

Sardar Patel College of Engineering Andheri (West), Mumbai 400 058

Year: 2016-17

6.

6.1. Ph.D. Programme

Scheme and Course Content for Coursework

Year: 2016-17

SCHEME FOR Ph. D. COURSE WORK

Sr. No.	Subject	Code	Course Plan for Each Week (Hrs)			Credits	Evaluation Scheme					Total	
			Lectures	Laboratory	Tutorial		Test 1	Test 2	End Semester		End Semester Weightage (%)		In semester evaluation
									Marks	Duration			
1	Research Methodology	PHC101	4	--	2	6	20	20	100	4	60	50	150
2	Quantitative Methods and Computer Applications in Research	PHC102	4	--	2	6	20	20	100	4	60	50	150
3	Seminar	PHC103	-	--	2	4	-	-	-	-	-	100	100
Total			08	--	06	16	40	40	200	-	--	200	400

NOTE Test 1, Test 2 and end semester weightage marks will be added and shown as the theory marks in the mark sheet. Duration of Test 1, Test 2 is of 1 hour. For passing, Student must secure minimum 50% marks in each subject. In semester evaluation will be considered as separate head and student must secure minimum 50% marks for passing this head also.

Ph. D. COURSEWORK

SEMESTER-I	CLASS: Ph. D. Civil/Mechanical Engineering			
CODE: PH 101	SUBJECT: Research Methodology			
Period per week (Each of 60 minutes)	Lecture	04		
	Laboratory	--		
	Tutorial	02		
Evaluation System		Duration (Hrs)	Marks	
	In Semester Tests	01	20 x 02	
	End Semester Exam*	04	100	
	In Semester evaluation	---	50	
	Total		150	
	Credits		06	

Course Objective

The primary objective of this course is to enable students to:

1. To develop an ability to identify, formulate research problem.
2. To develop an ability to apply knowledge of research methodology to engineering problems.
3. To carry out research on engineering problems.
4. To develop an ability to investigate the phenomenon in a critical manner.
5. Develop critical thinking to find business opportunities and to solve questions related to industries.
6. To get knowledge on various kinds of research questions and research designs
7. To be able to formulate research questions and develop a sufficiently coherent research design
8. To be able to assess the appropriateness of different kinds of research designs and methodology.
9. To develop independent thinking for critically analyzing research reports

Course Outcomes:

By the end of the Course, the student will be able to:

- To carry out literature survey, formulate the problem statement using various research considerations
- Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process

Year: 2016-17

- Apply a range of quantitative and / or qualitative research techniques to Engineering Research Problems
- Develop necessary critical thinking skills in order to evaluate different research approaches utilised in the service industries and Conceptualise the research process

1 1.1 Definition of research: Research – Definition; Concept of Construct, Postulate, Proposition, Thesis, Hypothesis, Law, Principle. Definition and Dimension of a Theory, Functions and Characteristics; Types of Theory: General Theory and Particular/ Empirical Theory. Cases and their Limitations; Causal Relations. Philosophy and validity of research. Objectives of research.

1.2 Characteristics of research: Various functions that describe characteristics of research such as systematic, valid, verifiable, empirical and critical approach.

2 2.1 Types of research: Pure and applied research. Descriptive and explanatory research. Qualitative and quantitative approaches.

Research procedure: Formulating the Research Problem, Literature Review, Developing the objectives, preparing the research design including sample Design, Sample size.

2.2 Considerations in selecting research problem: Relevance, interest, available data, choice of data, Analysis of data, Generalization and interpretation of analysis

Outcome of research: Preparation of the Report on conclusions reached. Testing validity of research outcomes .Suggestions and recommendations, identifying future scope.

3 Computer Applications in research: Introduction to spreadsheet application, features and functions, using formulas and functions, data storing, features for statistical data analysis, generating charts/ graph and other features. Tools used may be Microsoft Excel, Open office or similar tool. Introduction to presentation tool, features and functions, creating presentation, customizing presentation, showing presentation. Tools used may be Microsoft Power Point, Open Office or similar tool. Introduction to Internet based searches, use of advanced search techniques.

References:

- Dawson, Catherine, 2002, *Practical Research Methods*, New Delhi, UBS Publishers' Distributors.
- Kothari, C.R., 1985, *Research Methodology-Methods and Techniques*, New Delhi, Wiley Eastern Limited.
- Kumar, Ranjit, 2005, *Research Methodology-A Step-by-Step Guide for Beginners*, (2nd.ed), Singapore, Pearson Education.

Year: 2016-17

SEMESTER-I	CLASS: Ph. D. Civil Engineering/Mechanical Engineering			
CODE: PH 102	SUBJECT: Quantitative Methods & Computer Applications in Research			
Period per week (Each of 60 minutes)	Lecture	04		
	Laboratory	--		
	Tutorial	02		
Evaluation System		Duration (Hrs)	Marks	
	In Semester Tests	01	20 x 02	
	End Semester Exam*	04	100	
	In Semester evaluation	--	50	
	Total		150	
	Credits		06	

Module – 1

2.1 Probability Distributions: Theoretical: binomial, poisson, normal, exponential, hyper geometric, uniform distributions

2.2 Sampling and Sampling Distributions: Probability and non-probability samples, sampling and non-sampling errors, sample size, sampling distributions: t, F and χ^2 distributions

2.3 Hypothesis Testing: Type I and II error, testing of mean, proportion, tests for equality of mean and variances of two populations, confidence interval, χ^2 test for goodness of fit, ANOVA (one way classification), Non parametric tests: sign test, U test

2.4 Correlation and Regression: Karl Pearson's and Rank Correlation coefficient, simple linear regression: least squares method

2.5 Management Decision Making: System approach, decision making under uncertainty and risk: decision tables and decision tree.

