



## **Karmaveer Bhaurao Patil University, Satara.**

### **Admission Notification - 2023-2024**

#### **Entrance Examination**

Applications are invited from eligible candidates for admission to the Regular **Post Graduate (PG) Programmes and Ph.D Programme** conducted by the University on the campus and in Constituent Colleges.

#### **Schedule for Entrance Examination**

- **Online Application Date** : 24/04/2023 to 15/05/2023
- **Entrance Examination Fees** : Rs. 500 for PG Programme
- **Entrance Examination Fees** : Rs. 1500 for Ph.D Programme

#### **Important Note:**

1. A candidate is allowed to apply for more than one Programme. However, he/she will have to apply separately for each Programme for Entrance along with required fees.
2. Merit List will be declared purely on entrance examination marks only. If the entrance examination marks are the same, the CGPA of the previous year will be considered.
3. The candidate must apply through online mode on the University website <https://www.unikbp.ac.in/> Under ' **Admission 2023-2024** ' link.
4. The candidate should preserve a printout of the online form submitted and should submit it at the time of the final admission.
5. **Post Graduate (PG) Programme** : Candidates who have already **Appearing for Last Semester's examination** of the UG Programme can also apply for Entrance Test for Post Graduate Programme/s. However, they must submit a copy of their Final Statement of Marks of qualifying examination at the time of admission otherwise they will not be eligible for admission.
6. **Ph.D Programme** : Candidates who have already **Appearing for Last Semester's examination** of the PG Programme (M.A., M.Sc., M.Com, MBA etc) can also apply for Entrance Test for Post Graduate Programme/s. However, they must submit a copy of their Final Statement of Marks of qualifying examination at the time of admission otherwise they will not be eligible for admission.
7. Admissions for PG and Ph.D. programmes shall be through a Common Entrance Test conducted by Karmaveer Bhaurao Patil University, Satara except foreign students.
8. The reservation policy of Government of Maharashtra will be followed.
9. Please note that the intake quota that is displayed along with admission notification for various subjects may vary.
10. The candidate need not to submit hard copy of online application to University. However the candidate may get the print out of online application and retain the same for his/her personal information/records.
11. The fee of entrance test shall be remitted through Online Payment Gateway facility.
12. Application will be considered only after confirmation of payment.
13. The Entrance Test will be a qualifying test for admission to Ph.D. programme. The Entrance Test will be of 100 marks (50 questions of two marks each with multiple choices). The qualifying marks for Entrance test shall be 50% marks. Provided that a relaxation of 5% of marks (from 50% to 45%) shall be allowed for the candidates belonging to SC/ST/VI-NT (Non-Creamy layers)/OBC (Non- Creamy layers) EWS and for Differently-abled category in the entrance examination. (Negative marking system will NOT BE followed.)

#### **Centres Entrance Examination:**

- **Post Graduate (PG) Programmes:** Satara, Karad, Dahiwadi, Vita Kolhapur, Pandharpur, Vashi(Mumbai).
- **Ph.D Programmes:** Satara
- Request for Centre Change will not be entertained.
- If the number of candidates is less than TEN at the Centre, University reserves the right to cancel the said entrance examination centre. The decision regarding alternative centre will be displayed on the University website.



## Karmaveer Bhaurao Patil University, Satara.

**Admission Notification - 2023-2024**

### Entrance Examination

**(Post Graduate Programmes conducted by Constituent Colleges)**

- 1) Yashavantrao Chavan Institute of Science, Satara <http://www.ycis.ac.in/>
- 2) Chhatrapati Shivaji College, Satara <http://www.csc.ac.in/>
- 3) Dhnanjayrao Gadgil College of Commerce, Satara <https://www.dgccsatara.edu.in/>

Sr.No	Subject	Intake	Eligibility
1	Physics	40	B.Sc. Physics
2	Chemistry (Organic, Inorganic, Physical, Analytical )	160	B.Sc. Chemistry
3	Mathematics	50	B.Sc. Mathematics
4	Statistics	40	B.Sc. Statistics
5	Electronics	20	B.Sc. Electronics
6	Computer Science	40	B.Sc.Computer Science(Entire / Optional) / B.Sc.IT / BCS / B.Voc. (Software Development)
7	Botany	20	B.Sc. Botany
8	Zoology	20	B.Sc. Zoology
9	Fisheries	20	B.Sc. Fishery, B.F.Sc.
10	Applied Microbiology	30	B.Sc. Microbiology
11	Biotechnology	40	B.Sc. Biotechnology / B.Sc.Botany / B.Sc. Zoology / B.Sc. Microbiology / B.Sc. Nano Science & Technology
12	Food Processing and Packaging	40	B.Sc. Food Processing and Packaging / B.Sc. Food Science and Quality Control / B.Tech. Food Technology / B.Sc. Food Science and Nutrition / B.Sc. Food Technology and Management, B.Voc. Food Science
13	Animation Science	20	B.Sc.Animation Science / B.Sc. Computer Science (Entire/Optional) / B.Sc. Information Technology / B.Voc. Software Development
14	Forensic Science	20	B.Sc. Forensic Science
15	Data Science	20	B.Sc. Computer Science (Entire/Optional) / B.Voc. Software Development / B.Sc. Electronics/ B.Sc. Mathematics / B.Sc. Statistics
16	M.A. (Geography)	50	B.A Geography
17	M.Com (Advanced Accountancy)	50	B.Com
18	M.Com (Business Administration)	50	B.Com
19	M.Com (Bank Management)	50	B.Com (Bank Management) B.Com (Advanced Banking) B.Com (Banking) B.Com (Banking and Finance)
20	M.Com (Information Technology)	50	B.Com (Information Technology)

Note: Above Intake is subject change



## Entrance Examination

**(Subject wise Intake of Ph.D Programmes)**

Sr	Ph.D Programmes	Available Intake									
		Total	SC	ST	VJA	NT-B	NT-C	NT-D	OBC	EWS	Gen.
1	Education	01	-	-	-	-	-	-	-	-	01
2	English	07	01	01	-	-	-	-	01	01	03
3	Economics	08	01	01	-	-	-	-	02	01	03
4	Geography	16	02	01	01	-	01	-	03	02	06
5	Hindi	09	01	01	-	-	-	-	02	01	04
6	Marathi	12	02	01	-	-	01	-	02	01	05
7	Psychology	04	01	-	-	-	-	-	01	-	02
8	History	01	-	-	-	-	-	-	-	-	01
9	Political Science	02	-	-	-	-	-	-	01	-	01
10	Business Economics	04	01	-	-	-	-	-	01	-	02
11	Commerce	07	01	01	-	-	-	-	01	01	03
12	Biotechnology	02	-	-	-	-	-	-	01	-	01
13	Botany	09	01	01	-	-	-	-	02	01	04
14	Chemistry	16	02	01	01	-	01	-	03	02	06
15	Computer Science	02	-	-	-	-	-	-	01	-	01
16	Electronics	02	-	-	-	-	-	-	01	-	01
17	Physics	05	01	-	-	-	-	-	01	01	02
18	Statistics	04	01	-	-	-	-	-	01	-	02
19	Zoology	08	01	01	-	-	-	-	02	01	03
<b>Total</b>		<b>125</b>									
Note: Above Intake is subject change											

# Karmaveer Bhaurao Patil University, Satara.

## **Ph.D. Entrance Exam (Subject) Syllabus.** **Implemented From Academic Year 2023-24**

**Important Note: Nature of Question Paper, Standard of Passing and other rules shall be applicable as per New Ph.D Prospectus for the Academic Year 2023-24**

