

Bharati Vidyapeeth Deemed University
Faculty of Engineering and Technology
Structure of Ph. D. Coursework
(With effect from Academic Year 2017-18)

Sr. No.	Subject	Teaching Scheme		Examination Scheme (marks)			Credits
		L	P/D	Theory Examination	Presentations	Total	
1	Paper –I: Research Methodology	4	-	100	-	100	04
2	Paper- II: Advances in Computer Engineering	4	-	100	-	100	04
3	i) Literature survey presentation	-	02	--	50	50	02
	ii) Presentation of idea of research*	-	02	--	50	50	02
Total		08	04	200	100	300	12

Note: *- The student will have to give presentation based on the literature survey and idea of research and shall submit copy of the presentation to the respective Head of the Constituent Unit which is his/her place of research.

BHARATI VIDYAPEETH DEEMED UNIVERSITY
FACULTY OF ENGINEERING AND TECHNOLOGY
Ph.D. Course-Work Syllabus

Paper-I
Research Methodology

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Lectures: 4 Hours/Week	Theory Examination: 100 Marks	Total Credits: 04
	Duration : 3Hrs	

Course Objectives:

- begin to formulate researchable problem in areas of research interest;
- write a research proposal or report;
- make appropriate choices about research strategies;
- review literature judiciously and systematically;
- understand and begin to apply the principles of collecting suitable data;
- understand and begin to conduct appropriate analyses of data;
- make appropriate choices about quantitative methods;
- demonstrate sensitivity to ethical issues raised by researchers;

Topics Covered

UNIT-I	Types and Characteristics of Research Definition and objectives of research, Characteristics of research, Types of research- Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, Overview of research methodology in various areas of engineering, Introduction to problem solving, basic research terminology such as proof, hypothesis, lemma etc., Role of information and communication technology(ICT) in research.	(6 Hours)
UNIT-II	Review of Literature Importance of literature review in defining a research problem, sources of literature, identifying the gap areas from the literature review Searching for publications: Publication databases, search engines and patent databases etc.	(6 Hours)
UNIT-III	Research Problem Formulation Research problem formulation, determine the scope, objectives, limitations and assumptions of the identified research problem, justify basis for assumption, developing the objectives Developing a research plan: Exploration, description, diagnosis and experimentation	(6 Hours)
UNIT-IV	Methods of Data Collection Static and dynamic characteristics of instruments used in experimental set up, calibration of various instruments, sampling methods, various methods of data collection, selection of appropriate method for data collection, data collection using a digital computer system, case studies of data collection.	(6 Hours)
UNIT-V	Inferential Statistics and Hypothesis Testing Data processing, data analysis strategies and tools, Basic concepts concerning testing of hypotheses, procedures of hypothesis testing, generalization and interpretation, Hypothesis testing: Z-test, T-test, Chi	(6 Hours)

	Square test, Analysis of variance (ANOVA) etc.	
UNIT-VI	Quantitative Methods and Applied Statistics Measurement of central tendency and dispersion, Probability distribution, Regression analysis, Parameter estimation, Multivariate statistics, Principal component analysis, moments and response curve methods, probable errors in research, error analysis, Hidden Markov Model (HMM)	(6 Hours)
UNIT-VII	Computer Applications Role of computers in research, maintaining literature data using software tools such as Mendeley, Endnote2 etc., tabulation and graphical presentation of research data, use of statistical software tools such as Excel, R, SPSS, GRETL, MINITAB etc. in research, use of word processing tools such as Latex, software tools for making effective presentation.	(6 Hours)
UNIT-VIII	Developing Research Report: Structure and components of scientific reports, types of report, developing research report. Thesis Writing: Different steps and software tools in the design and preparation of thesis, layout, structure and language of typical reports, Illustrations and tables, bibliography, referencing and footnotes. Oral Presentation: Creating and making effective presentation, use of visual aids, importance of effective communication.	(6 Hours)
UNIT-IX	Research Ethics and IPR Ethics: ethical issues in research, plagiarism tools and its importance. IPR: intellectual property rights and patent law, techniques of writing a Patent, filing procedure, technology transfer, copy right, royalty, trade related aspects of intellectual property rights.	(6 Hours)
UNIT-X	Publishing of research work Design of conference and journal research paper, design of review paper, effective way of writing abstract, introduction, result and discussion and conclusion in research papers, answering the queries of reviewers. Importance of publication in standard databases such as Scopus, Web of science etc., understanding of h-index, citation index and impact factor.	(6 Hours)

Text Books/References:

