PSYCHOLOGY

Unit 3 – Written examination

2023 Trial Examination

SOLUTIONS

SECTION A: Multiple-choice questions (1 mark each)

Question 1

Answer: A
Explanation:

The Autonomic Nervous System is comprised of the Sympathetic and Parasympathetic Nervous System.

Question 2

Answer: C

Explanation:

The Somatic Nervous System is part of the Peripheral Nervous System which is responsible for motor movements. Messages are carried down the efferent pathway to the muscles and parts of the body which are involved in the actions.

Question 3

Answer: B

Explanation:

The afferent pathway of neurons in the somatic nervous system carries messages about various sensations to the brain and the efferent pathway of neurons carry messages linked to motor actions.

Question 4

Answer: C

When the Sympathetic Nervous System is triggered, the pupils dilate so that one can see more clearly and with more clarity and detail. This reaction enables the person to deal with a stressor or a stressful situation. The individual's heart rate and blood pressure are increased so more energy is created for quicker action as the blood circulation increases to distribute more oxygen around the body. Salivation decreases given that the process of digestion slows down and therefore, the mouth feels dry, and energy is directed to the limbs and other parts of the body that need to act quickly to deal with the threat. The bronchioles expand so as to increase the capacity of the lungs, so they work faster and expand.

Question 5

Answer: C

Explanation:

The Sympathetic Nervous System is activated to trigger the fight-flight-freeze response. It is part of the Autonomic Nervous system. The Parasympathetic Nervous System is also part of the Autonomic System, but it returns the body to homeostasis and creates a physiological "calming" effect reversing the effects of the Sympathetic Nervous System once the threat or emergency has dissipated.

Question 6

Answer: C

Explanation:

A voluntary action in which we give attention to a stimulus is a conscious response, not an unconscious response as we are aware of this action. The other suggested responses are all unconscious responses.

Question 7

Answer: A

Explanation:

Rashida's quick action of withdrawing her arm and hand in response to her burning these parts of her body with hot water was a spinal reflex. This is a survival mechanism. It is an action directed by the interneurons in the spinal cord so that it would occur without the direction of the brain for

it to happen in seconds and without a conscious awareness. Consequently, the interneurons send a message to the brain who makes sense of the action and intense pain is felt by Rashida.

Question 8

Answer: D

Explanation:

For a spinal reflex arc response to occur sensory information travels via the afferent pathway of neurons to the interneurons in the spinal cord. The interneurons then send the message via the efferent neural pathway to the muscles and parts of the body that need to make an urgent response during a threatening situation to enhance survival. This action is not directed by the brain, but the interneurons ensure that a quick action has occurred within seconds. Consequently, the brain is then informed of what has just occurred and it interprets what has just occurred making sense of the sudden response.

Question 9

Answer: B

Explanation:

The Autonomic Nervous System is part of the Peripheral Nervous System which controls the body's automatic internal responses which are self-regulated for survival, and not part of our conscious awareness. The Somatic Nervous System is also a part of the Peripheral Nervous System which includes the afferent and efferent pathways respectively carrying sensations to the brain and sending motor messages via the efferent neurons.

Question 10

Answer: D

Explanation:

Putting on a jumper when one feels cold or scratching an itch are activities that we do voluntarily. In contrast, the responses for C option such as sneezing, or blinking are unconscious reflexes linked to survival mechanisms. Responses such as shivering, sweating, or blushing are controlled by unconscious internal processes directed by the Autonomic Nervous System.

Question 11

Answer: B

Explanation:

Neurotransmitters can either be inhibitory or excitatory in nature and the release of neurotransmitters is localised to the synapse area in which they are released causing messages to travel very quickly to the receptor sites in the post-synaptic neuron. The neurotransmitters are released in the pre-synaptic neuron via the synaptic vesicles into the synaptic cleft.

Question 12

Answer: D

Explanation:

Glutamate is the major excitatory neurotransmitter which is involved in the process of Long-Term Potentiation which helps to form new neural pathways via repeated stimulation. This occurs via the process of sprouting, involving the growth of axons in terms of filigree appendages on the axon terminal of the pre-synaptic neuron or dendritic spines on the post-synaptic neuron, resulting in the dendrites appearing bushier. The formation of additional synapses where these dendritic spines and filigree appendages meet are referred to as synaptogenesis.

