



Instructions

- Write your name and GIAN ID below.
- For each question in the question paper, darken the circle corresponding to your answer to the question.
- The back side of the question paper can be used for rough work. Additional sheets will be provided if required.
- Question paper plus any additional sheets for rough work should be returned along with the answer sheet.

Grading

- Correct answer: 1 mark. Wrong answer or question not attempted: 0 marks.
 - More than one answer to a question will be treated as a **wrong** answer.
-

Name:

GIAN ID:

Q1. Aphasia is a

- (1) disorder of hearing caused by damage to the temporal lobe.
- (2) language disability caused by a brain injury.
- (3) disorder of emotional processing caused by trauma.
- (4) language disability due to early learning problems.

Q2. The central nervous system consists of the part of the nervous system

- (1) that carried signals from the muscles to the brain.
- (2) that innervates organs within the body.
- (3) that is enclosed in bone, including the brain and spinal cord.
- (4) that carries signals from the sensory organs in the skin to the brain.

Q3. Neuroconduction refers to the process by which

- (1) a neural signal is transmitted through a neuron.
- (2) a neural signal is transmitted from one cell to the next.
- (3) a neural signal is chemically transferred across a synapse.
- (4) neurotransmitters are created.

Q4. Glial cells

- (1) are not important in the nervous system.
- (2) are “sister” cells to the neuron.
- (3) transmit action potentials.
- (4) are the most abundant cells in the nervous system.

Q5. The 4 main lobes of the brain are

- (1) the frontal lobe, the parietal lobe, the temporal lobes, and the occipital lobe.
- (2) the frontal lobe, Wernickes area, the temporal lobes, and the occipital lobe.
- (3) the prefrontal lobe, the rear lobe, the occipital lobe, and the hearing lobe.
- (4) the cerebellum, the midbrain, the cortex, and the parietal lobe.

Q6. The limbic system of the brain

- (1) is located under the brainstem.
- (2) is located in the frontal lobe.
- (3) is located in midbrain.
- (4) supports the integration of sensory information.

Q7. The brain has many protection layers in place, including

- (1) myelin, the skull, and axons.
- (2) a surrounding layer of blood which supports buoyancy.
- (3) the skull, the meninges, and cerebral spinal fluid.
- (4) the skull, the prefrontal cortex, and the limbic system.

Q8. Which of the following is true:

- (1) Functional systems in the brain generally operate independently of each other.
- (2) Functional connections in the brain are always between regions that are anatomically adjacent to each other.
- (3) Functional systems in the brain only consist of sensory processing centers.
- (4) Functional systems in the brain do not operate independently and rely on the integration of information to create a complete picture .

Q9. Some examples of anatomical or structural imaging techniques include:

- (1) EEG, functional MRI (fMRI), and PET.
- (2) X-ray, CAT scans, and MRI.
- (3) X-ray, MEG, and functional MRI (fMRI).
- (4) EEG, CAT scans, and PET.

Q10. EEG and MEG

- (1) are thought to be direct measures of neural activity.
- (2) have excellent spatial resolution.
- (3) can be measured due to changes in blood flow in the head in response to a task.
- (4) can be used to measure activity from the firing of single neuron.

Q11. The universal standard for placement of EEG electrodes on the head is referred to as the

- (1) the international 20-20 placement system.
- (2) the international 10-20 placement system.
- (3) the international EEG placement system.
- (4) the international capping system.

Q12. Positron Emission Tomography (PET) scanning

- (1) requires the presence of a magnetic field to produce a signal.
- (2) require the use of a radionuclide tracer.
- (3) does not use any type of radiation.
- (4) measures electrical activity in the head.

Q13. Anatomical MRIs are best for viewing

- (1) bony structures in the head and body.
- (2) metabolic processes in the body.
- (3) soft tissue in the body, such as the brain.
- (4) functional activity in the brain.

Q14. In MRI, after the atoms are aligned in the strong static magnetic field,

- (1) we assume they are all pointing in different directions.
- (2) we apply a radio frequency pulse to change their magnetic properties.
- (3) we are finished collecting the image.
- (4) we apply a radio frequency pulse to tip them into the transverse (x - y) plane.

Q15. In MRI, tissue contrasting can be achieved

- (1) by using a radioactive dye.
- (2) by relying on the fact that different tissue types have different T1 and T2 properties.
- (3) by running a current through different types of tissues.
- (4) by using radionuclide tracers.

Q16. Which of the following is not true:

- (1) T1 is also called the longitudinal relaxation time.
- (2) T1 refers to the time it takes for the tipped atoms to return to their alignment within the magnetic field.
- (3) T1 is also called the resonant frequency.
- (4) In T1 tissue contrasting the cerebral spinal fluid appears darker than white and grey matter.

Q17. Which of the following is not true:

- (1) T2 is also called the transverse relaxation time.
- (2) In an imperfect (or inhomogeneous magnetic field), T2 is also affected by T2*.
- (3) In T2 tissue contrasting, the cerebral spinal fluid appears lighter than white and grey matter.
- (4) T2 is not a tissue dependent property.

