**Question 1**

Which of the following statements is correct regarding the cerebral circulation?

A The largest branch is the anterior cerebral artery

B The posterior communication artery joins the internal carotid artery and posterior cerebral artery

C The anterior cerebral artery is most likely to embolise

D The basilar artery is branch of the internal carotid

Explanation (B)

The middle cerebral artery is the largest vessel. Only the middle and anterior cerebral arteries branch off the internal carotid artery (ICA), the basilar artery is a branch of the vertebral artery. Near their termination, the internal carotids are joined to the posterior cerebral arteries by the posterior communicating arteries.

**Question 2**

In relation to the circle of Willis, which of the following statements is correct?

A Congenital aneurysms are more commonly found on the posterior cerebral artery (PCA)

B Most emboli lodge in the basilar part of the circle of Willis

C The anterior cerebral artery (ACA), the posterior cerebral artery (PCA) and middle cerebral artery (MCA) are all branches of the internal carotid artery (ICA)

D The middle cerebral artery (MCA) supplies the lateral surface of the brain and the temporal lobe

Explanation (D)

Congenital aneurysms are more commonly found on the anterior cerebral and anterior communicating artery. The posterior cerebral artery (PCA) is a branch of the basilar artery. Most emboli lodge in the carotid part of the circle of Willis, especially in the territory of the middle cerebral artery (MCA).

**Question 3**

The dorsal column pathways synapse in which of the following?

A Thalamus

B Cerebellum

C Gracile and cuneate nuclei

D Pons

Explanation (C)

The dorsal column (posterior white column) is wholly occupied by ascending fibers of the gracile and cuneate tracts. The two tracts end in the lower part of the medulla by synapsing with the cells of the gracile and cuneate nuclei. They are concerned with light (discriminative) touch, vibration sense, proprioception and the sense of fullness of the bladder and rectum

**Question 4**

Regarding the medulla oblongata, which of the following statements is correct?

A It is the part of the brainstem between the pons and spinal cord

B Is supplied by anterior inferior cerebellar artery

C Is largely within the middle cranial fossa

D Cranial nerves 8-12 arise from it

Explanation (A)

It is in the posterior cranial fossa. It is supplied by the vertebral and basilar arteries and the posterior inferior cerebellar artery. Cranial nerves 9, 10, and 12 arise from it.

Note: Cranial nerve 11 does not arise from the brainstem, rather from C1-5.

**Question 5**

Which of the following structures are not involved in the control of posture and movement?

A Tractus solitarius

B Vestibulo-spinal tract

C Lateral reticulo-spinal tract

D Spino-cerebellar tracts

Explanation (A)

The spinocerebellar tracts convey unconscious proprioceptive information from cord to cerebellum. The reticulo- and vestibulo-spinal tracts synapse with interneurons which in turn project to motor neurons. The vestibulo-spinal tract is of great importance for posture and balance. The reticulo-spinal tract Integrates information from the motor systems to coordinate automatic movements of locomotion and posture

The solitary tract and nucleus are structures in the brainstem which carry and receive visceral sensation and taste from the facial, glossopharyngeal and vagus nerves

**Question 6**

The posterior columns transmit which of the following structures?

A Pain afferents

B Motor tracts

C Tendon stretch afferents

D Temperature afferents

Explanation (C)

Temperature and pain afferents are transmitted by the spino-thalamic tracts

**Question 7**

Regarding the circle of Willis which of the following statements is correct?

A The posterior cerebral artery (PCA) is a branch of the internal carotid

B The middle cerebral artery (MCA) supplies the motor but not sensory cortex

C The anterior cerebral artery (ACA) is the largest branch of the internal carotid artery (ICA)

D The internal carotid artery (ICA) gives off the ophthalmic artery

Explanation (D)

Posterior cerebral artery (PCA) is a branch of the basilar artery, the middle cerebral artery (MCA) is the largest branch which supplies both the sensory and motor cortex

**Question 8**

Regarding the speech centres, which of the following statements is correct?

A Damage to Broca's area produces motor aphasia

B Broca's area is on the right side in most left handed people

C Wernicke's area controls motor response

D Damage to Wernicke's area produces expressive dysphasia

Explanation (A)

Left hemisphere is dominant for language in over 95% of right handers and in over 60-70% of left-handers. Wernicke's area is involved in the understanding of written and spoken language. Wernicke's area produces receptive aphasia when damaged. Broca's area is linked with speech production. (but new recent evidence demonstrates that Broca's area also plays a significant role in language comprehension)

**Question 9**

Regarding the ocular muscles, which of the following statements is correct?

A Abducens paralysis makes eye turn down and out

B In trochlear paralysis, the eye cannot look upwards when turned out

C Superior rectus makes eye turn up and out

D Combined action of superior rectus and inferior oblique causes vertical upward movement

Explanation (D)

Paralysis of the abducens nerve, abduction of the eyeball is lost. Superior rectus adducts, elevates and medially rotates the eyeball. Trochlear paralysis leads to inability to abduct, depress and medially rotate the eyeball

**Question 10**

Regarding the blood supply of the cerebral cortex, which of the following statements is true?

A The territory of the anterior cerebral artery (ACA) controls the contralateral leg, micturition and defacation

B The territory of the posterior cerebral artery (PCA) controls ipsilateral vision

C The territory of the middle cerebral artery (MCA) controls the ipsilateral arm, face and vision

D The territory of the anterior cerebral artery (ACA) controls the contralateral leg, auditory and speech

Explanation (A)

The MCA area of cortical distribution is the motor and sensory area for the opposite half of the body, excluding perineum, leg and foot, along with the speach and auditory area. The PCA controls the visual area for the field of vision on the opposite side.