**Index**

<b>Sr. No</b>	<b>Subject</b>	<b>Page No</b>
<b>Science and Technology</b>		
<b>1</b>	Biotechnology	<b>3</b>
<b>2</b>	Botany	<b>4-5</b>
<b>3</b>	Chemistry	<b>6-10</b>
<b>4</b>	Computer Science	<b>11-12</b>
<b>5</b>	Electronics	<b>13</b>
<b>6</b>	Physics	<b>14</b>
<b>7</b>	Statistics	<b>15-16</b>
<b>8</b>	Zoology	<b>17</b>
<b>Humanities, Languages and Social Sciences</b>		
<b>9</b>	Economics	<b>18-19</b>
<b>10</b>	Education	<b>20-23</b>
<b>11</b>	English	<b>24-25</b>
<b>12</b>	Geography	<b>25-28</b>
<b>13</b>	Hindi	<b>29-30</b>
<b>14</b>	History	<b>31-32</b>
<b>15</b>	Marathi	<b>33-34</b>
<b>16</b>	Political Science	<b>35-36</b>
<b>17</b>	Psychology	<b>37-38</b>
<b>18</b>	Sociology	
<b>All Commerce, Management Subjects</b>		
<b>19</b>	All Commerce, Management Subjects\$	<b>39-40</b>

## **Biotechnology**

### **Research Methodology (Section I)**

(50% Part of Entrance Examination for M. Phil. & Ph.D. Admission)

#### **Unit 1: Fundamentals of Research**

Aims and objectives of research, Types of research – basic, novel and applied research.

Tools for searching research topic – books, journals, internet, discussions etc.

Research hypothesis, Steps in research design.

#### **Unit 2: Research Aptitude**

Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics.

Ethics in research – plagiarism

#### **Unit 3: Research Methods**

Preparation of molar, percent solutions, pH, Buffers, Henderson Hasselbalch equation, Beer Lamberts Law, Enzyme assays, Principles of protein, carbohydrate, lipid and nucleic acid estimations, Isolation and characterization of protein, DNA, RNA and plasmids. Basics of microscopy.

#### **Unit 4: Research tools & Techniques**

Principles and methods for -

Cell Homogenization techniques

Chromatography – ion exchange, gel filtration, affinity, HPLC, paper and TLC.

Electrophoresis, Western / Southern / Northern blotting,

Immunological techniques – Radial immunodiffusion, Laurell's rocket

Immuno-electrophoresis, ELISA, RIA, BLAST

#### **Reference Book:**

**Research Methodology** Methods and Techniques, C. R. Kothari, II<sup>nd</sup> revised edition, New Age International Publishers Pvt Ltd, New Delhi, 2004.

2. Syllabus for SET Examination Part I

#### **Reference Books:**

Protein Purification, Robert Scopes, Springer Verlag Publication, 1982.

Practical Biochemistry, V<sup>th</sup> edition, Keith, Wilson and Walker, Cambridge University Press, 2000

A Textbook of Practical Biochemistry, David Plummer, Tat McGraw Hill, 1988

#### **Section - II**

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

## **Botany**

### **Research Methodology (Section I)**

(50% Part of Entrance Examination for Ph.D. Admission)

#### **Unit 1: Fundamentals of Research**

Aims and objectives of research, Types of research – basic, novel and applied research.

Tools for searching research topic – books, journals, internet, discussions etc.

Research hypothesis, Steps in research design.

#### **Unit 2: Research Aptitude**

Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics.

Ethics in research – plagiarism

#### **Unit 3: Data analysis** - variables, numerical, categorical

Central measures (mean, median and mode)

Dispersion measures (ranges, standard deviation), probability co-relation and regression, Binomial position and normal distribution, parametric and non parametric tests t - test, f – test, chi-square test, ANOVA.

#### **Unit 4: Tools & Techniques**

1. Microscopy : - Light microscopy, Fluorescence microscopy, Electron microscopy
2. Spectrophotometer
3. Cultivation of microbes: Algae, Fungi & Bacteria.
4. Plant cell culture.
5. Preservation techniques: Histochemical and Cytochemical preservation, Herbarium preparation.

#### **Reference Books:**

1. **Research Methodology** Methods and Techniques, C. R. Kothari, II<sup>nd</sup> revised edition, New Age International Publishers Pvt Ltd, New Delhi, 2004.
2. Syllabus for SET Examination Part I

#### **Reference Books:**

1. P. N. Arora and P. K. Malhan (1998). Biostatistics. Himalaya Publishing Bombay.
2. P. S. G. Kumar (2004). Research methods and statistical techniques B. R. publishing Academy, Udaypur, 192.
3. G. B. N. Chainy, G. Mishra and P. K. Mohanty(2004) Basic Biostatistics. Kalyani publisher.
4. N.Gurumani (2006).Research Methodology for Biological Sciences. MJP publishing, Chennai.

5. C. R. Kothari (2004). Research Methodology- Methods and Techniques, New Age Publ. Wiely Easten, 1985.
  6. Dawson, Catherina (2002). Practical Res. Methods. New Delhi. UBS Publ.
  7. Kumar Ranjit(2005). Res. Methodology. A step by step Guide for Begianers. Singapore, Pearson Education.
  8. Goswami H. K. and R. Goswami. Practical cytology, applied genetics and Bio-statisticsHimalayan Publ. House, Bombay (1993)
  9. M. A. Schwer and Zeclinskin publ. Academic Press New York (1989) : Methods in plantmolecular biology
  10. Jensen. Leagood and Long Chapman and Hall Publ. (1993): Plant histochemistry –
  11. J. Arditti and Dunn, Publ. Academic Press (1970).Experimental plant physiology –
  12. Techniques in Bioproductivity and photosynthesis by – Coombs, Hall, Long and Sourlock,
  13. Pergamon press Oxford (1985) :Methods in enzymology – Colowick and Kaplan Academic Press.
  14. S. K. Jain and R. R. Rao (1964): Handbook of field and herbarium techniques.PracticalBiochemistry
  15. E. Wilson and J. Walker (2000) :Principles and Techniques. EdCambridgePublH. N.(1961): Studies in Paleobotany-Andrews,) Boyer, R.(2005) Modern Experimental Biochemistry-. Pearsa, Education, Singapore.Ralph, R. (1975). Methods in Experimental Biology.-Blakie, LondonMungikar, A. M. (1997), An Introduction to Biometry- Saraswati Printing Press Aurangabad
- Kothari C Rand GargGaurav 2014 : Research Methodology Methods and Techniques, IIIrd Ed. New Age International Publishe

## Section - II

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**



## **Chemistry**

### **Research Methodology (Section I)**

(50% Part of Entrance Examination for Ph.D. Admission)

#### **Unit 1: Fundamentals of Research**

Aims and objectives of research, Types of research – basic, novel and applied research.

Tools for searching research topic – books, journals, internet, discussions etc.

Research hypothesis, Steps in research design.

#### **Unit 2: Research Aptitude**

Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics.

Ethics in research – plagiarism

#### **Unit 3 : Research Methods.**

***Solid State reactions:*** Preparative methods, vapor phase transport, preparation of thin films, electrochemical methods, chemical vapor deposition, single crystal growth – Bridgman & Stockbarger methods, zone melting, co-precipitation, sol-gel method and hydrothermal method.

***Application of following reagents and reaction in synthesis:*** Complex metal hydrides, lithium diisopropylamide (LDA), Dicyclohexylcarbodiimide (DCC), Trimethylsilyl iodide, Peracids, Diazomethane, Woodward-Prevost hydroxylation and Shapiro reaction.

***Raman Spectroscopy:*** Rayleigh scattering, Raman scattering, classical and quantum theories of Raman effect. Rotational Raman spectra for linear and symmetric top molecules. Vibrational Raman spectra, rotational fine structure. Polarization of light and Raman effect, Structure determination from Raman and Infra-Red spectroscopy.

***Colloidal State:*** Introduction, types and preparation and stability of colloids, properties of colloids and electrokinetic phenomena.

***Thermal methods of analysis:*** Effect of heat on materials, chemical decomposition and thermogravimetry curves, Analysis of thermogravimetry curves. Thermogravimetry in controlled atmosphere, DSC and its applications, thermometric titrations.

