DEPARTMENT OF BIOCHEMISTRY
MAHARSHI DAYANAND UNIVERSITY, ROHTAK

Scheme of Examination of Pre-PhD (Course Work) Examination 2019

Paper No	Nomenclature	Theory	Internal assessment	Review Writing/ Presentations	Max Marks
19BCHPC1	Research Methodology	80	20	--	100
19BCHPC2	Biostatistics & Computers	80	20	--	100
19BCHPC3	Advanced Techniques in Biochemistry	80	20	--	100
19BCHPC4	Review Writing		20	80*	100
Grand Total					**400**

Internal assessment

Two assignments of 10 marks each

*** Review Writing**

Division of Marks:

Review Writing:	50
Presentation:	15
Discussion:	15

Total: **100 marks**

Head, Deptt. of Biochemistry

19BCHPC1 : Research Methodology

Note: Que. 1 will be compulsory and will cover the entire syllabus in the form of short questions. Que. 2 to 9 will include two questions from each unit and candidate will have to attempt one question from each unit. Overall, five questions to be attempted. All questions carry equal marks.

Max. Marks: 80 Max. Time: 3 hrs

Unit-I:

Research Methodology:- Meaning, Types, Objective, General Characteristics, Criteria of Good Research, Types of Research, Research methodology- Philosophical Background, Qualitative Approach, Quantitative Approach, Mixed-Methods, Criteria for Selecting a Research Approach. Motivation in Research, Hypothesis: Definitions, Nature, Functions and Importance, Developing the hypothesis.-

Unit-II:

Types of information and sources: primary and secondary sources, overview of research process-phases and steps. Research process planning and conducting. Sampling: Functions of Population and Sampling; Methods of Sampling; Characteristics of a Good Sample; Size of a Sample; Sample Cycle

Unit-III:

Scientific Writing: Scientific Document; Organization and writing of research paper, Types of Scientific Communication, short communications, monographs, technical and survey reports, Importance of publishing research paper. Plagiarism: Definition, UGC guidelines for plagiarism, Approach for using copyright and other resources

Unit-IV:

Concept & Meaning of Intellectual Property ; Major forms of IP: Copyright, Patent, Trade Marks, Designs, Geographic indication, Semi conductors, Plant varieties, Nature and Characteristics of Intellectual Property, Origin and Development of Intellectual Property, Kinds of Intellectual Properties Rights.

References:

1. Research Methodology: Methods And Techniques By Dr C R Kothari.

2. Research Methodology: An Introduction By Wayne Goddard and Stuart Melville

3. Research methodology: techniques and trends By Y.K. Singh

4. Experimental Design and Data Analysis for Biologists By Gerry P. Quinn and Michael J. Keough. Publisher: Cambridge University Press.

5. Fundamentals of Research Methodology for Health-care Professionals By Hilla Brink, Christa Van der Walt

BC-CW-2: Biostatistics and Computers

Note: Que. 1 will be compulsory and will cover the entire syllabus in the form of short questions. Que. 2 to 9 will include two questions from each unit and candidate will have to attempt one question from each unit. Overall, five questions to be attempted. All questions to carry equal marks.

Max. Marks: 80 Max. Time: 3 hrs

Unit-I:

Tests of significance – concepts of null and alternative hypothesis, level of significance, type-I and type-II errors – power of the test. Descriptive statistics- measures of central tendency and dispersion. Random variable and probability distribution functions. Coefficient of correlation & regression- single and multiple. Sampling methods and experimental designs in stats. Graphical presentation of results.

Unit-II:

Parametric Tests of large samples by z-test. Small sample tests- t-test. Analysis of categorical data by chi-square test. ANOVA- one way and two way techniques. Duncan's Multiple range test.

Unit-III:

Non-parametric tests: Wilcoxon signed rank test, Wilcoxon rank sum test (Mann-Whitney U test), Sign test, Runs test, Kruskal-Wallis H Test, Spearman's and Kendall rank correlations, Tukey-Duckworth test and Friedman test.

Unit-IV:

Basics of Computers- classification, computer system components (CPU, Input/output devices, internal memory i.e. RAM, ROM & Cache and external memory i.e. secondary storage devices). Operating Systems and Utility programs. Number systems, Flow charts in computing language, DOS internal and external commands. Computers networks. Network communication standards and communication devices. Computer security and safety- safeguards against unauthorized access and thefts. Web browsing and web sites.