Question 13

Answer: B

Explanation:

Gamma-Amino-Butyric Acid (GABA) is one of the main inhibitory neurotransmitters which has the opposite effect of Glutamate on the Nervous System. It calms the Nervous System whereas Glutamate enhances the repeated firing of neural pathways in the Brain. If an individual has GABA in low levels the Nervous System, especially the Autonomic System could become overstimulated and cause issues with Anxiety. Hence, the heart rate and blood pressure can accelerate, and the lungs expand leading to increased respiration.

Question 14

Answer: A

Explanation:

Benzodiazepine is a drug that increase levels of GABA which will quieten the heightened effects of an aroused Sympathetic Nervous System such as an increased heart rate, respiration or blood pressure.

Question 15

Answer: D

Explanation:

Neuromodulators have a more diffused longer lasting effect as opposed to neurotransmitters who have a more localised effect in the synapses. Neuromodulators can change the effect of neurotransmitters at the synapse by making them more excitatory or more inhibitory.

Question 16

Answer: D

Explanation:

Dopamine is a neuromodulator that is involved in creating a reward pathway in which dopamine is increased when a reward is received, and the anticipation of the reward also causes an increase in dopamine. In both cases, the person experiences a high. The repeated stimulation of this Dopamine Reward Pathway encourages the addictive behaviour to be repeated given that dopamine levels within the brain begin to drop significantly when the behaviour is constantly repeated causing the urge for a greater hit for the individual's dopamine levels to increase.

Question 17

Answer: B

Explanation:

Serotonin is a neuromodulator that is involved in internal processes such as the pressure to go to sleep and to regulate your sleep-wake cycle as well as to balance emotions such as anger. Low levels of serotonin can lead to impulsive behaviour, aggression, and memory issues.

Question 18

Answer: B

Explanation:

For both scenarios, Angela and Joe come to the realisation in their primary appraisal that they have a serious problem which is a threat according to the Lazarus and Folkman's Model of Stress and Coping.

Question 19

Answer: B
Explanation:

Angela in her second appraisal of her situation with shopping addiction decides to take a proactive approach attempting to deal with her problem by seeking help from an expert and she is open to participating in hypnotherapy. Hence, she is problem-focused on her approach. On the other hand, Joe goes back to gambling and doesn't deal with the situation. Consequently, he displays an avoidance coping strategy as it is too difficult for him to deal with his problem, and he is in denial.

Question 20

Answer: B

Explanation:

All the other approaches can be classified as adaptive behaviours in dealing with the problem of addiction which could help with the situation. Denial is not an approach coping strategy. On the other hand, it is about pretending that the problem really does not exist and that makes it a maladaptive behaviour as nothing will be resolved.

Question 21

Answer: A

Explanation:

The Lazarus and Folkman Transactional Model of Stress and Coping is a psychological model, and it explains different psychological approaches to stressors. On the other hand, it does not cater for physiological responses to stress that influence the person's behaviour who is experiencing the stress.

Question 22

Answer: A

Explanation:

The repeated firing of neural pathways releasing glutamate when Aidan practised the piano, or the guitar tunes accurately helped to strengthen the neural pathway linked to the correct movements of playing the guitar or piano which were consolidated consistently. This process is called Long-Term Potentiation (LTP) and it helps to form strong memory traces and causes the process of learning to occur. When the wrong keys or chords are hit Long -Term Depression (LTD) occurs removing undesirable neural pathways as these are recognised as being incorrect

actions, so they fire less and less often and eventually forgotten. Consequently, the desired behaviours are repeated more often and consequently, learnt successfully.

Question 23

Answer: C

Explanation:

Glutamate is the main excitatory neurotransmitter in the brain which causes repeated firing, and which is involved in memory and learning. It is fundamental to the process of LTP which serves to consolidate information during the process of learning as synapses get strengthened.

Question 24

Answer: C

Explanation:

The playing of the piano is a learnt skill or procedural memory which is consolidated by the Cerebellum and involving the Basa Ganglia. We learn such skills by practising them. They become part of our implicit memories as opposed to explicit memories dealing with facts and autobiographical information.

Question 25

Answer: B

Explanation:

The words of the song are explicitly stored as part of an Explicit or Declarative Memory which deals with Semantic and Episodic memories. In this case, the words of the song would be a Semantic Memory.

