking

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27. PhD in Vocational Education and Training (PHDVE)

The syllabus of the Entrance Test shall consist of 50% of research methodology and 50% shall be of Vocational education and training

**Part-A: Research Methodology**

**Introduction to research:** meaning of research, role research in behavioral sciences, process of research, types of research, research approach and significance of research.

**Formulation of a Research Problem:** Research problem: definition, selection and necessity of research problem.

**Data Collection Methods:** Primary and secondary data, methods of collecting primary data, merits and demerits of different methods of collecting primary data, non-response.

**Data Collection Techniques:** Designing a questionnaire, pretesting a questionnaire, editing of primary data, technique of interview, collection of secondary data, scrutiny of secondary data, scale of measurements.

**Sampling Techniques:** Introduction to sampling, advantage of sampling over census, probability and non-probability sampling and non-sampling error, basics of simple random sampling, stratified random sampling, systematic sampling, and multistage sampling.

**Presentation of Data:** Classification and tabulation of data diagrammatic and graphical presentation of data.

**Statistical Methods:** Measure of Central tendency, measures of dispersion, simple correlation and regression, testing of hypothesis (z, t, F and chi-square tests), Interpretation of data.

**Report writing:** Formation of Report, Presentation of a report

**Part B: Vocational Education and Training**

**Vocational Education** (for Human Recourse Development for National Development, for Knowledge Economy, for Development of Marginalized Sections of the Society, for Persons with Special Needs, Personal/Family Actualisation and Happiness).


**Growth and Development in India:** Historical Background of Vocational Education in India (Pre-Independence Period, Post-Independence Period), Impact of Globalization and Liberalization on Vocational Education. Recent Government of India initiatives on Vocational education, NSOF, VET programmes through formal non-formal modes.

**Initiatives by Different Sectors of India:** Education Sector (CBSE, State Boards, NIOS and State Open Schools, Community Polytechnics, Jan Shikshan Sansthans, Community Colleges, Degree Colleges and Universities, Open Universities, NCERT and PSSCIVE), Industrial Sector (Craftsman Training Scheme, Apprenticeship Training Scheme, Skill Development Initiative),
Health and Paramedical Sector, Agriculture Sector, Business and Commerce Sector, Information and Communication Sector, Role and Work of Non-Governmental Organizations.

**Models of Vocational Education and Training:** School Based Model (Introduction of VEP in Schools, Thrust Areas Identified by NPE (1986) for VEP, Centrally Sponsored Scheme of Vocationalisation of Education, Programme of Action (POA, 1992), Industry Based Model (Vocational Training Programmes), Community Colleges Scheme, Apprenticeship.

**Issues in Vocational Educational and Training:** Social Acceptability, Access, Terminal Nature of Courses, Employability, Multi-Skilling, Managing a Small Enterprise, Remunerative Structure (wages and earnings) of Vocationally trained person Relevance, Untrained Vocational Teachers, On the Job Training, Apprenticeship Training Assessment and Certification of Prior Learning, Connectivity among Vocational programmes at All Levels, Lateral and Vertical Mobility.

**Environmental consciousness and Sustainable Development:** Understanding Environment, Environmental Concerns, Environmental Problems and Issues, Major Environmental Problems, Global Environmental Issues (Global Warming, Acid Rain, Ozone Layer Depletion), Environmental Resources (Forest Resources, Land Resources, Water Resources, Animal Resources).
28. PhD in French (PHDFL)

- Research methodology: Approaches and categories/types of research; selection of subject; research design; sampling techniques; data gathering, fieldwork, primary & secondary sources, questionnaires and data collection tools, data analysis, quantitative and qualitative analysis, referencing and annotation: research ethics.
- French and francophone literature (17th-20th century); Linguistics; Theories of translation & Interpretation; Didactics of foreign languages with emphasis on FLE: Trends and Theories; History, Culture & Civilization of France (17th-20th century), Current contexts in socio political trends in France; Francophonie: history, culture and literary trends; introduction to Open and Distance learning – FOAD., Popular culture in France: art, cinema & theatre.

****BEST WISHES ***