***Sampling in analysis:*** Techniques and criteria of sampling, minimization of variables, Sampling of gas, liquids and solids, transmission and storage of samples, high pressure ashing techniques, particulate matter its separation and analysis( asbestos, dust and aerosols), Filtering and gravity separation.

#### **Unit 4 : Research Tools & Techniques**

***X-ray Fluorescence spectroscopy (XRF):*** Introduction and basic theory, instrumentation, spectral analysis and applications.

***X-ray Photo electron Spectroscopy (XPS):*** Introduction and basic theory, Instrumentation, sample selection and preparation, spectral analysis, Ar ion sputtering technique and applications of XPS.

**Mossbaur Spectroscopy:** Introduction, Principles, Condition of Mossbaur spectroscopy, Mossbaur effect, recoilless emission & absorption. Instrumentation, Parameter from Mossbaur spectra, isomer shift, Quadrupole splitting and hyperfine interactions, application of Mossbaur effect to the investigations of compounds of iron and tin.

**Electron spin Resonance [ESR]:** Principles of ESR, Selection rule, intensity, width, position of spectral line, multiplet structure, hyperfine interaction, spin orbital coupling, zero field splitting and Kramers degeneracy, rules for interpreting the spectra, Instrumentation, factors affecting G values, applications to inorganic complexes.

**Newer methods of stereoselective synthesis:** Introduction and Stereoselective and Stereospecific reactions; Enantioselective synthesis (chiral approach) reactions with hydride donors, hydroboration, catalytic hydrogenation via chiral hydrazones and oxazolines, Sharpless epoxidation, Diels Alder selective synthesis, use of calculations of optical purity and enantiomeric excess.

**Hückel Molecular Orbital Theory:** Hückel molecular orbital theory – Assumptions of HMO theory, the Born-Oppenheimer approximation, electron approximation, Secular determinant and secular equations, Hückel rule and aromaticity, HMO calculations for organic molecules, free valence index and prediction of chemical reactivity, use of molecular symmetry for simplification of HMO calculations, HMO treatment for molecules containing heteroatoms, extended Hückel methods.

**Heterogeneous Catalysis:** Chemical reactions on surfaces, unimolecular surface reactions, bimolecular surface reactions, Electronic theories of chemisorptions and heterogeneous catalysis. Photocatalysis, Reaction mechanism of photocatalysis Effect of photocatalysis reaction. Heterogeneously catalyzed oxidation and reduction reactions: oxidation of hydrogen with oxygen (Determination of Pt, Pd, Ir and Rh) Reduction of silver bromide (Determination of S and Se)

**Cyclic Voltammetry:** Introduction, Principle, instrumentation, digital simulation of cyclic Volta grams, excitation signals in voltammetry, Determination of analytes using cyclic voltammetry, Pulse voltammetry, High frequency and High speed voltammetry, applications Stripping voltammetry Electrodeposition step, voltammetric completion of the analysis, adsorptive stripping methods, voltammetry with microelectrodes.

**Dynamic light scattering (DLS) technique:** Introduction, Principle, Instrumentation, sample cell and sample handling, setting velocity and particle size, Stokes equation, Particle size distribution analysis and applications.

#### **Reference books:**

**Research Methodology** Methods and Techniques, C. R. Kothari, II<sup>nd</sup> revised edition, New Age International Publishers Pvt Ltd, New Delhi, 2004.

2. Syllabus for SET Examination Part I

#### **Reference Books:**

### **Inorganic Chemistry**

1. A. F. Wells, Structural Inorganic Chemistry – 5th edition (1984)
2. J H Huheey, Inorganic Chemisry - Principles, structure and reactivity, Harper and Row Publisher, Inc. New York (1972)
3. J. D. Lee, Concise Inorganic Chemistry, Elbs with Chapman and Hall, London
4. A. R. West, Plenum, Solid State Chemistry and its applications
5. N. B. Hanney, Solid State Physics
6. H. V. Keer, Principles of Solid State
7. S. O. Pillai, Solid State Physics
8. W. D. Callister, Wiley, Material Science and Engineering: An Introduction
9. R. Raghwan, First Course in Material Science
10. R. W. Cahan, The coming of Material Science
11. A. R. West, Basic Solid State Chemistry, 2nd edition
12. U. Schubert and N. Husing, Synthesis of Inorganic Materials, Wiley VCH (2000)
13. M. C. Day and J. Selbin, Theoretical Inorganic Chemistry, Reinhold, EWAP
14. A. H. Hanney, Solid State Chemistry, A. H. Publications
15. O. A. Phiops, Metals and Metabolism
16. Cullen Dolphin and James, Biological aspects of Inorganic Chemistry
17. Williams, An Introduction to Bioinorganic Chemistry
18. M. N. Hughes, Inorganic Chemistry of Biological Processes
19. Ochi, Bioinorganic Chemistry
20. John Wulff, The structure and properties of materials
21. L. V. Azoroff, J. J. Brophy, Electronic processes in materials, Mc Craw Hill
22. F. A. Cotton, R. G. Wilkinson. Advanced Inorganic chemistry
23. William L. Jolly, Modern Inorganic Chemistry
24. Manas Chanda, Atomic Structure and Chemical bonding
25. N. N. Greenwood and A. Earnshaw, Chemistry of elements,. Pergamon
26. Chakraborty, Solid State Chemistry, New Age International
27. S. J. Lippard, J.M . Berg, Principles of bioinorganic Chemistry, Univ. Science books.
28. G. L. Eichhorn, Inorganic Biochemistry, Vol I and II, Elsevier
29. Progress Inorganic chemistry , Vol 18 and 38, J. J. Lippard, Wiley

### **Organic Chemistry**

1. A guide book to mechanism in Organic chemistry (Orient-Longmans)- Peter Sykes
2. Organic Reaction Mechanism (Benjamin) R. Breslow
3. Mechanism and Structure in Organic chemistry (Holt Reinh.)B. S. Gould.
4. Organic Chemistry(McGraw-Hill)Hendrikson, Cram and Hammond.
5. Basic principles of Organic Chemistry (Benjamin) J. D.Roberts and M. C. Caserio.
6. Reactive Intermediates in Organic Chemistry (John Wiley)N. S. Issacs.
7. Stereochemistry of Carbon compounds. (McGraw-Hill)E.L.Eliel
8. Organic Stereochemistry (McGraw-Hill) by Hallas.

9. Organic Reaction Mechanism (McGraw-Hill) R. K. Bansal.
10. Organic Chemistry- R. T. Morrison and R. N. Boyd,(Prentice Hall.)
11. Modern Organic Reactions(Benjumin) H. O. House.
12. Principle of organic synthesis- R.O.C. Norman and J. M. Coxon.(ELBS)
13. Reaction Mechanism in Organic Chemistry- S. M. Mukharji and S. P. Singh.
14. Stereochemistry of Organic compoundsc) D. Nasipuri.
15. Advanced Organic Chemistry (McGraw-Hill) J. March.
16. Introduction to stereochemistry(Benjumin) K. Mislow.
17. Stereochemistry by P. S. Kalsi (New Age International)

### **Physical Chemistry**

1. Physical Chemistry – P. W. Atkins, Oxford University press, 8th edition, 2006.
2. Text book of Physical Chemistry – S. Glasstone.
3. Principles of Physical Chemistry – Marron and Pruton.
4. Physical Chemistry – G. M. Barrow, Tata-McGraw Hill, Vth edition, 2003.
5. Thermodynamics for Chemists – S. Glasstone, D. Van Nostrand , 1965.
6. Thermodynamics: A Core Course- R. C. Srivastava, S. K. Saha and A. K. Jain, Prentice-Hall of India, IInd edition, 2004.
7. Elements of statistical thermodynamics - L. K. Nash, 2nd Ed. Addison Wesley 1974.
8. Theoretical Chemistry: An introduction to quantum mechanics, statistical mechanics, and molecular spectra for chemists - S. Glasstone, D. Van Nostrand Company, Inc., 1944.
9. An Introduction to Statistical Thermodynamics – T.L. Hill, Addison-Wesley. 1960.
10. Statistical Mechanics – Donald A. McQuarrie, 2000.
11. Physical chemistry of surfaces – A. W. Adamson, 4th Ed. John Wiley, 1982.
12. Introduction to Colloid and Surface Chemistry – D. Shaw, Butterworth Heinemann, 1992.
13. Surface Activity: Principles, Phenomena and Applications (Polymers, Interfaces and Biomaterials) – K. Tsujii, 1st Ed. Academic Press, 1998.
14. Biophysical Chemistry – J.P. Allen, Wiley-Blackwell, 2008.
15. Biophysical Chemistry – A. Cooper, RSC, 2004.
16. Thermodynamics of Biochemical Reactions – R.A. Alberty, Wiley-Interscience, 2003.
17. Textbook of Biophysical Chemistry – U.N. Dash, McMillan India, 2006.