Question 26

Answer: B

Explanation:

The cerebellum known as the ‘Little Brain’ is involved in the consolidation of Procedural Memories which are memories about remembering ‘how do things’ as opposed to remembering ‘ ‘what things’.

Question 27

Answer: B

Explanation:

Memories of past events form part of our explicit Declarative Memories which are stored as Long-Term Memories. They are called Episodic-Autobiographic Memories which focus on one's memories of events. as opposed to explicit Semantic Memories which are based on General Knowledge.

Question 28

Answer: B

Explanation:

If someone has Aphantasia they find it difficult to create mental pictures or images in their brain. This condition impairs someone from picturing past events and incidences (Episodic-Autobiographical Memories). Such individuals also lack the ability to picture themselves in future scenarios as they have to rely on Episodic-Autobiographical Memories in order to do this successfully (Episodic Future Thinking).

Question 29

Answer: C

Explanation:

Aphantasics have an inability to generate mental pictures in their mind. Consequently, producing mental imagery is a difficulty for them but other types of memory listed are possible.

Question 30

Answer: A

Explanation:

Joseph and his mate were experiencing bullying every afternoon over several weeks that can be described as an external stressor, developing from external circumstances in the environment and not developing from an internal stressor.

Question 31

Answer: D

Explanation:

Joseph is beginning to experience psychological symptoms such as feeling anxious and feeling the need to attempt the avoidance behaviour of not going to school at times. He also experiences the physical repercussions of the bullying experience such as stomach issues and increased sweating e.g., of the palms from feeing anxious.

Question 32

Answer: C

Explanation:

Joseph displays an avoidant strategy as opposed to trying to tackle the problem of bullying. If he was using an Approach Strategy, he would be tacking the problem, but he does not respond to the boys' taunts.

Question 33

Answer: B

Explanation:

In terms of Selye's General Adaptation Syndrome (GAS) model, Joseph would be considered to be in the Resistance Stage of the GAS model given that he has been dealing with the stress over an extended period of time. Consequently, the consistent release of cortisol to help the body respond to the stressor allows the body to remain on high alert over this time, energised and with high levels of glucose. Nevertheless, if Cortisol circulates in the body for too long it can depress the immune system and it makes the individual more susceptible to getting sick. This would explain why Joseph began catching colds more regularly and feeling unwell more often with indigestion and stomach upsets.

Question 34

Answer: B

Explanation:

As mentioned for Question 34 the higher levels of Cortisol have impacted Joseph's immune system (immunosuppression) and it has made him more susceptible to sicknesses such as colds.

Question 35

Answer: C

Explanation:

Joseph's fight-flight response was triggered after he works out a way of dealing with the bullying incidences on the bus causing a fight response based on an approach-coping strategy. The fight response was triggered by the sympathetic system which causes Joseph to move from the Counter-Shock stage to the Resistance Stage in dealing with the stressor.

Question 36

Answer: A
Explanation:

B to D options are all true with regards to the nature and use of Songlines. A. option is incorrect given that Songlines are based on oral information and not written information.

Question 37

Answer: C

Explanation:

Familiar places would act as a visual cue helping Lia to consolidate and retrieve certain information in a particular order as the information is sequentially memorised. Landmarks at a holiday destination not yet visited would not be as effective or successful for the Method of Loci compared to the other 3 responses which are based on very familiar locations to Lia.

Question 38

Answer: C

Explanation:

Unlike Western cultures, who rely on written texts, Aboriginal and Torres Strait Islander cultures pass on cultural information via oral and other muti-modal traditions such as using narratives, dance, visual metaphors, music, imagery, the mapping of places linked to sacred geographical locations, etc.

Question 39

Answer: C

Explanation:

Acronyms are memory tricks which chunk information for more effective recall using abbreviations. They do this by using the first letters of more complex words to form simpler words. These words act as cues in the consolidation and retrieval of these more sophisticated words to be remembered.

Question 40

Answer: B

Explanation:

The Gut-Brain Axis involves a network in which information travels to and from the brain and the Gut via the Vagus nerve forming part of the Enteric Nervous System. Chronic Stress, Anxiety and Depression can upset the balance of good bacteria and bad bacteria in the gut causing stomach issues such as ulcers, indigestion, etc.,

SECTION B: Short-Answer questions

Question 1a.