**Question 11**

Which of the following statements is correct in relation to the midbrain?

A It is largely in the middle cranial fossa

B It lies between the pons and the upper spinal cord

C It is supplied by the anterior and inferior cerebellar arteries

D It contains the occulomotor nuclei

Explanation (D)

Most of the midbrain lies in the posterior cranial fossa, with its upper part passing through the tentorial notch. The midbrain is supplied by the posterior cerebral and superior cerebellar arteries as they curl around the cerebral peduncle. The medulla oblongata lies between the pons and the spinal cord. The internal structure of the midbrain contains the occulomotor nucleus

**Question 12**

Cerebrospinal fluid communicates with the subarachnoid space via which of the following?

A 4th ventricle

B Choroid plexus

C 3rd ventricle

D Tela Choroidia

Explanation (A)

It communicates via the foramina of the lateral rescesses of the 4th ventricle in an area termed the cerebello-medullary cistern.

The foramina through which the CSF flows are two lateral apetures of Luschka (L for lateral) and in the median apeture of Magendie (M for median)

**Question 13**

The motor nuclei of the facial nerve are found in which of the following areas?

A pons

B medulla oblongata

C midbrain

D cerebellum

Explanation (A)

The motor part of the facial nerve arises form the facial nerve nucleus in the pons, which the sensory part arises from the nervus intermedius which emerges between the pons and the inferior cerebellar peduncle, near the vestibulo-cochlear nerve.

Cranial nerve nuclei: 1st 4 above the pons, 2nd 4 in the pons, 3rd 4 below the pons

**Question 14**

A lumbar puncture needle passes through which correct series of layers to get CSF?

A Skin, subcutaneous tissue, supraspinous ligament, ligamentum flavum, interspinous ligament, dura, arachnoid

B Skin, subcutaneous tissue, interspinous ligament, ligamentum flavum, supraspinous ligament, dura, arachnoid

C Skin, subcutaneous tissue, ligamentum flavum, supraspinous ligament, interspinous ligament, dura, arachnoid

D Skin, subcutaneous tissue, supraspinous ligament, interspinous ligament, ligamentum flavum, dura, arachnoid

Explanation (D)

**Question 15**

In relation to the anatomy of the lateral ventricles of the brain, which of the following statements is correct?

A The choroid plexus extends into the canal Correct Answer

B The inferior horn is in the occipital lobe

C The posterior horn is in the temporal lobe

D The caudate nucleus is in the roof of the lateral ventricle

Explanation (A)

The caudate nucleus is in the floor of the lateral ventricle. The posterior horn extends into the occipital lobe and the inferior into the temporal lobe.

**Question 16**

Which of the following regarding the cerbrospinal fluid is false?

A 400-500 mls is produced daily

B It communicates between the 3rd and 4th ventricle via the cerebral aqueduct

C It is absorbed by the choroid plexuses

D The weight of the brain is only slightly heavier than the weight of the CSF

Explanation (C)

CSF is secreted (at a rate of 400-500ml/day) by the choroid plexuses in the lateral, third and fourth ventricle. The main site of absorption of CSF is through the arachnoid granulations, especially those that protrude into the superior sagittal sinus and its lateral lacunae. CSF leaves the lateral ventricles and passes through the interventricular foramina into the third ventricle. From the third to the fourth ventricle via the cerebral aqueduct and then via the median and lateral apertures in to the subarachnoid space. The brain is only slightly heavier (denser) than the CSF, because of this the gyri on the basal surface of the brain are in contact with the cranial fossa in the floor of the cranial cavity when a person is standing erect.

**Question 17**

Which of the following is true regarding brain herniation syndorme?

A Transtentorial herniation results in compression of the fourth cranial nerve

B Secondary haemorrhages do not occur following brain herniaton syndromes

C Subfalcine herniation results in compression of the anterior cerebral artery

D Tonsillar herniation is the most benign form

Explanation (C)

When the volume of the brain increases beyond the limit, permitted by the compression of veins and displacement of the cerebrospinal fluid, the pressure within the scull rises. Because the cranial vault is divided by rigid dural folds (the falx and the tentorium), localised expansion of the brain may cause it to be displaced in relation to theses partitions. If the expansion is severe, a brain herniation syndrome may occur.

Subfalcine (cingulate) herniation: occurs when unilateral or asymmetric expansion of a cerebral hemisphere displaces the cingulate gyrus under the falx cerebri. This may lead to compression of the anterior cerebral artery

Transtentorial (uncinate) herniation: occurs when the medial aspect of the temporal lobe is compressed against the free margin of the tentorium. The third cranial nerve can be compressed, resulting in pupillary dilation and impairment of ocular movements on the side of the lesion. The posterior cerebral artery may also be compressed resulting in ischaemia to the primary visual cortex. Progression of transtentorial herniation is often accompanied by haemorrhagic lesions in the midbrain or pons, called secondary brainstem (Duret) haemorrhages

Tonsillar herniation: displacement of the cerebellar tonsils through the foramen magnum. The type of herniation is life threatening because it compresses and compromises vital respiratory and cardiac centres in the medulla oblongata.

Extra: Monro-Kellie doctrine: Any change in the volume of the intracranial contents (e.g., a brain tumour, an accumulation of ventricular fluid caused by blockage of the cerebral aqueduct, or blood from a ruptured aneurysm) will be reflected by a change in intra-cranial pressure. This rule is called the Monro-Kellie doctrine, which states that the cranial cavity is a closed rigid box and that a change in the quantity of intracranial blood can occur only through the displacement or replacement of CSF