References:

1. Biostatistics: A foundation for analysis in Health Sciences 9th Ed By Wayne W Daniel. John Wiley & Sons Inc.
2. Fundamentals of Biostatistics 7th Ed by Bernard Rosner. Brooks/Cole Cengage Learning.
3. Biostatistics By PN Arora and PK Malhan, Himalaya Publishing House.
4. Biostatistics: a guide to design, analysis and discovery By Ronald Forthofer, Eun Sul Lee and Michael Hernandez.
5. Experimental Design and Data Analysis for Biologists By Gerry P. Quinn and Michael J. Keough. Publisher: Cambridge University Press.
6. Fundamentals of Research Methodology for Health-care Professionals By Hilla Brink, Christa Van der Walt
7. Discovering Computers: Fundamentals (Paperback) by Gary B. Shelly. Publisher: Course Technology.
8. Discovering Computers: Fundamentals, Fourth Edition (Shelly Cashman) (Paperback) by Gary B. Shelly Thomas J. Cashman and Misty E. Vermaat. Publishers: Course Technology
9. Computer Fundamentals: Concepts, Systems and Applications By PK Sinha. BPB Publications.
10. Computer Fundamentals and Programming in C By JB Dixit. University Science Press.
11. Computer Fundamentals: Architecture and Organization (Paperback) by B. Ram. Publisher: New Age Publications (Academic)

19BCHPC4: Advanced Techniques in Biochemistry

Note: Que. 1 will be compulsory and will cover the entire syllabus in the form of short questions. Que. 2 to 9 will include two questions from each unit and candidate will have to attempt one question from each unit. Overall, five questions to be attempted. All questions to carry equal marks.

Max. Marks: 80 Max. Time: 3 hrs

Unit-I: Molecular biology & Bioinformatics

Gene Cloning, Screening and selection of recombinants clones, RFLP, RAPD, tRFLP analysis, Polymerase chain reactions, Site directed mutagenesis, De Novo Genome sequencing of Prokaryotes and Sequence analysis, protein-protein interactions, yeast two hybrid systems, pull down assay, reporter assays, searching in BLAST & FASTA, Multiple sequence alignment, phylogeny analysis, Structure database- Secondary structure prediction, Predicting 3D structure of proteins

Unit-II: Enzyme Technology

Immobilization of enzymes/proteins on organic and inorganic supports including artificial and natural membranes, Study of kinetic properties of immobilized enzymes, Co-immobilization of enzymes and their analytic applications, Construction of enzyme electrodes, Optimization and applications of enzymes electrodes.

Unit-III: Toxicology

Analytical and preparative methodology, Drug susceptibility testing: Minimum inhibitory conc., Disc diffusion, Spot assay, Time kill kinetics, Combinatorial drug testing, Hodge test, Drug-drug interactions, CYP interaction, inhibition and induction. Toxicokinetics and toxicodynamics, Transport and accumulation of xenobiotics, bioactivation of xenobiotics, xenobiotic-induced oxidative stress. Introduction to GLP/GMP and CRO.

Unit –IV: Biochemical Techniques

Centrifugation and its applications, purification of proteins using ion-exchange, gel-filtration and affinity chromatography, SDS-PAGE, western blotting, 2-D PAGE, isoelectric focusing, Mass spectrometry, HPLC. Preparation and processing of sample for electron microscopy, Fluorescence microscopy and immuno-histochemistry

References:

1. Bioinformatics: Methods & Protocols ***By*** Stephen Misener and Stephen Krawetz
2. Essential Bioinformatics ***By*** Jin Xiong
3. Gene cloning ***By*** TA Brown
4. Principles of Gene Manipulation and Genomics, ***By*** S.B. Primrose & Richard M. Twyman, Blackwell Publishing.
5. Molecular Biology of the Gene VI ***By*** Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R.
6. Handbook of Enzyme Biotechnology ***By*** Alan Wiseman
7. Nature of enzymology ***By*** RL Foster
8. Disinfection, sterilization, and preservation ***By*** Seymour Stanton Block
9. Pharmacodynamics and drug development: perspectives in clinical pharmacology ***By*** Neal R. Cutler, John J. Sramek, Prem K. Narang
10. Mechanistic toxicology: the molecular basis of how chemicals disrupt biological targets ***By*** Urs A. Boelsterli
11. Modern Experimental Biochemistry ***By*** Rodney Boyer
12. Principles & Techniques of Biochemistry and Molecular Biology ***By*** Keith Wilson and John Walker.
13. Immunohistochemistry: Basics and Methods ***By*** Igor B. Buchwalow, Werner Böcker