The neutral stimulus-the chickens

The unconditioned stimulus-chickens pecking at the grandmother and visitors.

The unconditioned response- intense fear of the pecking.

The conditioned response-intense fear of chickens.

Question 1b.

The repeated association of the chickens (NS) with the aggressive behaviour of pecking behaviour, especially that of the rooster (UCS) has caused Jacinta to develop an intense fear of chickens which were initially the neutral stimulus.

Question 1c.

The brain structures that would have been involved in the consolidation of the memory of Jacinta's intense fear linked to chickens would be the hippocampus and the amygdala. The

hippocampus is linked to the consolidation of memories and the amygdala triggers messages for this memory to be strengthened given it is an intense emotional memory. This is an adaptive survival mechanism helping us to recall vividly threatening situations and stimuli in the environment.

Question 2a.

Negative Punishment is applied as Rashida's privilege of using the family car on weekends has been taken away to decrease her behaviour of arriving late home on weekends and not sticking to the curfew time as arranged with her parents. On the other hand, Negative Reinforcement is based on taking something away to increasing a desirable behaviour.

Question 2b.

Rashida's parents could change their approach to punishing their daughter, Rashida by applying positive reinforcement as an alternative. For example, they could reward her with praise or extra privileges when she arrives home on time after going out on the weekend to increase the likelihood of this positive behaviour. They could also use positive punishment such as giving her extra chores to do if she comes home late to increase the chances of her coming home on time and causing the late behaviour to be extinguished. The positive reinforcement would be a more effective alternative as it rewards the desired behaviour as opposed to using punishment approaches, whether that is positive or negative punishment.

Question 3

Both negative reinforcement and positive reinforcement is based on increasing the desired behaviour with positive reinforcement giving the individual something they like or a desirable consequence. On the other hand, negative reinforcement is about taking something desirable away from the individual to increase the desirable behaviour. In contrast, negative punishment involves taking something desirable away from the individual to decrease their undesirable behaviour. The students provide an example for negative reinforcement, positive punishment, and negative punishment to demonstrate the different approaches to reinforcement or they can use one scenario and apply the different scenarios to it to show their understanding.

Question 4

The use of Songlines by Aboriginal and Torres Strait Islander cultural groups involve an oral narrative linked to the geographical features which in its recounting encompasses multimodal expressions of the story and the linked knowledge it imparts. These intertwined aspects include linked narrative songs, dance, art, music, and kinship relationships which work as memory cues facilitating the passing on and consolidation of knowledge. This multi-modal approach fosters an understanding of phenomena about the plants, animals, mankind, the heavens and all entities including mankind given that information is encoded in different parts of the brain. On the other hand, the method of loci used by western cultures employs the use of mental imagery linked to familiar spatial places like one's home, school or workplace or a familiar journey using key

landmarks. Each familiar location is used to encode and store a list of sequential words or information and it facilitates the retrieval of this information when one takes a mental journey to the specific location in a specific order. These locations act as visual cues with mental visual imagery facilitating the process. This method was used by the ancient poets and philosophers to recall passages that they would recite to audiences. With regards to Songlines, a range of mnemonic devices are used at the same time such as kinaesthetic movement, sound via the dances, imagery and colour through the use of created art works and even spatial cues by the fundamental use of geographical locations related to the land.

Question 5a.

The different "Ways of Knowing" and imparting cultural knowledge to their younger generations employed by Aboriginal and Torres Strait Islander groups is outlined in detail in the answer to question 4. This mode of imparting and preserving knowledge for future generations is based on a multi-modal approach which cleverly scaffolds the knowledge and focuses very much on an oral tradition taking different forms. The Western Cultural groups do have muti-modal ways of knowing but there is a greater focus on the written texts and communication as well as some oral components such as storytelling. Nevertheless, Indigenous cultures place a greater emphasis on the oral component, and it is fundamental to how they preserve and pass on cultural knowledge and all they understand about life and the world.

Question 5b.

In Aboriginal and Torres Strait Islander cultures learning is situated in a **'Kinship System'** meaning that learning is embedded in relationships which are defined through the system of Kinship connections. Everyone is situated within the kinship network and their position defines what knowledge they can hold and who they can share it with. The kinship network also is linked with different entities in the world including plants, animals, and locations. Also, different clans convey different aspects of knowledge when they unite. The students will give an example to show an understanding of this Kinship system by even talking about the role of the Elders in the network of relationships and the imparting of their cultural knowledge.

