



Guru Nanak Dev Engineering College, Ludhiana
An Autonomous College u/s 2(f) and 12 (B) of UGC Act 1956
Punjab Government Aided Status
Institute Accreditation: "A" Grade NAAC, Tata Consultancy Services
AICTE Approved, Affiliated to IKG Punjab Technical University, ISO : 9001:2008 Certified

Ref. No. RK/109

Dated 3/8/17

Dr. A.P.Singh,
Dean (RIC),
IKG Punjab Technical University,
Jalandhar-Kapurthala Road, Near Science City,
Kapurthala

Dear Sir,

This is with reference to telephonic conversation with your goodself regarding joining of Ms. Bharti Koul, QIP Application No. 50356 admitted in QIP Centre, GNDEC, Ludhiana in Electrical Engineering. She has reported on 1.8.2017 for pursuing her Ph.D at GNDEC Ludhiana. As per IKGPTU guidelines, she has filled online form and deposited the requisite fee. As per the IKGPTU letter No. IKGPTU/Reg/N4244-4251, Dated 22-08-16 and in light of AICTE guidelines she will be offered following subjects:

Subject Nomenclature	Core/Elective	Code of Autonomous college (GNDEC Ludhiana)	Remarks	Credit
Research Methodology	Compulsory	PhDCC-17001	As per IKGPTU guidelines	04
English for Technical Writing	Compulsory Noncredit, Internal Lab course	PhDCC-17002	As per AICTE's guidelines	00 Only Pass/Fail may be reflected
Advanced Power System Analysis	Core Subject	PhDEE-17001	As per IKGPTU guidelines	04
Power System Operation	Elective Subject	PhDOE-17001	As per IKGPTU guidelines	04
Presentation	Dept. Specific	PhDEE-17003	As per IKGPTU guidelines	03
Total Minimum credit				15

PhDCC: Common course, PhDEE: Core course of Electrical Engg., PhDOE: Elective course (Interdisciplinary)

The classes for above course work will be conducted separately from regular M.Tech/other PG programmes. This is for your kind information and ratification, please.

Thanking you,

Yours sincerely

DIP Coordinator

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03/8/2017

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ORIP PhD
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4/8/17

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PhDCC – 17001 RESEARCH METHODOLOGY

Internal Marks : 50	L	C
External Marks : 100	4	4
Total Marks : 150		

COURSE OUTCOMES

The students will be able to

- Identifying and defining research problems.
- Classification the methods of data collection.
- Work with the samples to carry out research.
- Process and analyze the data and validate the results obtained.

CONTENTS

1. Overview of Research

Nature and objectives of research, Methods of Research and its types, identifying and defining research problem and introduction to different research designs. Essential constituents of Literature Review. Basic principles of experimental design, completely randomized, randomized block, Latin Square, Factorial, response surfaces

2. Methods of Data Collection

Primary data and Secondary Data, methods of primary data collection, classification of secondary data, designing questionnaires and schedules.

3. Sampling Methods

Probability sampling: simple random sampling, systematic sampling, stratified sampling, cluster sampling and multistage sampling. Non-probability sampling: convenience sampling, judgement sampling, quota sampling. Sampling distributions.

4. Processing and analysis of Data

Statistical measures and their significance: Central tendencies, variation, skewness, Kurtosis, time series analysis, correlation and regression, Testing of Hypotheses: Parametric (t, z and F) Chi Square, ANOVA, and non-parametric tests.

5. Reliability and Validity

Test-retest reliability, alternative-form reliability, internal-comparison reliability, and scorer reliability. Content validity, Essential of Report writing

Note: Use of software for statistical analysis like SPSS, Mini Tab or MAT Lab, Report writing, preparation of thesis, use of software like MS Office.

Recommended Books

- C.R Kothari, Research Methodology, Wishwa Prakashan
- P.G Triphati, Research Methodology, Sultan Chand & Sons, N.Delhi
- Fisher, Design of Experiments, Hafner
- Sadhu Singh, Research Methodology in Social Sciences, Himalya Publishers
- Stoufferetal, Measurement & Prediction, Wiley, N.York
- J.W Bames, Statistical Analysis for Engineers & Scientists, McGraw Hill, N.York
- Donald Cooper, Business Research Methods, Tata McGraw Hill, N.Delhi

PhDCC – 17002 ENGLISH FOR TECHNICAL WRITING

Internal Marks : 50	P	C
External Marks : --	2	0
Total Marks : 50		

COURSE OUTCOMES

The students will be able to

- a) Understand the requirements and ethics of technical writing.
- b) Critically compare and evaluate technical literature.
- c) Work individually and in a team to produce effective technical documents.
- d) Communicate effectively for technical presentations.

CONTENTS

1. To practice in preparing power point presentation
2. To enhance communicative skills by Seminar presentation
3. To gain experience in Report writing
4. Learn to write Bibliography /referencing
5. Learn to develop skill of Paraphrasing
6. To learn Summarizing/précis writing
7. To understand and practice Paragraph writing
8. To analyze and understand the book/article reviews
9. To gain expertise in technical writing (journal article, conference papers, review and research articles.