### **Analytical Chemistry**

1. Analytical Chemistry: (J.W) G. D. Christain
2. Introduction to chromatography : Bobbit
3. Instrumental Methods of analysis (CBS)- H.H . Willard, L.L. Mirrit, J.A. Dean
4. Instrumental Methods of Analysis : Chatwal and Anand
5. Instrumental Methods of Inorganic Analysis(ELBS) : A.I. Vogel
6. Chemical Instrumentation: A Systematic approach- H.A. Strobel
7. The principals of ion-selective electrodes and membrane transport: W.E.Morf
8. Physical Chemistry – P.W.Atkins
9. Principal of Instrumental Analysis- D. Skoog and D.West

10. Treatise on Analytical Chemistry: Vol I to VII – I.M. Kolthoff
11. Computer, Fundamentals-P.K.Sinha
12. Programming in BASIC : E. Balaguruswamy
13. Computer programming made simple : J.Maynard.

**Section - II**

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

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## **Computer Science**

### **Research Methodology (Section I)**

(50% Part of Entrance Examination for Ph.D. Admission)

#### **Unit 1: Fundamentals of Research**

Aims and objectives of research, Types of research – basic, novel and applied research.

Tools for searching research topic – books, journals, internet, discussions etc.

Research hypothesis, Steps in research design.

#### **Unit 2: Research Aptitude**

Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics.

Ethics in research – plagiarism

#### **UNIT 3: Research Methods**

Data pre-processing, Design and Analysis of algorithm, Algorithm optimization, Design patterns

#### **UNIT 4: Research tools & Techniques**

Cloud Computing, Big Data, Machine Learning, Open Source Software (Weka and R)

#### **Reference Book:**

**Research Methodology** Methods and Techniques, C. R. Kothari, II<sup>nd</sup> revised edition, New Age International Publishers Pvt Ltd, New Delhi, 2004.

2. Syllabus for SET Examination Part I

#### **Reference:**

1. R.C.Kothari , Research Methodology, New Age international Publisher, Third Edition
2. A.A.Puntambekar, Design And Analysis Of Algorithms, Technical Publications, First Edition, 2010
3. Rajesh Kumar Arora, Optimization: Algorithms and Application, CRC Press,2015
4. Eric Freeman, Elisabeth Robson, Head First Design patterns, O'Reilly Publication, 1<sup>st</sup> edition, Oct 2004
5. Judith Hurwitz, Robin Bloor, Marcia Kuafman, Fern Halper , Cloud Computing for Dummies, Wiley Publishing, Inc, 2010
6. Kailas jayaswal, jagannath kallakurchi,Donald, Dr. Devan shasha- Cloud computing black book-Kongent dreamtech Press,2015
7. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers

8. Rajkumar Buyya, Christian Vechhiola, S.Thamarai Selvi , “Mastering Cloud Computing “, McGraw Hill Education (India) Private Limited
9. Rajkumar Buyya, James Broberg and Andrzej M.goscinski, “Cloud computing:
10. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015
11. Tom White, Hadoop: The Definitive Guide, O’Reilly, 3rd edition
12. Ryszard Michalski, Gheorghe Tecuci, Machine Learning- A multi strategy approach 1<sup>st</sup> edition, Feb 1994
13. Michael J Crawley, The R Book, 2<sup>nd</sup> Edition, Wiley Publication,
14. Data Mining concepts and techniques - Jiawei Han and Micheline Kamber , Third Edition, Morgan Kaufmann Publishers, 2012
15. Data Mining: Introductory and Advanced Topics - Margaret H. Dunham, Pearson education,2006

## **Section - II**

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

# **Electronics**

## **Research Methodology (Section I)**

(50% Part of Entrance Examination for Ph.D. Admission)

### **Unit 1: Fundamentals of Research**

Aims and objectives of research, Types of research – basic, novel and applied research.

Tools for searching research topic – books, journals, internet, discussions etc.

Research hypothesis, Steps in research design.

### **Unit 2: Research Aptitude**

Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics.

Ethics in research – plagiarism

### **Unit 3: Research Methods**

Error analysis pertaining to sensor and systems, Precision, Resolution, Accuracy, Reliability issues related to instrumentation, Statistical analysis of device and system characteristics in Electronics, Energy and power issues of Electronic systems, Modeling, simulation, prototyping of Electronic systems

### **Unit 4: Research tools & Techniques**

Matlab / Scilab, NS3, IE3D, HFSS, Xilinx Web pack, Xilinx EDK, Eclipse for mobile app development, Cloud computing tools, Electronics Workbench, PSPICE/HPSPICE++

### **Reference Book:**

**Research Methodology** Methods and Techniques, C. R. Kothari, II<sup>nd</sup> revised edition, New Age International Publishers Pvt Ltd, New Delhi, 2004.

### **2. Syllabus for SET Examination Part I**

### **References:**

1. Research Methodology: Methods and Techniques, C. R. Kothari, New age international.
2. Getting Started with MATLAB, Seventh edition by Rudra Pratap, Oxford University press
3. IE3D/ HyperLynx manual
4. ISE 10.1 Quick Start Tutorial,  
<https://www.xilinx.com/itp/xilinx10/books/docs/qst/qst.pdf>
5. Embedded System Tools Reference Manual,  
[https://www.xilinx.com/support/documentation/sw\\_manuals/edk10\\_est\\_rm.pdf](https://www.xilinx.com/support/documentation/sw_manuals/edk10_est_rm.pdf)
6. Introduction to PSpice using OrCAD for circuits and electronics, M. H. Rashid, Pearson/Prentice Hall, 2004

## **Section - II**

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**



# Physics

## **Research Methodology (Section I)**

(50% Part of Entrance Examination for Ph.D. Admission)

### **Unit 1: Fundamentals of Research**

Aims and objectives of research, Types of research – basic, novel and applied research.

Tools for searching research topic – books, journals, internet, discussions etc.

Research hypothesis, Steps in research design.

### **Unit 2: Research Aptitude**

Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics.

Ethics in research – plagiarism

### **Unit 3: Research Methods:**

Synthesis techniques: Chemical bath deposition, Spray Pyrolysis, Electrodeposition, SILAR, Spin coating, deep coating, Hydrothermal, Solvothermal, Types of RF receivers, Antennas, Magnetometer

### **Unit 4: Research tools & Techniques:**

XRD, SEM, FESEM, AFM, DTA, TGA, Raman, Hall effect, UV-VIS-near IR, microwave, Numerical techniques & error analysis, nuclear detectors, satellites & spacecraft for space applications, SOHO, SDO and GOES

### **Reference Book:**

**Research Methodology** Methods and Techniques, C. R. Kothari, II<sup>nd</sup> revised edition, New Age International Publishers Pvt Ltd, New Delhi, 2004.