Question 6a.

Mariska is attempting to construct a possible imagined future of her reunion in ten years' time. This episodic future thinking involves tapping into her Declarative Memory system which comprises Explicit Memories. Mariska will use Episodic Memories (or known as Autobiographical Memories) which would provide specific details of what might happen during the imagined event of the future reunion and who might you meet there, and what they might do and look like. Researchers believe that we rearrange our memories of the past to put together a vision of what the future might look like. Semantic Memories are also used to provide the context of the imagined reunion event. This will provide details about the location of the reunion venue, the features of the place, the atmosphere and setting.

Question 6b.

If Mariska was subjected to a brain scan, the Neocortex, the Hippocampus, the Amygdala, and the Visual Cortex would be 4 key brain areas that would be activated as they are involved in constructing possible imagined futures. The hippocampus would take the role of encoding and retrieving personal memories (autobiographical memories) and the more general knowledge of semantic memories. The Neocortex is involved in storing personal memories and the general knowledge of facts and figures. The Visual Cortex would also be involved in conjuring up mental images of past and future events, people, and places. The Amygdala interacts with the hippocampus to link emotions to explicit episodic memories. For example, with regards to emotionally arousing episodic experiences, the hippocampus encodes the explicit memories of the event, whereas the amygdala encodes the emotions related to the event. When you retrieve the memory from the neocortex in the future, the hippocampus will help retrieve the 'the what' of the event and the amygdala would be triggered and help recall the associated emotions. This is also true of future-orientated imaginings.

Question 6C.

Phil has the condition of Aphantasia which affects 2-5% of the population. He is unable to conjure up mental images of a scene, a person or even an incident in his mind. People with Aphantasia struggle to 'relive' or mentally picture autobiographical events and consequently, they also have problems with episodic future thinking. In this case, Phil would have difficulty imagining a future reunion event in ten years' time as the capacity of mental imagery is required and the ability to recreate images from episodic memory and semantic memory. No Phil cannot overcome the inability to create mental pictures in his mind and there is no external intervention that would change this situation.

Question 7a.

Alex's grandmother's difficulty with her family members' names, and the fact that she seems to be living more and more in the past would be of concern to the neurologist. The fact that she talks about events in the past more like when she was a child or a young adult or that she mistakes her grandson for her brother shows that she is digressing into the world of the past. Moreover, Alex's grandmother cannot remember what happened yesterday or earlier on in the day. Therefore, she seems to be displaying anterograde amnesia because she forgets about recent events, names and details about her own identity and dates. She is displaying difficulty in encoding and consolidating Short-Term memories into Long-Term Memories as shown by her inability to remember what happened earlier in the day or yesterday. Hence, these mental impairments displayed by Alex's grandmother would raise red flags so the neurologist would think it necessary to test her for Alzheimer's Disease as these are features of someone with Alzheimer's Disease.

Question 7b.

This answer for **7b** is evident in the explanation given in **7a** to justify which stage of Alzheimer's Disease Alex's grandmother finds herself in when she is diagnosed.

Question 7c.

A brain scan of Alex's grandmother such as an MRI scan would show that compared to a healthy brain in that age group (especially around the hippocampal area in the earlier stages of the disease-)
- there is a build-up of amyloid plaques (Beta-amyloid proteins) between the synapses of neurons
-Neurofibrillary tangles occur when protein builds up in the neurons
-There is a decline in levels of the neurotransmitter of Acetylcholine which is a significant memory transmitter
- The neurons of the hippocampus begin to die affecting the encoding and the consolidation of memories and retrieval of memories.
_The beginnings of Brain Atrophy occur. Amyloid plaques and neurofibrillary tangles progressively damage the neurons, and they slowly die, and this leads to the brain tissue shrinking. Amyloid Plaques and Neurofibrillary tangles interfere with the flow of information and disrupt neural communication and eventually the neurons die leading to Brain Atrophy.