1.	Wayne Goddard, Stuart Melville, Research Methodology: An Introduction, Juta and Company Ltd, 2004
2.	Ranjit Kumar, Research Methodology: A Step by Step Guide for Beginners, SAGE publications Ltd., 2011.
3.	C. R. Kothari ,Research Methodology: Methods and Trends, New Age International, 2004
4.	S.D. Sharma , Operational Research, KedarNath Ram Nath& Co.,1972
5.	B.L.Wadehra, Law relating to patents, trademarks, copyright designs and geographical indications, Universal Law Publishing, 2014.
6.	Donald Cooper, Pamela Schindler, Business Research Methods, McGraw-Hill publication, 2005.
7.	T. W. Anderson, An introduction to Multivariate Statistical Analysis, Wiley Eastern Pvt. Ltd. New Delhi.
8.	A. Fink, Conducting Research Literature Reviews: from the internet to paper, Sage Publications, 2009
9.	R. A. Day, How to write and publish a scientific paper, Cambridge University Press, 1992

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FACULTY OF ENGINEERING AND TECHNOLOGY

Ph.D. Course-Work Syllabus

Paper-II Subject: Advances In Computer Engineering

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Lectures: 4 Hours/Week	Theory Examination: 100 Marks	Total Credits: 04
	Duration : 3 Hrs	

Topics Covered

UNIT-I	Discrete Mathematics and Data Structures Relation functions, Recursion relation, Probability and distribution, proof techniques, advanced data structures, advanced searching sorting techniques.	(06 Hours)
UNIT-II	Operating System Latest techniques of Memory management, Processor information, device and I/O activities, Mobile operating system, distributed operating system, Virtual machines.	(06 Hours)
UNIT-III	Computer Architecture Virtual and Cache memory, Optimization of cache performance, Secondary storage. I/O Organization. Advanced processor technology, VLIW and scalar architecture.	(06 Hours)
UNIT-IV	Advanced Computer Algorithms Analysis of Algorithms, Approximation algorithms, linear programming, Dynamic programming, Greedy Algorithms, Parallel algorithms.	(06 Hours)
UNIT-V	Software Engineering Software development methodologies, Software measures and metrics. Software architecture optimization methods, Automated Software Engineering Tools. Software Testing: Mobile application testing, Testing in the Agile Development, Fault prediction model.	(06 Hours)
UNIT-VI	Data Engineering Database Systems, Data Analytics, Big Data, Cloud Computing, Data Visualization, NoSQL Databases, Semantic Web, Business Intelligence.	(06 Hours)
UNIT-VII	Information Engineering Information Generation - Deep Learning, Information security and privacy. Metadata Governance. Information Storage - Distributed File Systems, storage virtualization, Converged storage infrastructure, Data centers.	(06 Hours)
UNIT-VIII	Knowledge Engineering Knowledge representation methods, reasoning, Artificial Neural Networks, Fuzzy logic, Machine learning, Natural Language	(06 Hours)

	processing, Information Retrieval systems. Applications of data mining, text mining.	
UNIT-IX	Computer Network & Network Security WSN, mobile Ad-hoc networks, IoT, Cloud Security, High speed 4G and LTE networks, Biometrics, Quantum Computing, Software data networks, Advancement in VoIP, QoS in wireless network.	(06 Hours)
UNIT-X	Computer Graphics & Visualization 2D, 3D Geometric object representation, Illumination models light Shading algorithms and Rendering, Tone Mapping, Matters of Perception, image manipulation and storage, advanced modeling techniques. Digital image processing.	(06 Hours)

Text Books/References:

1.	Kenneth H. Rosen, "Discrete mathematics and its applications", McGraw Hill.
2.	Kenneth Bogart, Slein, Drysdale, "Discrete mathematics for computer science". Key College.
3.	Sartaj Sahni, "Data Structures", Silicon Press.
4.	Balaguruswami, "Data structures using C", McGraw Hill.
5.	Dietel H, "An Introduction to Operating System", Addison Wesley.
6.	Silberschatz and Galvin, "Operating System Concepts", John Wiley.
7.	Jochen Schiller, "Mobile Communication", Pearson Education Asia.
8.	John L. Hennessy and David A. Patterson, "Computer architecture a quantitative approach" Elsevier.
9.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", MIT Press.
10.	Yegnanarayana, "Artificial neural Networks", B. PHI Publication
11.	Roger Pressman, "Software Engineering", McGraw Hill Publications.
12.	EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley Publications.
13.	O'really Radar Team, "Big Data Now, Current perspectives", O'Reilly strata.
14.	J. Han and M. Kamber, "Data Mining-Concepts and Techniques", Morgan Kaufmann.
15.	James Martin, "Information Engineering", Prentice Hall.
16.	Kendal, Simon, "An Introduction to Knowledge Engineering", Springer Publication.
17.	Stuart Russel, Peter Norvig, "Artificial Intelligence–A Modern Approach", PHI/Pearson Education.
18.	Behrouz A. Forouzan, "Cryptography& Network Security", TMH.
19.	William Stallings, "Cryptography and Network Security", Pearson Education.
20.	Eric A.Marks, Bob Lozano, "Executive's Guide to Cloud Computing", Wiley publications.
21.	Hearn and Baker, "Computer Graphics", PHI
23.	John C. Martin, "Introduction to Language & Theory of Computation", Mc Graw Hill.