2. Syllabus for SET Examination Part I

### **Reference Books:**

1. Basic Microwave Techniques & Laboratory manual – M. L. Sisotia
2. Antenna theory, analysis & Design – C. A. Balanis
3. Nuclear Detectors – J. F. Kenoll
4. Research methods & techniques – C. R. Kothari
5. Holography & its applications – P. Hariharan
6. Elements of X-ray diffraction – B. D. Cullity
7. Atomic & molecular spectroscopy – Bandwell

## **Section - II**

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

# **Statistics**

## **Research Methodology (Section I)**

(50% Part of Entrance Examination for Ph.D. Admission)

### **Unit 1: Fundamentals of Research**

Aims and objectives of research, Types of research – basic, novel and applied research.

Tools for searching research topic – books, journals, internet, discussions etc.

Research hypothesis, Steps in research design.

### **Unit 2: Research Aptitude**

Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics.

Ethics in research – plagiarism

### **Unit 3: Research Methods**

Combinatorics, Elementary calculus and matrix theory, Methods of data collection, Methods for data analysis, , Method for goodness of fit, Methods based on likelihood principle and Bayesian approach, Numerical methods for finding roots of linear and nonlinear equations, Numerical methods for solving system of equations, Numerical integral.

### **Unit 4: Research Tools and Techniques**

Analytical and simulation techniques for performance evaluation of various statistical procedures in statistical modeling and inference, exploratory data analysis tools, Bootstrap and Jackknife techniques, Algorithms, Data analysis using MS-Excel

### **Reference Book:**

**Research Methodology** Methods and Techniques, C. R. Kothari, II<sup>nd</sup> revised edition, New Age International Publishers Pvt Ltd, New Delhi, 2004.

2. Syllabus for SET Examination Part I

### **References:**

1. Atkinson, K. E. (1989). An Introduction to Numerical Analysis, Wiley.
2. Casella, G. and Berger, R. L. (2001). Statistical Inference, 2<sup>nd</sup> Edition, Duxbury press. Devroye, L. (1986). Non- Uniform Random Variate Generation, SpringerVerlag, NewYork.
3. Dudewicz, E. J. and Mishra, S. N. (1988). Modern Mathematical Statistics, John Wiley & Sons.
4. Efron, B. and Tibshirani. R. J. (1994). An Introduction to the Bootstrap, Chapman and Hall.
5. Lehmann, E. L. (1983). Theory of Point Estimation, John Wiley & sons. Morgan, B. J. T. (1984). Elements of Simulation, Chapman and Hall.

6. Mukhopadhyay, P. (2015). Mathematical Statistics, Books and Allied (p) Ltd.
7. Rao, A. R. and Bhimasankaram P. (2000), Linear Algebra, 2<sup>nd</sup> edition, Hindustan BookAgency.
8. Rohatgi, V. K. and Saleh, A. K. MD. E. (2015). Introduction to Probability Theory and Mathematical Statistics -3<sup>rd</sup> Edition, John Wiley & sons.
9. Rubinstein, R. Y. (1998). Modern Simulation and Modeling, Wiley Series in Probabilityand Statistics.
10. Taha, H. A. (1971). Operational Research and Introduction, Macmillan. Tukey, J. W. (1977). Exploratory Data Analysis, Pearson.

## Section - II

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

## **Zoology**

### **Research Methodology (Section I)**

(50% Part of Entrance Examination for Ph.D. Admission)

#### **Unit 1: Fundamentals of Research**

Aims and objectives of research, Types of research – basic, novel and applied research.

Tools for searching research topic – books, journals, internet, discussions etc.

Research hypothesis, Steps in research design.

#### **Unit 2: Research Aptitude**

Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics.

Ethics in research – plagiarism

#### **Unit 3: Research Methods**

- a) Formulating a research problem, scientific statement
- b) Experimentation: Roles and limitations, Natural experiments, manipulative experiments, comparative experiments
- c) Validity, reliability, uncertainty in research, statistical analysis

#### **Unit 4: Research tools & Techniques**

- a) Immunochemical techniques
- b) Centrifugation techniques
- c) Electrophoretic techniques
- d) Chromatographic techniques
- e) Microscopy- compound, fluorescence, phase contrast, electro microscope.

#### **Reference Book:**

**Research Methodology** Methods and Techniques, C. R. Kothari, II<sup>nd</sup> revised edition, New Age International Publishers Pvt Ltd, New Delhi, 2004.

2. Syllabus for SET Examination Part I

#### **References:**

1. Research methodology : The aims, practices and ethics of science By Peter Pruzan-Springer
2. Principles and Techniques of Biochemistry and Molecular Biology by Keith Wilson and John Walker.

#### **Section - II**

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

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## **Subject - Economics**

### **Section - I Research Methodology**

(50% Part of Entrance Examination for M. Phil. & Ph.D. Admission)

#### **Unit-I Fundamentals of research-**

Meaning, Objectives, Research process, Methods and Methodology, Criteria of good research

#### **Unit-II Types of Research-**

Pure research, applied research, Exploratory Research, Descriptive research, Diagnostic research, Quantitative and Qualitative research etc.

#### **Unit-III Research Design-**

Meaning, Need, Types of research design-Exploratory Research Design, components of research design and features of good research design.

#### **Unit-IV Collection and Analysis of Data:**

Types of data, Methods of data collection- Interview Method, Mailing Method, Observation Method, Survey Method etc.; Primary and secondary sources of data, Sampling- meaning and methods, Classification and Tabulation, Graphical presentation.

#### **Unit-V Presentation of Research:**

Citation Styles- APA, MLA etc., Research ethics and Plagiarism, Report writing- steps in report writing, layout of report writing, reference and bibliography.

#### **Reference Books:**

- 1) George J. (1964), The Science of Education Research, Eurasia Publishing House, New Delhi
- 2) William Philip at. Al (1973), Evaluation and Assessment of educational Studies: A third level course methods of educational enquiry, The Open University Press, Walton Hall Blethaley Buckinghamshire
- 3) Mariampolski H. (2001) Qualitative Market Research – A Comprehensive Guide Sage Publication, India Ltd, New Delhi
- 4) Black Thomas (2001), Understanding Social Science Research, Sage Publication, India Ltd, New Delhi.
- 5) Fern Edward F.(2001) Advanced focus Group Research, Sage Publication, IndiaLtd, New Delhi
- 6) Michael V.P., ‘Research Methodology in Management’, Himalaya PublishingHouse, New Delhi.
- 7) Krishnaswami O.R. and Ranganatham M., ‘Methodology of Research in Social Sciences’, Himalaya Publishing House, New Delhi.
- 8) Kothari C.R., ‘Research Methodology – Methods and Techniques’, New Age International Publishers
- 9) Pauline V. Young, ‘Scientific Social Surveys and Research’, Prentice-Hall of Indian Pvt. Ltd., New Delhi.
- 10) Sachdeva J.K., Business Research Methodology, Himalaya Publishing House, 2<sup>nd</sup> revised, 2011.
- 11) Sadhu and Singh, Research Methodology in Social Sciences, HimalayaPublishing House, Mumbai.

- 12) Wilkinson and Bhandarkar (2002), Methodology and Techniques of Social Research.
- 13) Barker, Nancy and Nancy Huling (2000), A Research Guide for Under Graduate Students: English and American Literature, New York: Norton
- 14) Miller, R. H. (1995), Handbook of Library Research, Meghuen.
- 15) Rengachari, S. & Rengachari, Sulochana, Research Methodology for English Literature, Bareilly
- 16) Sinha, M. P., Research Methods in English.

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**Section - II**

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

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## **Education**

### **Section I**

(50% of M. Phil. & Ph.D. (Education) Entrance Examination Syllabus on Research Methodology)

#### **Research Methodology**

Kinds of educational research: basic & applied research, evaluation research and action research, and their characteristics.