Question 8

As Alzheimer's Disease progresses retrograde amnesia develops for episodic-autobiographical memories. Given that this sort of memory as well as semantic memory, are crucial for the individual constructing imagined future projections they have difficulty imagining future or hypothetical events as do Aphantasic's. People with Aphantasia struggle to recall autobiographical events as well as imagined futures because they cannot visualise any type of imagery needed for both types of memories to work normally.

Researchers have found similarities between the process of remembering the past and imagining the future. Studies of people with Alzheimer's Disease have shown that there is a common brain neural pathway that is involved in both memory and imagination, and the use of mental imagery to mentally picture an object or event in the future. (Schacter et.al., 2012)

Question 9a.

The Social-Cognitive Approach to learning better known as Observational Learning follows four cognitive processes during as the model is observed. *Attention, Retention, Reproduction, Motivation and Reinforcement*. The young ballet students in the first stage carefully focused their awareness on the older Intermediate and Advanced Ballet students and the dance steps they performed.

In the second stage, *Retention,* the young ballet dancers mentally represent the observed steps by encoding visual, auditory, and motor images of the older Ballet dancers and their dance sequence. At this stage they encode symbolic representations via language explanations of the situation and steps they are observing as well.

The next stage, *Reproductio*n is the process whereby the young ballet students attempt to reproduce the dance steps they observed the older girls executing. They try reproducing the sequence of movements over many dance lessons after observing these older students in the same session doing them.

The last stage is *motivation and reinforcement*. The younger students would have been motivated to learn the observed dance sequence from the older students as they are held in high regard in the dance school, and they receive much praise and most of the awards by the end of the year. They are the elite group in the dance class, and they receive many accolades when they perform at the concerts. The younger students are also encouraged and motivated to do well by receiving reinforcements from the dance teacher and the older students in the form of praise and a McDonald's meal. They would also be intrinsically motivated to be like the older ballet students who dance with skill and mastery.

Question 9b.

Vicarious Reinforcement involves learning through observation of the consequences of actions for other people who act as models for certain behaviour. When a learner observes an individual they identify with and the role model receives reinforcement, the learner is motivated to imitate the behaviour as if they have been reinforced themselves or if they are punished they are less likely to imitate the behaviour of the model. In this scenario the older ballet dancers received a lot of positive reinforcement such as praise, adulation and a higher status in the dance company as a consequence of their ballet performances. Vicarious reinforcement would occur in this scenario as these positive consequences for the older ballet students would especially motivate the younger ballet students to learn the dance steps that they observe as they watch the older students complete their dance moves.

Question 10

a. It is hypothesised that university students who consume drinks with caffeine will score higher on memory tests than those students who drink decaffeinated drinks.

b. The experimental design used was *the Between Subjects Design*. It involved an experimental and control group. The experimental group was the one that consumed the caffeinated drink and the control group drank the decaffeinated drink. An alternative approach could have been the *Within Subjects Design* or the *Repeated Measures Design*. The same group would drink the caffeinated and decaffeinated drink at different times and then the effect of the drink on memory would be tested. An advantage of the *Between Subjects Design* is that it does not have *order effects* but one of its limitations is the possibility of participant differences as a variable that can become a confounding variable. On the other hand, the advantage of the *Within Subjects Design* is that individual differences between participants do not influence the results given the same group is compared for the different conditions (one being the IV). A limitation of the *Within-Subjects Design* is that the Order-Effect (or the Practice Effect) could influence the results as each subject has to be tested twice and may benefit from practising or react differently during the second trial/attempt.

c. Possible Confounding Variables-

-Participant differences based on different memory abilities and different IQ levels of the participants as this was not controlled for by pre-testing and using stratified sampling

-The cohort of university students was not screened in terms of what courses they were doing and what subjects they are doing which might explain different skills and memory capacities based on the modes of learning that they are familiar with

-The highlighting of the words and the delivery of the information may have impacted on how the information was remembered

-The participants were not screened for other substances before they took the caffeinated/caffeinated drink. Some of them might have had caffeinated drinks before the trial or other substances that could interfere with cognitive processing.

d. The results of this study cannot be generalised to the larger population as the sample study may not be representative of the population of students and that age group. There is not enough information about the university students or known participant differences to ascertain whether it is a representative sample for a range of characteristics, ages and genders. Moreover, the sample is too small as well. One could raise questions about the validity and reliability of the study.