Q18. The method in which the TR, TE, and gradient sequences are sequentially applied to collect an MRI image is referred to as the

- (1) pulse sequence.
- (2) the echo time.
- (3) the gradient echo time.
- (4) the time of repetition.

Q19. Both the raw functional and anatomical MRI images are always initially recorded

- (1) as NIFTI images.
- (2) in k -space (or frequency space).
- (3) in image space.
- (4) in cyberspace .

Q20. The basic principles of Functional MRI (fMRI) rely on the

- (1) blood oxygen level dependent (BOLD) signal.
- (2) blood accelerated level dependent (BALD) signal.
- (3) differing amounts of hydrogen atoms in the tissue.
- (4) differences in the T1 properties of different tissues.

Q21. Functional MRI (fMRI) data has lower spatial resolution than anatomical MRI images because

- (1) the images are collected very rapidly to capture the effects of changes in blood flow in response to changing oxygen needs of the activated neural tissue.
- (2) we do not care about spatial resolution in fMRI.
- (3) fMRI experiments are not designed well in most cases.
- (4) we do not sample high enough frequencies in k -space.

Q22. In fMRI, tasks are alternated between two experimental or cognitive conditions

- (1) to keep the subject from getting bored.
- (2) to allow enough time for the BOLD signal to return to baseline.
- (3) so that we can compare the data collected during each state to determine regions of activation.
- (4) so that we can apply universal fMRI experimental designs.

Q23. Which would be the best experimental design for a subject to carry out during a functional MRI (fMRI) scan

- (1) alternating between listening to music and looking at musical notes.
- (2) alternating between looking at faces and looking at shapes.
- (3) alternating between singing and wiggling the toes.
- (4) alternating between finger tapping and looking at a checkerboard.

Q24. Motion is perhaps one of the biggest sources of artifact in fMRI data. It can lead to

- (1) false positives in activation due to varying signal intensity, especially at the borders of the head and different tissue types.
- (2) slice timing problems.
- (3) susceptibility artifacts.
- (4) true positives in activation.

Q25. Normalization of brains refers to the process by which

- (1) individual subject brains are classified into the categories of abnormal or typical.
- (2) motion in the scans is minimized.
- (3) individual subject brains are warped into common brain space for comparison to the brains of other individuals or for group analysis.
- (4) the raw DICOM images are converted to NIFTI images.

Q26. First level analysis in fMRI refers to the process by which

- (1) an individual's brain is analyzed to find regions of activation that are specific to that person.
- (2) groups of brains are compared to determine differences in activation across subject types or clinical groups.
- (3) the data is cleaned of artifacts for further processing.
- (4) the raw DICOM images are converted to NIFTI files.

Q27. The gradient magnetic fields of an MRI machine

- (1) are used to help determine spatial location of an image.
- (2) are always on and could create a missile effect of magnetic objects.
- (3) are often denoted as B0.
- (4) are not an important part of an MRI machine.

Q28. The static magnetic field of an MRI machine

- (1) gets turned off at night.
- (2) only works when a scan is taking place.
- (3) poses no risks to safety.
- (4) is always on and could create a missile effect of magnetic objects.

Q29. Quenching of an MRI machine refers to:

- (1) Cleaning it with soap and water.
- (2) The missile effect created by the magnetic field.
- (3) The process by which the MRI machine collects an image.
- (4) The process by which the superconductivity of a scanner is lost, thereby causing a loss of the static magnetic field.

Q30. I am very grateful for this opportunity to come and teach this course because (hint: Choose answer D)

- (1) I have enjoyed meeting old colleagues and while making new professional connections. (If you come to the US please look me up. I'd love to show you our labs and research facilities there!)
- (2) You have all been wonderful students who are very attentive and ask great questions.
- (3) I have loved learning more about Indian culture and spending time in such a friendly and beautiful country.
- (4) All of the above.



CENTRE FOR MODELING AND SIMULATION
SAVITRIBAI PHULE PUNE UNIVERSITY

GIAN :: Modern Methods of Brain Exploration ...

Quiz 2016-18 • November 17, 2016 • 12:00–13:30

30 multiple-choice questions with 4 options each
6 pages including the answer sheet

1/NP

Instructions

- Write your name and GIAN ID below.
- For each question in the question paper, darken the circle corresponding to your answer to the question.
- The back side of the question paper can be used for rough work. Additional sheets will be provided if required.
- Question paper plus any additional sheets for rough work should be returned along with the answer sheet.

Grading

- Correct answer: 1 mark. Wrong answer or question not attempted: 0 marks.
- More than one answer to a question will be treated as a **wrong** answer.

Name:

GIAN ID:

Q↓	1	2	3	4
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q↓	1	2	3	4
16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

For Office Use

Correct answers : _____ × (+1) = + _____

Assessed by

Wrong answers : _____ × (−0) = − _____

Total attempted : _____ Total score : _____

Verified by