Sources of knowledge generation:

Planning the research study:

Identification and conceptualization of research problem: statement of problem, purposes, and research questions in qualitative and quantitative research. Formulation of Hypotheses.

Preparation of a research proposal; framework of the research proposal and strategies for writing the research proposals.

#### **Quantitative and Qualitative Methods of Research**

Types of Research: survey studies, descriptive studies, co-relational studies, developmental studies, comparative studies, casual-comparative and co-relational research; cross-sectional, longitudinal and retrospective.

Experimental Research

Experimental Research designs

Naturalistic enquiry : case studies and grounded theory.

Historical Research

Mixed Research

Sampling in Qualitative, Quantitative and Mixed Research

Concept of population and its type, sampling unit, Sampling frame, sample size, sampling error, representative and biased samples.

Random sampling techniques : simple random sampling, systematic

sampling, stratified random sampling, cluster sampling, and multi-stage sampling.

Non Random Sampling Techniques, convenience sampling, purposive

sampling, quota sampling, snowball sampling, theoretical sampling, incidental and critical case.

Methods of Data Collection – a) Tests, inventories and scales: types and construction and uses, identifying tool using reliability and validity information.

b) Questionnaire: forms, principles of construction and their scope in educational research, administration of questionnaires.

c) Interview : types, characteristics and applicability, guidelines for

conducting interviews d) Qualitative process and quantitative process, observation: use of the checklist and schedules, time sampling, field notes, role of researcher during observation, focus group discussion.

Descriptive Analysis of Quantitative Data: a) Data types: Nominal, Ordinal, Interval and Ratio Scale, data levels: Individual and group graphical representation

of data. b) Description and comparison of groups: measures of central tendencies and dispersion, assumptions, uses and interpretation. c) Normal distribution: theoretical and empirical distributions, deviation from normality and underlying causes, characteristics of normal probability curve and its applications. d) Relative positions: percentile rank z-scores. e) Correlation Coefficient

#### Inferential Analysis of Quantitative Data

a) Estimation of a parameter – Concept of parameter and statistics,

Sampling error, sampling distribution, standard error of mean. b) Testing of hypotheses – testing of null hypotheses, types of error, levels of significance, testing the significance of difference between the following statistics for independent and correlated samples: Proportions, means (including small samples) and variances. c) Analysis of variance and co-variance (ANOVA and ANCOVA) d) Non-parametric statistics

Data Analysis in Qualitative and Mixed Research : Data reduction, data display, conclusion drawing and verification, removing, categorization and clarification, analysis of visual data, enumeration, identifying relationship among categories, context analysis, corroborating, establishing credibility.

## Section - II

### **50% of M.Phil & Ph. D. (Education) Entrance Examination Syllabus based on compulsory Subject at post Graduate level.**

#### **Philosophy of Education**

Interdisciplinary Nature of Education – relationships with disciplines/subjects such as Philosophy, Psychology, Sociology, Management, Economics and Anthropology

Interrelationship between philosophy & Education

Indian Schools of Philosophy - Vedic, Buddhist, Jainism, Islamic

Western Schools of Philosophy - Idealism, Naturalism, Pragmatism, Realism

Contribution of Swami Vivekananda, Rabindranath Tagore, Mahatma Gandhi, J. Krishnamurthy, Aurobindo to educational thinking.

Contribution of Plato, Rousseau, Dewey to educational thinking

Contemporary challenges of School Education

RTE – 2009 and Issues related to its implementation.

Equality and Equity in Education

Process of socialization and acculturation of the child – critical appraisal of the role of the school, parents, peer group and the community

Globalisation and Challenge before Education at different levels.

Impact of Globalisation on Knowledge, Skill and attitude

#### **Psychology of Education**

Learner and its development - Definition of learner, approaches for learning: Knowledge centeredness, Learner centeredness, Environmental centeredness and Assessment centeredness

Individual differences and its causes - socio - cultural and economic context



Learning Environment - Physical environment instructional time, discipline and participatory management

Cognition and Learning: cognitive process - perception attentionmemory development of concept, logical reasoning, critical thinking, problems solving

Concept and principles of brain based learning

Role of motivation and approaches to motivation: humanistic and cognitive

Diversity in learning path and learning styles

Learning disabilities

Dynamics of Individual Development

Dynamics of Social Development and Group Dynamics

Mental Health and Adjustment

Multiple Intelligences,

Human Development Index

Neuropsychology of Learning

### **Teacher Education**

The need and importance of Teacher Education

Meaning, Nature, Scope of Teacher education

Aims and Objectives of teacher Education at different level

Pre-service and in-service teacher education : concept, nature, objectives and scope.

Need for pre-service and in service professional education of teachers at different levels in the present Indian situation.

Issues, concerns and problems of pre-service and in-service teacher education at secondary and senior secondary level.

Co-relationship of College of Education with Co-operating Schools

Evaluation procedures in Teacher Education

Teaching as a profession

Teacher Thought Process

Need of Research in Teacher Education

Current problems of Teacher Education

Teacher Education and National Curriculum Frameworks

Types of Teacher Education Programmes and Agencies:

Agencies of Teacher Education- UGC, NCTERT, SCERT, Colleges of Teacher Education, Open University.

Development of teacher education in India at secondary and senior secondary level, recommendations of various commissions and committees concerning teacher education system. Impact of NPE, 1986 and its POA on teacher education system

Roles, functions and networking of institutions like UGC, NCERT, NCTE, NUEPA, SCERTs etc.

CCE in Teacher Education.

Formative and summative evaluation; norm referenced and criterion reference evaluation in teacher education.

Assessment of teaching proficiency: criteria, tools and techniques.

Structure of MIS school mapping at secondary level

### **Educational Technology**

Meaning & Scope of Educational Technology

Interdisciplinary and Multidisciplinary approach to ET

Transactional usage of educational technology: integrated, complementary, supplementary, standalone (independent).

Major institutions of educational technology in India – CIET, EMMRC (AVRC, EMRC and MCRC), IGNOU, SIET, Consortium for Educational Communication (CEC), UGC, their role in education.

Components of Educational technology software and hardware.

Modalities of Teaching

Instructional Design System

Designing of Instructional strategies, such as lecture, team teaching, discussion, panel discussion, seminars & tutorials.

Systems Approach to Education and its Components: Goal Setting, Task Analysis. Content Analysis, Context Analysis and Evaluation Strategies.

Education and Training : Face-to-Face, Distance and other alternative modes

Overview of Models of Instructional Design – ADDIE Model; Instructional Design or Competency Based Teaching : Models for Development of Self Learning Material,

Review of Researches on Instructional Design.

### **Information Communication Technology**

Interdisciplinary and Multidisciplinary approach to ICT

Communication Modes in education

Word Processors and Word Processing, Spreadsheets, Databases, Presentations, Digital Media, Graphics, Photographs, Animation, Audio and Video in the digital context; Sourcing, digitizing and using; Educational applications of digital media.

Online Learning, online courses and learning management systems

Use of ICT in Research,

ICT for Teaching Learning Process

Multimedia concept and meaning text, graphics, animation, audio, video

Web Resources for research, Blog and Professional Forum.

Multimedia applications

Educational software applications

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## **English**

### **Research MethodologySection I**

(50% Part of Entrance Examination for M. Phil. & Ph.D. Admission)

#### **Unit-I Fundamentals of research-**

Meaning, Objectives, Research process, Methods and Methodology, Criteria of good research

#### **Unit-II Types of Research-**

Pure research, applied research, Exploratory Research, Descriptive research, Diagnostic research, Quantitative and Qualitative research etc.

#### **Unit-III Research Design-**

Meaning, Need, Types of research design-Exploratory Research Design, components of research design and features of good research design.

#### **Unit-IV Methods, Collection and Analysis of Data:**

Types of data, Methods of data collection- Interview Method, Mailing Method, Observation Method, Survey Method etc.; Primary and secondary sources of data, Sampling- meaning and methods, Classification and Tabulation, Graphical presentation.