e. The sampling procedure could have included stratified sampling based on representing all sub-groups of the population. The research could also control the variable of participant differences by using *within Subjects Design* which does cater for this aspect. Using the same subjects who would be tested with the caffeine or decaffeinated drink to test their effect on recall. *A Mixed Design* would have been even more optimal in this case, as it uses *Within and Between Participant Designs*. *A matched-Groups Participant Design* would also control the issue of participant differences. In this case, individuals from each the two groups are matched on several variables based on participant differences. With regards to the methodology, a pre-test or screening on a range of factors could have also given more information about the University students who participated and who volunteered to do this study via the University Portal. A pre-survey or interview would have been beneficial for the researchers to collect more information about the participants. The sample size could also have been larger for the researchers to be able to use a more representative sample for their study.

Question 11

A neuromodulator is a type of chemical messenger in the nervous system that modulates or changes the activity of neurons and therefore, the effect of neurotransmitters. Unlike neurotransmitters, which are released by neurons and bind to receptors on other neurons to transmit a signal, neuromodulators diffuse widely and can affect multiple neurons in a more widespread area. This includes Dopamine which has a reward pathway within the brain and, Serotonin has a widespread pathway as well. The effect of neurotransmitters is that they are more localised in a synapse. Modulators can either increase or decrease the activity of neurons, depending on the type of neuromodulator and the type of receptor it binds to. Dopamine can either increase or decrease the effect of a neurotransmitter and Serotonin decreased the activity of a neurotransmitter. Examples of neuromodulators include acetylcholine, norepinephrine, and

dopamine and serotonin. Moreover, the effect of neuromodulators manifests slowly and usually last longer in terms of minutes or hours compared to neurotransmitters which cause their effect in synapses in a matter of seconds. Neurotransmitters are relatively fast and capable of rapid changes in signal transmission.

Neurotransmitters are released from nerve endings into synaptic cleft after they are synthesised, and they bind to receptor proteins on the membrane of the postsynaptic cell, causing ionic channels to either open or close. Neurotransmitters, on the other hand, typically bind to pre-synaptic and post-synaptic G protein-coupled receptors to activate secondary molecules in order to initiate a second signalling cascade that would induce a long-lasing signal.

Question 12

This question is based on the Atkinson and Shiffrin Model of Memory (1968). One can explain the different parts of the model first and then show how Alice attempts to learn the diagram of the nervous system by applying this model. On the other hand, the different parts of the model can be explained with the scenario in a more integrated manner.

Alice attends to the information in the diagram via iconic and echoic sensory memory by visually seeing it when she reads it (Iconic Memory) and listening to the words (Echoic Memory) forming a sensory impression. This information is transferred into Short Term Memory and with the use of repetition (Maintenance Rehearsal) as she reads over it several times and then some of the information about the Nervous System is encoded into Long-term memory. When Alice arrives at home she uses maintenance rehearsal again by reading and repeating the information to herself again. She further consolidates the information into Long-term memory by using elaborative rehearsal as she encodes the information with greater meaning by explaining it to herself and to understand it by referring to her own examples. Therefore, with this second attempt she encodes the information on a deeper level connecting the information to her schema for this concept by linking it with its meaning. When Alice tries to reproduce the diagram based on The Parts of the Nervous System, she retrieves it from Long-term memory and transfers the information into Short-Term memory and various parts of the neocortex contribute to the STM recreating the diagram with the visual information based on The Nervous System.

Question 13

Applying the GAS Model to the Scenario-

When the COVID pandemic begins, Jessica has a lot to deal with not only with the fear of the unknown but with the fact that her business has had to close and no longer does she have customers who are able to come to her restaurant. She is at a loss as to how to keep her business afloat and continuing to make a living and consistently pay her staff. According to the GAS Model, her behaviour can be explained in terms of her being at the first stage- *the Alarm stage* and at the initial *Counter-shock stage* which is like a freeze stage where she cannot cope with this threat. Once she comes up with a solution to her problem she goes into the *Counter-Shock Stage* as part of the *Alarm Stage* as her Flight-Fight Response begins to kick in and her *Sympathetic Nervous System* accelerates and causes her to begin to deal with her initial distressing situation