Module - 2

2.6 Linear Programming: Graphical solution, simplex method, dual, sensitivity analysis, transportation and assignment problems.

Module - 3

2.7 Computer Applications in research: Introduction to spreadsheet application, features and functions, using formulas and functions, data storing, features for statistical data analysis, generating charts/ graph and other features. Tools used may be Microsoft Excel, Open office or similar tool. Introduction to presentation tool, features and functions, creating presentation, customizing presentation, showing presentation. Tools used may be Microsoft Power Point, Open Office or similar tool. Introduction to Internet based searches, use of advanced search techniques.

Year: 2016-17

References:

- *Shrivastava, Shenoy & Sharma, Quantitative Techniques for Managerial Decisions, Wiley*
- *Kothari C R, Research Methodology, Wiley Eastern*
- Goode W J & Hatt P K, *Methods in social research, McGraw Hill*
- *Basic Computer Science and Communication Engineering – R. Rajaram (SCITECH)*

Year: 2016-17

SEMESTER-I	CLASS: Ph. D. Civil Engineering/Mechanical Engineering		
CODE: PHX	COURSE: X		
Period per week (Each of 60 minutes)	Lecture	04	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 x 02
	End Semester Exam*	04	100
	In Semester evaluation	---	50
	Total		150
Credits		06	

- The second course 'X' should be given by the guide in alignment with the Research Requirement of research scholar.
- The Guide may select one course from any of the followings and should ensure that candidate complete the entire course of 6 credits.

X- Courses the to be offered for PhD Course work

Sr. No.	X- Courses	Sr. No.	X- Courses
1	Advanced Solid Mechanics.	11	Management of Housing Projects
2	Structural Dynamics	12	Project Appraisal, Planning and Scheduling.
3	Non-linear Analysis.	13	Advanced Construction Techniques.
4	Advanced Structural Analysis	14	Accounting and Finance Management.
5	Numerical Methods.	15	Safety Management.
6	Finite Element Analysis.	16	Construction materials.
7	Theory of Plates.	17	Management of Construction Resources.
8	Reliability Based Civil engineering Design.	18	Value Engineering
9	Construction Management and Organisation.	19	Project Monitoring and Control
10	Applied Statistics and Quantitative Techniques.	20	Value Engineering

Year: 2016-17

SEMESTER-I	CLASS: Ph. D. Civil Engineering/Mechanical Engineering			
CODE: PH103	SUBJECT: SEMINAR			
Period per week (Each of 60 minutes)	Lecture	--		
	Laboratory	--		
	Tutorial	02		
Evaluation System		Duration (Hrs)	Marks	
	In Semester Tests	--	--	
	End Semester Exam*	--	--	
	In Semester evaluation	--	100	
	Total		100	
	Credits		04	

3.1 Formulating Problem Statement: Overview of research process: Formulating the Research Problem, Extensive Literature Review, Developing the objectives, preparing the Research Design including Sample Design, Collecting the Data, Analysis of Data, Generalization and Interpretation, preparation of the Report or Presentation of Results-Formal write-ups of conclusions reached. Problem statement – Conditions and steps in selecting a research problem, Understanding the Key research area of interest, How to get new ideas (Criticizing a paper), Finding a good problem: Top-down and Bottom-up approach, Creative thinking techniques, Coming up with a problem statement Defining objectives – How to find objectives, characteristics of objectives.

3.2 Literature survey : Overview – What is literature survey, Functions of literature survey, maintaining a notebook, developing a Bibliography Methods of data collection – Observation, survey, contact methods, experimental, determining sample design. Searching for publications – Publication databases, search engines and patent databases, Find out the references for a given paper. The on-line Civil Engineering bibliography, Survey papers, Finding material not on the web, Searching patents.

3.3 Guidelines to read research paper: Summarizing paper – Reading abstracts and finding ideas, conclusion, Advantages of their approach, the drawbacks of the papers and scope for future work. Generalize results from a research paper to related research problems Comparing the approach - Identify weaknesses and strengths in recent research articles in the subject.

3.4 Publishing research paper: How to write research paper - Structure of a conference and journal paper, how (and How Not) to write a Good Systems Paper: Abstract writing, chapter writing, discussion, conclusion, references, bibliography, and In-class discussion of technical writing examples, Poster papers, review papers, how to organize thesis/ Project report, How to write a research proposal? How research is funded? Research ethics – Legal issues, copyright, plagiarism General advice about writing technical papers in English - Tips for writing correct English.

Year: 2016-17

3.5 Presentation of scientific and engineering research work: Talk structure, basic presentations skills, INFLIBNET, Documentation and presentation tools – LATEX, Microsoft office, PowerPoint and SLIDESHOW