#### **Unit-V Presentation of Research:**

Citation Styles- APA, MLA etc., Research ethics and Plagiarism, Report writing- steps in report writing, layout of report writing, reference and bibliography.

#### **Reference Books:**

- 1) George J. (1964), The Science of Education Research, Eurasia Publishing House, New Delhi
- 2) William Philip at. Al (1973), Evaluation and Assessment of educational Studies: A third level course methods of educational enquiry, The Open University Press, Walton Hall Blethaley Buckinghamshire
- 3) Mariampolski H. (2001) Qualitative Market Research – A Comprehensive Guide Sage Publication, India Ltd, New Delhi
- 4) Black Thomas (2001), Understanding Social Science Research, Sage Publication, India Ltd, New Delhi
- 5) Fern Edward F. (2001) Advanced focus Group Research, Sage Publication, India Ltd, New Delhi
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- 7) Krishnaswami O.R. and Ranganatham M., 'Methodology of Research in Social Sciences', Himalaya Publishing House, New Delhi.
- 8) Kothari C.R., 'Research Methodology – Methods and Techniques', New Age International Publishers.
- 9) Pauline V. Young, 'Scientific Social Surveys and Research', Prentice-Hall of Indian Pvt. Ltd., New Delhi.
- 10) Sachdeva J.K., Business Research Methodology, Himalaya Publishing House, 2<sup>nd</sup> revised, 2011.
- 11) Sadhu and Singh, Research Methodology in Social Sciences, Himalaya Publishing House, Mumbai.
- 12) Wilkinson and Bhandarkar (2002), Methodology and Techniques of Social Research.
- 13) Barker, Nancy and Nancy Hulig (2000), A Research Guide for Under Graduate Students: English and American Literature, New York: Norton

- 14) Miller, R. H. (1995), Handbook of Library Research, Meghuen.
- 15) Rengachari, S. & Rengachari, Sulochana, Research Methodology for English Literature, Bareilly
- 16) Sinha, M. P., Research Methods in English.
- 17) Research Methodology, H. V. Deshpande.
- 18) Research in Literature: Philosophy, Areas and Methodology by Prin. H. V. Deshpande, 820, E, Shahupuri, 4<sup>th</sup> Lane, Kolhapur.

## **Section - II**

**maining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

## **Geography**

### **Research Methodology (Section I)**

(50% Part of Entrance Examination for Ph.D. Admission)

#### **Unit 1: Fundamentals of Research**

Aims and objectives of research, Types of research – basic, novel and applied research.

Tools for searching research topic – books, journals, internet, discussions etc.

Research hypothesis, Steps in research design.

#### **Unit 2: Research Aptitude**

Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics.

Ethics in research – plagiarism

#### **Unit 3: Research Methods:**

- i) Nature and types of Geographical Research. ii) Approaches of Geographical research and research problem. iii) Types and sources of data and data collection. iv) Processing and analysis of data. v) Role of computers in Geographical research.

#### **Unit 4: Research Tools and Techniques**

- i) i) Importance of statistics in Geography ii) Geographical Information system. iii) Indian Toposheet – History, type, importance. iv) Meaning and application of remote sensing. v) Importance of cartography vi) Methods of survey and their types. vii) Importance of weather instruments with structure and features.
- ii) Cartographic Techniques: Map Scale and their types, Direction, Scale conversion. Legends, Enlargement and Reduction of Maps
- iii) SOI: Indexing, Conventional Signs and Symbols, References. Contours. Slope. Drainage Pattern  
Types of Geographical Data  
Analytical methods (Mean, Median, Variance, Standard Deviation, Skewness and Kurtosis.)  
Concept of Probability (Methods of Determination)  
Time Series Analysis, Correlation and Regression  
Testing of Hypothesis (Parametric and Non-Parametric Tests)
- iv) Basics of Computer (input and Output Devices)

Map and figures Making Tools and Functions

Use of Excel Software

Excel software; Data Analysis and Graphical Representation.

- v) Basic Concepts: Spectrum, Spectral Quantities, EMR, Laws of Radiation, Concept of Blackbody radiation, Spectral Signatures, Scattering, Absorption, Refraction, Path

Radiance Reflection, Transmission, Absorption, Scattering,  
Surfaces, Atmospheric Windows

Basics of Ariel Photography, Basics of Satellite Remote Sensing

### Reference Book:

**Research Methodology** Methods and Techniques, C. R. Kothari, II<sup>nd</sup> revised edition, New Age International Publishers Pvt Ltd, New Delhi, 2004.

### 2. Syllabus for SET Examination Part I

### References:

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- Das P. K. : The Mansoon, Prayag pustak Bhavan, Allahabad.
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- Misra R. P.: Regional Planning, concepts, New Delhi.
- Clark, J. I. (1972): Population Geography. Pergamon Press, Oxford.
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- Trewartha, G.T. (1959): A Geography of Population-World Patterns. John Wiley & Sons Inc. New York.
- Sing R. L. (1996): Map Work & Practical Geography, Central Book Dept. Allahabad.
- Singh & Kanaujia (1973): Map Work & Practical Geography, Central Book Dept. Allahabad.
- N. N. Basak (1994): Surveying and Leveling, Tata McGraw Hill Publishing Company LTD., New Delhi.
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- Campbell, J.B., and Wynne, R.H. (2011): Introduction to Remote Sensing (5th Ed.), Guilford Press, New York, 667pp.
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- Savinder Singh (1991): Environmental Geography. Prayag Pustak Bhavan, Allahabad.
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- Bhatia B.M. (1977): Poverty Agriculture & Economic Growth, Vikas New Delhi.
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#### **Section - II**

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

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# **Hindi**

## **Research Methodology**

### **Section I**

(50% Part of Entrance Examination for M. Phil. & Ph.D. Admission)

#### **Unit-I Fundamentals of research-**

Meaning, Objectives, Research process, Methods and Methodology, Criteria of good research

#### **Unit-II Types of Research-**

Pure research, applied research, Exploratory Research, Descriptive research, Diagnostic research, Quantitative and Qualitative research etc.

#### **Unit-III Research Design-**

Meaning, Need, Types of research design-Exploratory Research Design, components of research design and features of good research design.

#### **Unit-IV Methods, Collection and Analysis of Data:**

Types of data, Methods of data collection- Interview Method, Mailing Method, Observation Method, Survey Method etc.; Primary and secondary sources of data, Sampling- meaning and methods, Classification and Tabulation, Graphical presentation.

#### **Unit-V Presentation of Research:**

Citation Styles- APA, MLA etc., Research ethics and Plagiarism, Report writing-steps in report writing, layout of report writing, reference and bibliography.

Reference Books:

- 1) George J. (1964), The Science of Education Research, Eurasia Publishing House, New Delhi
- 2) William Philip at. Al (1973), Evaluation and Assessment of educational Studies: A third level course methods of educational enquiry, The Open University Press, Walton Hall Blethaley Buckinghamshire
- 3) Mariampolski H. (2001) Qualitative Market Research – A Comprehensive Guide Sage Publication, India Ltd, New Delhi
- 4) Black Thomas (2001), Understanding Social Science Research, Sage Publication, India Ltd, New Delhi
- 5) Fern Edward F.(2001) Advanced focus Group Research, Sage Publication, India Ltd, New Delhi
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- 7) Krishnaswami O.R. and Ranganatham M., 'Methodology of Research in Social Sciences', Himalaya Publishing House, New Delhi.
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- 13) Barker, Nancy and Nancy Hulg (2000), A Research Guide for Under Graduate Students: English and American Literature, New York: Norton
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- 15) Rengachari, S. & Rengachari, Sulochana, Research Methodology for English Literature, Bareilly
- 16) Sinha, M. P., Research Methods in English.
- 17) Research Methodology, H. V. Deshpande.

