DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
PROGRAMME: B. TECH (Minor in Cognitive Science)
COURSE TITLE: Cognitive Modeling

Course Category: Minor Degree	**Internal: 50 Marks**
Course Code: HSMCS 402	**Theory 50 Marks**
Credits 3 (L-03, T-00)	**Total: 100 Marks**
Semester: 8th	**Time: 3 Hrs.**

Course Objectives

This course offers an elementary introduction to developing and testing computational models of cognition, aiming to scientifically explain fundamental cognitive processes and their interactions.

Instructions for Examiner

The number of questions to be set will be five, at least one from each unit. The examinees will be required to attempt all five questions. All questions shall carry equal marks.

Unit I: Introduction to Cognitive Modeling

What are cognitive models? Advantages of cognitive models, Practical uses of cognitive models, Steps involved in cognitive modeling.Familiarization with cognitive modeling software tools.

Unit II: Qualitative Model Comparison

Category learning experiment, Two models of category learning, Qualitative comparisons of Models, Matlab Simulation of qualitative model.

Unit III: Basic Parameter Estimation Techniques

Linear and Nonlinear parameter estimation, Retention Experiment and Model, Aggregate modeling versus individual modeling, Objective function and searching for optimal parameters.

Unit IV: Quantitative Model Comparison

Maximum likelihood estimation, Bechara's Simulated Gambling Task (BSGT), Three Cognitive Models on BSGT, Parameter estimation, Quantitative model comparisons using AIC and BIC, Cross-validation, and Generalization.

Course Outcomes

Upon completion, students will possess a thorough understanding of cognitive modeling principles and their practical applications. They will develop proficiency in creating, assessing, and comparing computational models, utilizing tools such as Excel and MATLAB.

Suggested Readings

1. J. Busemeyer & A. Diederich. (2009). *Cognitive Modeling.* Sage Publications, Inc.

2. S. Farrel& S. Stephan Lewandowsky. (2010). *Computational Modeling in Cognition: Principles and Practice*. Sage Publications, Inc.

3. Polk, T. A., & Seifert, C. M. (Eds.). (2002). *Cognitive modeling*. MIT Press.

4. Levine, D. S. (2000). *Introduction to neural and cognitive modeling.* Psychology press.