PhDEE – 17001 ADVANCED POWER SYSTEM ANALYSIS

Internal Marks : 50	L	C
External Marks : 100	4	4
Total Marks : 150		

COURSE OUTCOMES

After studying this course, the students will

- Construct network matrices by singular and non-singular transformation and bus impedance matrices by algorithmic approach.
- Develop mathematical model and find solution of optimal power flow problems.
- Investigate state of a power system by power flow analysis as well as state estimation.
- Investigate security of Power System using Short Circuit and Contingency Analysis.

CONTENTS

1. FORMATION OF NETWORK MATRICES

Incidence and network matrices, Formation of network matrices by singular and non-singular transformation, Formation of single phase bus impedance matrix using algorithmic approach including the effect of mutually coupled elements.

2. POWER FLOW & OPTIMAL POWER FLOW ANALYSIS

Review of power flow without and with tap changing and phase shifting transformers, Power flow analysis with series and shunt compensating devices, Power flow for radial distribution network, Optimal power flow problem formulation and solution techniques.

3. POWER SYSTEM SECURITY

Factors effecting power system security, Short circuit and contingency analysis, Network sensitivity using load flow, Correcting the generation dispatch by using sensitivity method and linear programming.

4. STATE ESTIMATION

State estimation from on line measurements, Method of least squares, the line power flow state estimation.

BOOKS RECOMMENDED

- G.N. Stagg and A. H.EI- Abiad, *Computer Methods in Power System Analysis*, Mc Graw– Hill, International Edition.
- George L .Kusic , *Computer Aided Power Systems Analysis*, Prentice Hall.
- Arrillaga, C.P. Arnold and S.J. Harker, *Computer Modelling of Electrical Power Systems*.
- O.I. Elgerd, *Electric Energy Systems-An Introduction*, Tata Mc Graw Hill.
- M.A. Pai, *Computer Techniques in Power Systems Analysis*, Tata McGraw Hill.
- P.M. Anderson, *Analysis of Faulted Power System*, IEEE Press Book.
- Related IEEE/IEE Publication.

PhDOE- 17001 POWER SYSTEM OPERATION

Internal Marks : 50	L	C
External Marks : 100	4	4
Total Marks : 150		

COURSE OUTCOMES

After studying this course, the students will

- Analyze the difference in characteristic curves for different types of generation.
- Understand economic dispatch problem, unit commitment problem and apply various solution methods to these problems.
- Understand hydro-thermal co-ordination, concept of energy banking and power trading.
- Apply techniques for optimized operation of power system.

CONTENTS

1. CHARACTERISTICS OF POWER GENERATION UNITS

Characteristics of steam units, variations in steam unit characteristics, cogeneration plants, hydro-electric units.

2. OPTIMIZATION TECHNIQUES

Lagrange's multiplier, random search, steepest-descent, conjugate-gradient, interior and exterior penalty function methods for Unconstrained and constrained optimization.

3. OPTIMAL OPERATION OF THERMAL UNITS

Economic load dispatch problem without and with transmission losses, Lambda iteration method, Gradient method, Newton's method, Base point and participation factors, Unit commitment, Priority method, Dynamic programming, Analytical method, Introduction to optimal power dispatch considering unit commitment.

4. HYDRO-THERMAL CO-ORDINATION

Introduction to long range and short range hydro scheduling, Types of short range scheduling problem, Scheduling energy, the short term hydro-thermal scheduling problems and its solution by Lambda-Gamma iteration and gradient methods.

BOOKS RECOMMENDED

- Allen J. Wood and Brace F Woollenberg, *Power Generation Operation and Control*, John Willey & Sons 2nd Edition.
- D.P. Kothari and J.S. Dhillon, *Power System Optimization*, Prentice-Hall of India, Pvt. Ltd., New Delhi
- L.K. Kirchmayer, *Economic Operation of Power Systems*, John Willey & Sons, N.Y.
- D.P. Kothari and I.J. Nagrath, *Modern Power System Analysis*, Tata Mc Graw- Hill Publishing Company Ltd., New Delhi.

PhDEE – 17003 PRESENTATION

Internal Marks : 100	P	C
External Marks : --	3	3
Total Marks : 100		

COURSE OUTCOMES

After studying this course, the students will

- a) Evaluate various latest topics in Electrical Engineering and formulate research problem.
- b) Survey extensive literature and understand others point of view, thereby encouraging team work.
- c) Evaluate generalized research results and impact of various technologies on environment.
- d) Analyze and develop a thought process for presentation.

CONTENTS

1. LITERATURE SURVEY

Publication database, search engine and patent database, Online tools – google, citeseer, digital library, IEEE, survey papers.

2. RESEARCH PROBLEM FORMULATION

Developing the objectives, Research design, Defining key area of research, Creative thinking technique.

3. PRESENTATION

Analyze and prepare 1-1.30 hours presentation related to area of concern and future scenario in Electrical Engineering.