Additional Reference books for Hindi:

- 1 I fgr; d vuq dku ds vk; ke & MKW jfomz dækj t s
- 2 'kæk ifu/kh & MKW fou; ekgu 'kekZ
- 3 vuq dku dk Lo: i & I æk MKW I kfo=h fl Ugk
- 4 vuq dku dh ifdz k & I æk MKW I kfo=h fl Ugk vkj MKW fot; mz Lkukrd idk'ku & jktdey idk'ku] ukxh idk'ku] uMkuy ifcyf'kæ gkÅI ] U; qfnYyh-

Note:

The question paper of Hindi syllabi shall be translated in Urdu for candidates who are appearing for Urdu medium.

## Section - II

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

## **Subject - History**

### **Section-I**

#### **Research Methodology**

(50% Part of Entrance Examination for M. Phil. & Ph.D. Admission)

#### **Unit-I Fundamentals of research-**

Meaning, Objectives, Research process, Methods and Methodology, Criteria of good research

#### **Unit-II Types of Research-**

Pure research, applied research, Exploratory Research, Descriptive research, Diagnostic research, Quantitative and Qualitative research etc.

#### **Unit-III Research Design-**

Meaning, Need, Types of research design-Exploratory Research Design, components of research design and features of good research design.

#### **Unit-IV Collection and Analysis of Data:**

Types of data, Methods of data collection- Interview Method, Mailing Method, Observation Method, Survey Method etc.; Primary and secondary sources of data, Sampling- meaning and methods, Classification and Tabulation, Graphical presentation.

#### **Unit-V Presentation of Research:**

Citation Styles- APA, MLA etc., Research ethics and Plagiarism, Report writing- steps in report writing, layout of report writing, reference and bibliography.

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- 6) Michael V.P., ‘Research Methodology in Management’, Himalaya Publishing House, New Delhi.
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- 15) Rengachari, S. & Rengachari, Sulochana, Research Methodology for English Literature, Bareilly
- 16) Sinha, M. P., Research Methods in English.

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## **Section - II**

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

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# **Marathi**

## **Research Methodology**

### **Section I**

(50% Part of Entrance Examination for M. Phil. & Ph.D. Admission)

#### **Unit-I Fundamentals of research-**

Meaning, Objectives, Research process, Methods and Methodology, Criteria of good research

#### **Unit-II Types of Research-**

Pure research, applied research, Exploratory Research, Descriptive research, Diagnostic research, Quantitative and Qualitative research etc.

#### **Unit-III Research Design-**

Meaning, Need, Types of research design-Exploratory Research Design, components of research design and features of good research design.

#### **Unit-IV Methods, Collection and Analysis of Data:**

Types of data, Methods of data collection- Interview Method, Mailing Method, Observation Method, Survey Method etc.; Primary and secondary sources of data, Sampling- meaning and methods, Classification and Tabulation, Graphical presentation.

Physiological    ¼ekul"kkL=h;½]    Mythological    ¼vknhc/kkRed½]    Phase wise  
¼dky[kaMkuq I kj½]    Performance Base¼iz;ksxthoh½]    Pathchikitsa ¼ikB;fpfdRlk½]

#### **Unit-V Presentation of Research:**

Citation Styles- APA, MLA etc., Research ethics and Plagiarism, Report writing-steps in report writing, layout of report writing, reference and bibliography.

#### **Reference Books:**

- 1) George J. (1964), The Science of Education Research, Eurasia Publishing House, New Delhi
- 2) William Philip at. Al (1973), Evaluation and Assessment of educational Studies: A third level course methods of educational enquiry, The Open University Press, Walton Hall Blethaley Buckinghamshire
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- 12) Wilkinson and Bhandarkar (2002), Methodology and Techniques of Social Research.
- 13) Barker, Nancy and Nancy Hulig (2000), A Research Guide for Under Graduate Students: English and American Literature, New York: Norton
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- 16) Sinha, M. P., Research Methods in English.
- 17) Research Methodology, H. V. Deshpande.

Additional Reference books for Marathi:

- 1 Hkk'kk o l kgr; l dksku [1] 2] 3
- 2 'wskfoKku dksk & nq dk- l r
- 3 l kgr; l eh'kk vlf.k ifjHkk'kk & ol r nkooj
- 4 i cak dl k fygkok & t; r oy.kdj
- 5 l dkskukph yskui/nrh & l - x- eky'ks @ fefym eky'ks
- 6 l dkskukps i/nrh'kkL= & j- ek- oj [k/s
- 7 'wskfucak i/nrh & fefym eky'ks

Additional Reference books for Sanskrit:

Elements of Research Methodology - K. C. Das, Chaukhamba Publications, Varanasi.

## Section - II

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

# Political Science

## Section - I

### Research Methodology

(50% Part of Entrance Examination for M. Phil. & Ph.D. Admission)

#### Unit-I Fundamentals of research-

Meaning, Objectives, Research process, Methods and Methodology, Criteria of good research

#### Unit-II Types of Research-

Pure research, applied research, Exploratory Research, Descriptive research, Diagnostic research, Quantitative and Qualitative research etc.

#### Unit-III Research Design-

Meaning, Need, Types of research design-Exploratory Research Design, components of research design and features of good research design.

#### Unit-IV Collection and Analysis of Data:

Types of data, Methods of data collection- Interview Method, Mailing Method, Observation Method, Survey Method etc.; Primary and secondary sources of data, Sampling- meaning and methods, Classification and Tabulation, Graphical presentation.

#### Unit-V Presentation of Research:

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- 16) Sinha, M. P., Research Methods in English.

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## Section - II

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

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# Psychology

## Section - I

### Research Methodology

(50% Part of Entrance Examination for Ph.D. Admission)

#### Unit-I Fundamentals of research-

Meaning, Objectives, Research process, Methods and Methodology, Criteria of good research

#### Unit-II Types of Research-

Pure research, applied research, Exploratory Research, Descriptive research, Diagnostic research, Quantitative and Qualitative research etc.

#### Unit-III Research Design-

Meaning, Need, Types of research design-Exploratory Research Design, components of research design and features of good research design.

#### Unit-IV Collection and Analysis of Data:

Types of data, Methods of data collection- Interview Method, Mailing Method, Observation Method, Survey Method etc.; Primary and secondary sources of data, Sampling- meaning and methods, Classification and Tabulation, Graphical presentation.

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## Section - II

**Remaining 50% shall be based on Compulsory Subjects (Subject Specific) of concerned Master's Degree Programme**

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## **All Commerce, Management Subjects**

(50% Part of Entrance Examination for M. Phil. & Ph.D. Admission)

### **Research Methodology**

#### **Section-I**

##### **Unit-I Fundamentals of research-**

Meaning, Objectives, Research process, Methods and Methodology, Criteria of good research

##### **Unit-II Types of Research-**

Pure research, applied research, Exploratory Research, Descriptive research, Diagnostic research, Quantitative and Qualitative research etc.

##### **Unit-III Research Design-**

Meaning, Need, Types of research design-Exploratory Research Design, components of research design and features of good research design.

##### **Unit-IV Collection and Analysis of Data:**

Types of data, Methods of data collection- Interview Method, Mailing Method, Observation Method, Survey Method etc.; Primary and secondary sources of data, Sampling- meaning and methods, Classification and Tabulation, Graphical presentation.

##### **Unit-V Presentation of Research:**

Citation Styles- APA, MLA etc., Research ethics and Plagiarism, Report writing-steps in report writing, layout of report writing, reference and bibliography.

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- 10) Pauline V. Young, 'Scientific Social Surveys and Research', Prentice-Hall of India Pvt. Ltd., New Delhi. **40**
- 11) Sachdeva J.K., Business Research Methodology, Himalaya Publishing House, 2<sup>nd</sup> revised, 2011.
- 12) Sadhu and Singh, Research Methodology in Social Sciences, Himalaya Publishing House, Mumbai.
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## **Section - II**

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