

# Entrance Examination Syllabus for M.Phil in Cognitive Science – 2017

## School of Cognitive Science

### Jadavpur University

[IN ACCORDANCE TO THE CLAUSE NO. 5.4.1<sup>1</sup>, 5.4.2<sup>2</sup> AND 5.5<sup>3</sup> OF THE GAZETTE OF INDIA REGD NO. D.L. -33004/99, PART III- SECTION 4 DATED JULY 5 2016 ON UNIVERSITY GRANTS COMMISSION (MINIMUM STANDARDS AND PROCEDURE FOR AWARD OF M.PHIL./PH.D. DEGREES) REGULATIONS, 2016]

The entrance examination will comprise of two sections-

- a. Research Methodology - 50% of entrance test syllabus
- b. Subject specific (the broad area of Cognitive Science) topics - 50% of entrance test syllabus
- c. The interview/viva voce: In the Viva voce, the candidate is expected to discuss their research interest/area through a presentation (5 min) before the Panel.

#### The basics of topics included in Research Methodology

Qualitative & quantitative methods, Scientific Method, Purpose of statistics, Different kind of Variables, Probability, Distributions, Sampling, Experimental Designs (Independent samples design, Repeated measure design), Validity (Validity in Experiments and other research design, types of validity), Quasi-experiments, Analysis: Correlations, t-tests, non-parametric tests, ANOVA (factorial, mixed), Introduction to Regression mathematical Logic (First order predicate calculus)

Different methodologies used in Cognitive science, Reaction Time measurement and analysis, basics of Signal detection theory, Eye tracking, MRI, EEG, TMS.

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1 5.4.1 An Entrance Test shall be qualifying with qualifying marks as 50%. The syllabus of the Entrance Test shall consist of 50% of research methodology and 50% shall be subject specific. The Entrance Test shall be conducted at the Centre(s) notified in advance (changes of Centres, if any, also to be notified well in advance) at the level of the individual HEI as mentioned in clause 1.2; and

2 5.4.2 An interview/viva-voce to be organized by the HEI as mentioned in clause 1.2 when the candidates are required to discuss their research interest/area through a presentation before a duly constituted Department Research Committee.

3 5.5 The interview/viva voce shall also consider the following aspects, viz. whether: 5.5.1 the candidate possesses the competence for the proposed research;

5.5.2 the research work can be suitably undertaken at the Institution/College;

5.5.3 the proposed area of research can contribute to new/additional knowledge.

## **The Broad area of topics included in Cognitive Science**

### ***Basics in Cognitive Science***

Different theoretical approaches to perception and attention.

Information processing approach, Marr's levels of processing, Representations, Dynamical approaches, Situated and Embodied cognition, Modularity, Culture and Cognition, Cognitive Development

### ***Philosophy of Mind***

Different views on mind-brain relationship, functionalism, eliminative materialism, fundamental issues on self and consciousness, representationalism, phenomenological approaches, Language and thought.

### ***Logic and reasoning***

Intuitive set theory, Axiomatic Set theory, Proof theory, Model theory, Mathematical constructivism. Informal logic – Critical thinking, different types of arguments.

### ***Psycholinguistics/Biology of language***

Introduction to Linguistics, Biological basis of language, language evolution, Design features of language, Foundations of Psycholinguistics, Levels of linguistic analysis: Phonology-phonetics, syntax, semantics, morphology, pragmatics, Word Recognition, Sentence processing, Language Acquisition, Comprehension, Bilingualism, Language-Vision interaction.

### ***Computation***

Values and their representation, operations on values, data-types, control statements, data structures, functions, pointers, Basic algorithms.

Basics of programming, algorithmic problem solving, data structures, associative structures, Basic algorithms (sorting, searching, etc)

Introduction to Computational Modeling, Types of learning mechanisms and learning rules, Introduction to neural networks, Probabilistic reasoning, Production Systems, Cognitive Architectures

### ***Cognitive Neuroscience***

Structure of neurons, glial cells, action potential, synapse, synaptic transmission, neurotransmitters, anatomical organization of the nervous system, sensory systems.

Functional organization of the cortex, Cognitive neuroscience of perception, language, learning and memory, motor systems, emotions, and hemispheric lateralization.

### ***Cognitive Psychology***

Decision making, Reasoning and Problem Solving.

Sample Questions:

**1. Objective Questions**

- A. Which of the following is NOT a core component of emotion?
  - i. A positive or negative experience
  - ii. Bodily arousal
  - iii. Characteristic behaviors
  - iv. Instinct

**2. Comprehension**

A writer is someone who spends years patiently trying to discover the second being inside him, and the world that makes him who he is: when I speak of writing, what comes first to my mind is not a novel, a poem, or literary tradition, it is a person who shuts himself up in a room, sits down at a table, and alone, turns inward; amid its shadows, he builds a new world with words. This man – or this woman – may use a typewriter, profit from the ease of a computer, or write with a pen on paper, as I have done for 30 years. As he writes, he can drink tea or coffee, or smoke cigarettes. From time to time he may rise from his table to look out through the window at the children playing in the street, and, if he is lucky, at trees and a view, or he can gaze out at a black wall. He can write poems, plays, or novels, as I do. All these differences come after the crucial task of sitting down at the table and patiently turning inwards. To write is to turn this inward gaze into words, to study the world into which that person passes when he retires into himself, and to do so with patience, obstinacy, and joy. As I sit at my table, for days, months, years, slowly adding new words to the empty page, I feel as if I am creating a new world, as if I am bringing into being that other person inside me, in the same way someone might build a bridge or a dome, stone by stone. The stones we writers use are words. As we hold them in our hands, sensing the ways in which each of them is connected to the others, looking at them sometimes from afar, sometimes almost caressing them with our fingers and the tips of our pens, weighing them, moving them around, year in and year out, patiently and hopefully, we create new worlds.

The writer's secret is not inspiration – for it is never clear where it comes from – it is his stubbornness, his patience. That lovely Turkish saying – to dig a well with a needle – seems to me to have been said with writers in mind. In the old stories, I love the patience

of Ferhat, who digs through mountains for his love – and I understand it, too. In my novel, *My Name is Red*, when I wrote about the old Persian miniaturists who had drawn the same horse with the same passion for so many years, memorising each stroke, that they could recreate that beautiful horse even with their eyes closed, I knew I was talking about the writing profession, and my own life. If a writer is to tell his own story – tell it slowly, and as if it were a story about other people – if he is to feel the power of the story rise up inside him, if he is to sit down at a table and patiently give himself over to this art – this craft – he must first have been given some hope. The angel of inspiration (who pays regular visits to some and rarely calls on others) favours the hopeful and the confident, and it is when a writer feels most lonely, when he feels most doubtful about his efforts, his dreams, and the value of his writing – when he thinks his story is only his story – it is at such moments that the angel chooses to reveal to him stories, images and dreams that will draw out the world he wishes to build. If I think back on the books to which I have devoted my entire life, I am most surprised by those moments when I have felt as if the sentences, dreams, and pages that have made me so ecstatically happy have not come from my own imagination – that another power has found them and generously presented them to me.

Orhan Pamuk: *My Father's Suitcase*

Nobel Lecture, December 7, 2006

- a. What makes a writer a writer?
- b. 'The writer's secret is not inspiration'. Do you agree with this statement? Give justifications.
- c. Do you think written language is same as spoken language? Illustrate with specific reference to the role of emotion in language.
- d. Do writers need any methodology for writing? If so, justify the need for method in writing.

### 3. Sample Essay

- A. Ethical conscience in research
- B. Cognition at Siachen
- C. Illusions in visual perception