



RK University (Pre-registration coursework for PhD program)

PhD Program – PhD (IC Engineering)

Concerned Dean – Dr. Ajit Kumar Shukla (email – ajit.shukla@rku.ac.in)

Sr. No.	Subject	Contents	Method of evaluation	Credits
1	Research Methodology	As per syllabus mentioned below	Written examination (3 hrs)	4
2	Subject of specialization: 1. FPGA Design & Constraints	Research topic specific	Written examination (3 hrs)	4
3	Review work	Review of literature for the PhD research topic	Presentation + Detailed report in hard copy	3
			Total	11

(*Shall be decided by the Dean of Faculty, individually, for each PhD scholar)

Notes -

1. The admission process of PhD program will comprise of 2 stages viz. (a) admission to PhD program (b) final registration in PhD program.
2. A successful PhD candidate (RAT examination) will be admitted to PhD program after paying admission fees (Rs.60000/-) and upon allocation of a PhD guide by RK University.
3. An admitted PhD candidate will have to submit synopsis and presentation of his/her actual research project (in consultation with the PhD guide approved and allocated by RK university) before Doctoral Research Committee (DRC) within 6 months from date of admission(date will be declared by university).
4. An admitted PhD candidate will be registered after earning minimum of 11 credits as per above mentioned course-work structure.
5. The candidate will acquire credit of a subject on passing the examination that will be conducted at the end of 6 months (date will be declared by university).
6. On acquiring required credits, an admitted candidate will be issued a certificate of registration(along with project title)by RK University.

Course Title	Research methodology
Detailed syllabus	
<p><u>Research:</u> Meaning, purpose, Types, (Educational, Clinical, Experimental, historical descriptive, Basic applied and Patent oriented Research) and objectives of research, phases of research.</p> <p><u>Research Design:</u> Review of Research Literature: Purpose and use of literature review, locating relevant information, use of library & electronic databases, preparation & presentation of literature review, research article reviews, theoretical models and frame work. Identification of gaps in research, formulation of research problem, definition of research objectives.</p> <p><u>Documentation:</u> a. "How" of documentation b. Techniques of documentation c. Importance of documentation d. Use of computer packages in documentation</p> <p><u>Research Publication:</u> Thesis, Research paper, Review Article & Technical Reports: Organization of thesis and reports, formatting issues, citation methods, references, effective oral presentation of research. Quality indices of research publication: impact factor, immediacy factor, H-index and other citation indices</p> <p><u>Presentation (especially for oral presentation):</u> Importance and types of different skills, contained, format of model, introduction, Poster, Gestures, eye contact, facial, expressions, stage fright, volume of pitch, speed, pause & language, Visual aids & seating, Questionnaire etc.</p> <p><u>Cost analysis of the project:</u> cost incurred on raw materials, Procedure, instrumentations and clinical trials.</p> <p><u>Sources for procurement of research grants:</u> International agencies, government and private bodies.</p> <p><u>Industrial-institution interaction:</u> Industrial projects, their feasibility reports, interaction with industries.</p> <p><u>Research Ethics and Morals:</u> Issues related to plagiarism, collaborative models and ethics, acknowledgements. Intellectual Property Rights: copy rights, copy left: patents, Industrial designs, Trademarks.</p>	

Reference Books:

1. Research Methodology, Methods & Techniques, C. R. Kothari, Vishwa Prakashan
2. Research Methods- A Process of Inquiry, Graziano, A.M., Raulin, M.L, Pearson Publications.
3. How to Write a Thesis:, Murray, R. Tata McGraw Hill
4. Writing For Academic Journals, Murray, R., McGraw Hill International.
5. Writing for Publication, Henson, K.T., Allyn & Bacon.
6. Research Methodology by Bhattacharyya Excel Books 2nd Edition.
7. What is this thing called Science, Chalmers, A.F., Queensland University Press.
8. Methods & Techniques of Social Research, Bhandarkar & Wilkinson, Himalaya publications.
9. Doing your Research project, Bell J., Open University Press, Berkshire.
10. A Handbook of Academic Writing, Murray, R. and Moore, S., Tata McGraw Hill International.
11. Business Research Methods Donald R. Cooper and Pamela S.Schindler Business Research Methods Tata McGraw Hill Publishing Company Ltd
12. Research Methodology: A Guide for Researchers in Management and Social Sciences Taylor, Sinha & Ghoshal

Course Title	FPGA Design & Constraints
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Detailed syllabus

1. Introduction of Hardware Description Language(HDL) :

History, Concept of HDL, Existing Languages, Comparison, Introduction of Verilog HDL & VHDL.

2. Programming with Verilog HDL:

Basic concepts- Lexical conventions, Data types, modules, ports.

Hierarchical Modeling concepts, Gate level modeling- Gate types, Gate delays, Dataflow Modeling- Continuous assignments, Delays, Operator types, Behavioral Modeling- Structured Procedures, Procedural Assignments, Timing controls, Conditional Statements, case Statement, Loops, Sequential and Parallel Blocks, Tasks , Functions, user-defined Primitives, State Machines.

3. Designing with Digital circuits:

Combinational, Sequential, Synchronous and Asynchronous Circuits like Binary/BCD Adders and Binary Subtractions, Comparators, Multiplexers, Demultiplexer, Encoder and Decoders, Enable / Disable Inputs, Flip-Flops, Design of Counter. Finite State Machines, Designing State Machines , Mealy and Moore Machines.

4. Constraints:

Architecting Speed-High Throughput, Low latency, Timing, Architecting area- Rolling up the pipeline, control based logic reuse, resource sharing, impact of reset on area. Architecting power- clock control, input control, dual edge triggered flipflops

5. Clock Domains:

Crossing clock domains, gated clocks

6. Reset Circuits:

Asynchronous versus Synchronous, Mixing reset types, multiple clock domains

Reference Books

1. Verilog HDL by Samir Palnitker.
2. Verilog HDL by Bhaskar
3. Digital Design & Implementation with Field Programmable Devices by Zainalabed inNavabi
- 4.. Steven Kilts, Advanced FPGA Design, John Wiley & Sons, 2007
5. Wayne Wolf, FPGA Based System Design, Kluwer Academic Pubilshers, 2004