FUNCTIONS OF MIND
Brain Structure and Function
The brain

- Most complex organ of the body
- Only weighs 1,300 grams
- Contains billions of neural networks that interact to create human behaviour
Forebrain

- Cerebrum and Cerebral cortex
- Left and Right Hemispheres
- Left hemisphere for most people is the dominant hemisphere- responsible for production of language, mathematical ability, problem solving, logic
- Right hemisphere thought to be responsible for creativity and spatial ability
Frontal Lobe

- Located at the front of both cerebral hemispheres
- Primary motor cortex
- Pre-motor cortex
- Broca’s Area - Motor Production of speech
- Complex Functioning - personality, judgement, insight, reasoning, problem solving, abstract thinking and working memory
(Barlow and Durand, 2005)
Parietal lobe

- Located behind frontal lobe
- Somatosensory cortex
- Spatial orientation, perception and comprehension of language function recognizing object by touch
- Links visual and somatosensory information together
- Neglect
Temporal Lobes

- Contains primary auditory and olfactory areas.
- Involved in receiving and processing auditory information, higher order visual information, complex aspects of memory and language
- Wernicke’s Area- Comprehension of speech
(Barlow and Durand, 2005)
Occipital lobes

- Rearmost portion of the brain
- Visual processing area

- Corpus Callosum- Fibre bundle in the brain that connects the two hemispheres together.
Diencephalon

- **Thalamus** - ‘relay station of the brain’. Filters sensory information, controls mood states and body movement associated with emotive states.

- **Hypothalamus** - ‘Central control’ for pituitary gland. Regulates autonomic, emotional, endocrine and somatic function. Has a direct involvement in stress and mood states.

(http://training.seer.cancer.gov/module_anatomy/unit5_3_nerve_org1_cns.html)
Hindbrain

- **Cerebellum** - regulates equilibrium, muscle tone, postural control, fine movement and coordination of voluntary muscle movement.

- **Pons** - Relay station between cerebrum and cerebellum
- **Medulla oblongata**: Conscious control of skeletal muscles, balance, co-ordination, regulating sound impulses in the inner ear, regulation of automatic responses such as heart rate, swallowing, vomiting, coughing and sneezing.

- **Reticular Formation**: Important in arousal and maintaining consciousness, alertness, attention and Reticular Activating System which controls all cyclic functions i.e. respiration, circadian rhythm.
- **Basal Ganglia** - Control of muscle tone, activity, posture, large muscle movements and inhibit unwanted muscle movements.

- **Substantia Nigra** - Produces dopamine is connected to the basal ganglia. – EPSE’s

(Barlow and Durand, 2005)
The Limbic system

- **Amygdala** - mediates and controls major affective mood states such as friendship, love, affection, fear, rage and aggression.

- **Hippocampus** - Memory, particularly the ability to turn short term memory into long term memory. Alzheimer's disease.

(Barlow and Durand, 2005)
- **Acetylcholine** (ACh)
  Release through the brain via cholinergic pathways. Plays role in:
  - cognition (memory)
  - sleep/wake cycle
  - parasympathetic nervous system
  - regulation of heart rate, digestion, production of saliva, bladder function.
  - smooth muscle contraction

(Boyd, 2002)
Monoamines

- **Norepinephrine** (NE)

  Found mainly in 3 areas of the brain; the locus coeruleous, the pons and reticular formation.

  Main role:
  - attention,
  - alertness, arousal
  - sleep/wake cycle
  - regulating mood/anxiety

(Barlow and Durand, 2005)
Dopamine (DA)

Almost a million nerve cells in the brain contain dopamine. Role in:
- complex movement
- cognition
- motor control
- emotional responses such as euphoria or pleasure.

Newer antipsychotic medication focus on particular dopaminergic pathways in the brain. Lessening EPSE’s.

(Barlow and Durand, 2005)
**Serotonin (5HT)**
Believed to be one of the great influences on behaviour. Complex neurotransmitter. Surprisingly only 2% of serotonin is found in CNS. Roles include
- Vasoconstriction, gastrointestinal regulation.
- Low serotonin associated with aggression, suicide, impulsive eating, anxiety and low mood.
- Regulates general activity of the CNS, particularly sleep.
- Delusions, hallucinations and some of the negative symptoms of schizophrenia.

(Barlow and Durand, 2005)
Amino Acids

**Glutamate**
- found in all cells
- controls opening of ion channels
- blocking glutamate produces psychotic symptoms
- Over exposure to glutamate causes cell death

**GABA** (Gamma-aminobutyric acid)
- Only found in CNS
- Inhibitory neurotransmitter
- controls excitatory neurotransmitters
- Implicated in anxiety disorders
DEFENCE MECHANISMS OF MIND

- Many a times conflicts can be solved by rational means – as by changing the environment that caused the conflict or by the compensatory adjustment to the situation.

- Some of those defence mechanisms of mind are described here. They occur at an unconscious level.
1. **Repression**: This is an important defence mechanism by which offensive or painful thoughts, impulses or desires are banished from entering consciousness. It is akin to selective forgetting & the repressed material cannot be recalled to the memory.

2. **Sublimation**: Unresolved conflicts find substitute satisfaction through redirection & sublimation. By sublimation, unconscious drives & desires are channeled into acceptable social outlets.
3. **Projection**: Objectionable qualities in the individual which he refuses to recognise are projected to others. Thus he attributes to others his own unacceptable impulses and desires. Those who are aggressive believe that all others except themselves are aggressive.

4. **Rationalisation**: By rationalisation the individual hunts for arguments to justify his action.
5. **Reaction Formation**: While repressing the unacceptable impulses, behaviour patterns which are opposite to them are shown at a conscious level in an exaggerated form. Thus repressed ‘love’ may manifest as ‘hostility’ and vice versa.

6. **Denial**: Denial of reality helps to protect the individual from the crushing impact of a traumatic situation.
7. **Fantasy**: This is a temporary retreat from the real world of anxiety, frustration & unhappiness to one which is soothing & desirable.

8. **Identification**: This is closely allied to fantasy. Frustrations are overcome by identifying in imagination with a person whom one admires for his superior accomplishments.
9. **Regression**: It is a return to childhood or to an earlier level of development. (ex: frustrated adult may exhibit temper tantrums.)

10. **Conversion**: An emotional conflict may be converted to physical symptom. At a sensory level they manifest as anaesthesia, paresthesia, pain etc. The motor symptoms may be tremors, tics, convulsions etc.
11. **Dissociation**: In this, individual dissociates himself from the stressful trauma & virtually becomes unaware of its existence.

12. **Fugue & multiple personality**: Fugue is a type of dissociation where a person leaves the stressful environment and wanders away totally lost of his identity and intentions.