caused by the COVID pandemic. Adrenaline and Noradrenaline is released into blood stream and Cortisol as well which accelerate all her efforts to get the job done of changing the nature of her business to a delivery service online and to diversify it even more to keep it running. As Jessica manages to keep coping with her situation and dealing with it over the height of the pandemic, she remains in the *Resistance stage* with greater release of Cortisol. At this point, she faces greater challenges once lockdown is lifted but with restrictions, which limit her clientele and the success of the business. The circulation of Cortisol at higher levels slowly compromises Jessica's immune system especially with further hurdles such as her fall and the breaking of her leg which leads to time off for rehabilitation. This situation helps leads to Chronic stress which can cause a range of health issues such as high blood pressure, and high sugar levels. Jessica begins feeling that she can no longer cope after many issues causing continuous stress and loses hope after persevering during the last couple of years. Consequently, Jessica may most likely move into the *Exhaustion Stage* of the GAS model if she continues along this trajectory.

This model's strength is that it explains Jessica's physical responses consistent with her actions and considers her physiological reactions linked to the various stressors she encounters and especially, explains her Flight-Fight- Freeze Responses. It does not fully cater for psychological responses since it is a model based on physiological responses.

Applying the Lazarus and Folkman's Transactional Model of Stress and Coping to the Scenario:

This model views the individual who undergoes a stressful situation as a transaction between the person and the environment. This model proposes that stress is a subjective experience that varies depending on how they interpret the stressor and perceive their own ability to cope with it. The model emphasises how a person interacts with the environment, and stress is viewed because of how a person appraises (evaluates) a situation and their ability to cope with it. It talks about primary and then secondary appraisal. In this scenario, the COVID pandemic begins causing challenges and stresses with regards to Jessica keeping her business afloat. Jessica initially appraises the situation and sees the pandemic and her related problems as a threat and feels that she can't cope (distress). In a secondary appraisal she works out that she can cope with the stressors and that she can change the nature of her business and diversifying it so that she can still make money. (Eustress) She thinks about all the things she can do as described above. (Approach-Coping Strategy) Consequently, with this mindset she begins to cope. But with further stressors leading to Chronic stress with issues of re-opening her business and its limitations as a viable business, the breaking of her leg and the rehabilitation time needed from work and the other issues Jessica reappraises her situation and begins to feel that she has done everything to cope but goes into distress as she feels there is no hope.

This model's strength is that it explains Jessica's psychological responses and decisions and Jessica's changing mind-set throughout this experience. It caters for different individual responses to stressors. It distinguishes between Eustress and Distress and how they can be achieved by the individual. The model also explains approach and avoidance-coping approaches to stressors. It also highlights that people can change their appraisal of a stressor and their response to it as Jessica does in the scenario described above. Unlike Selye's model of stress

(GAS Model) it considers a range of psychological individual's such as the person's personality, motivation, confidence, etc., Nevertheless, it does not take into account physiological reactions due to stressors and it is a subjective explanation of one's stress response which is difficult to test through experimental research. Sometimes primary appraisal and secondary appraisal are not clear cut and difficult to separate.

Applying the Gut-Brain Axis Model to the Scenario:

The GBA is a network of bidirectional (two-way) neural pathways that enable the communication between bacteria in the gastrointestinal (GI) tract and the brain. It is part of the Enteric System which forms part of the Autonomic Nervous System linked to the Fight-Flight-Freeze Response. Research into the GBA is a new field in psychology exploring how stress can influence the microbiota in the Gut and hence, the Enteric Nervous System that it is part of. Jessica's prolonged chronic stress caused by multiple stressors at the Resistance Stage caused her to develop stomach issues such as reflux and indigestion. It has been found that Dysbiosis (when the gut bacteria become less diverse and there is no longer a healthy balance of bacteria) has been linked to prolonged stress such as Jessica's Chronic stress causing the repeated activation of the HPA Axis that causes the release of adrenaline, noradrenaline, and cortisol. Dysbiosis can cause a range of digestive issues and reduce the effectiveness of the immune system. This could explain Jessica's issues of reflux and indigestion and other illnesses experienced during her long-term stress experience.
This model helps to explain the health issues especially the stomach problems that chronic stress causes such as it did for Jessica in the scenario above. Nevertheless, on its own the Gut-Brain Axis Model does not cater for her psychological responses and the full extent of the physiological reactions. Nevertheless, more research is still needed in this area for a full understanding to its link to stress.