

Question Paper

Exam Date & Time: 27-Jan-2021 (10:00 AM - 01:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST MBBS DEGREE EXAMINATION - JANUARY 2021
SUBJECT: PHYSIOLOGY - PAPER II

Marks: 100

Duration: 180 mins.

Answer all the questions.

Section Duration: 20 mins

- 1) An individual after head injury can recall old events but the process of consolidation leading to formation of long term memory from recent events is lost. This is probably due to damage in: (1)

[Amygdala](#)
[Hippocampus](#)
[Hypothalamus](#)
[Midbrain](#)

- 2) During the recovery stage from spinal shock following complete transection at T10 level, which of the following is likely to be observed in the function of urinary bladder? (1)

[Automatic emptying of bladder occurs](#)
[Detrusor tone is regained but the sphincters remain atonic](#)
[Sensation of bladder fullness is appreciated](#)
[Voluntary control over micturition is regained](#)

- 3) A 65 year old man presents with shuffling gait, pill rolling movement, tremors at rest, mask like face and difficulty in initiating movement. Ballistic movements seem normal. Truncal ataxia and dysmetria are absent. On further neurological examination, he is also likely to exhibit: (1)

[Ankle clonus](#)
[Babinski sign bilaterally](#)
[Cog Wheel rigidity](#)
[Pendular knee jerk](#)

- 4) Fluent speech, neologism, deficit in language comprehension are characteristics of damage to which of the following areas of the categorical hemisphere? (1)

[Angular gyrus](#)
[Cingulate gyrus](#)
[Inferior part of precentral gyrus](#)
[Posterior part of superior temporal gyrus](#)

- 5) On instilling warm water in a normal individual's left external auditory meatus, you would most likely expect (1)

[Bilateral blinking of eyelids](#)
[Both eyes to drift slowly to the left](#)
[A nystagmus with a quick component to the left](#)
[No response if the semicircular canals are normal](#)

- 6) Which of the following sequences correctly represents the reflex arc when a skeletal muscle is stretched by a sharp tap on its tendon? (1)

[Muscle spindles - Group II afferents - Single interneuron - Gamma motor neurons - Intrafusal fibers](#)

[Golgi tendon organs - Group Ib afferents - Alpha motor neurons - Intrafusal fibers](#)

[Muscle spindles - Group Ia afferents - Alpha motor neurons - Extrafusal fibers](#)

[Golgi tendon organs - Group Ia afferents - Gamma motor neuron - Alpha motor neurons - Extrafusal fibers](#)

- 7) Which of the following conditions describes the deficit resulting from damage to an area located on the medial aspect of postcentral gyrus on the right side? (1)

[Flaccid paralysis of the small muscles of the left hand](#)

[Paralysis of the muscles of the larynx and pharynx](#)

[Poor localization of tactile sensation of the dorsum of left foot](#)

[Loss of affective component of pain inflicted on either side of body](#)

- 8) Which of the following is CORRECT with regard to taste modalities and taste transduction? (1)

[Sweet taste is due to activation of metabotropic glutamate receptors](#)

[Umami taste is due to activation of ligand gated channels](#)

[ENaC related channel is involved in the signal cascade associated with the salt sensation](#)

[Sour taste is detected by G- protein coupled taste receptors](#)

- 9) If eye ball is shorter than normal and the parallel rays of light are brought to the focus behind the retina, the person is still able to see distant objects because: (1)

[Light rays are divergent from distant objects](#)

[Accommodation occurs for viewing distant objects](#)

[Pupillary constriction helps to focus the rays on retina](#)

[Less muscular effort is needed to focus distant objects](#)

- 10) A 32 year old man complains of impaired memory after thyroid surgery. History reveals muscle cramp involving lower back, legs and feet with experiences of tingling in the lips and fingers. Upon examination, Chvostek sign is elicited. Which of the following would most likely be expected in this patient? (1)

[Decreased plasma calcium level](#)

[Increased 1 alpha-hydroxylase enzyme activity](#)

[Increased phosphate excretion](#)

[Increased parathyroid hormone levels](#)

- 11) Which of the following hormones initiates a biological effect by activation of adenylyl cyclase- cAMP second messenger system? (1)

[Aldosterone](#)

[Corticotropin releasing hormone](#)

[Cortisol](#)

[Progesterone](#)

- 12) A 5 year old boy is brought to the hospital for stunted physical growth. The child is found to be mentally normal for his age. Replacement of growth hormone will stimulate physical growth by which of the following mechanisms? (1)

[Stimulating growth of cartilage cells](#)

[Inhibiting the hepatic production of IGF1](#)

[Potentiating the action of parathyroid hormone on bone](#)

[By synergistic action with cortisol](#)

- 13) In untreated diabetes mellitus, the liver fails to extract glucose from plasma and continues to produce glucose regardless of its plasma concentration and consequently hepatic glucose output increases. Which of the following most likely contributes to this? (1)

[Increased glucokinase activity](#)

- [Decreased phosphorylase activity](#)
- [Increased gluconeogenesis](#)
- [Decreased insulin-dependent glucose transport in the hepatocytes](#)

14) Cardiovascular effects of epinephrine and norepinephrine are studied by slow infusion of these hormones. The fall in the cardiac output seen with norepinephrine infusion is best explained by which of the following? (1)

- [Norepinephrine causes decrease in peripheral vascular resistance](#)
- [Norepinephrine increases mean arterial pressure causing reflex bradycardia](#)
- [Stroke volume is reduced by norepinephrine by \$\beta_1\$ receptor activation](#)
- [Norepinephrine causes reduced venous return by venodilation](#)

15) hCG (human chorionic gonadotropin) is a hormone of early pregnancy and can be detected in the blood as early as 6 days after conception. hCG is essential to sustain early pregnancy because it helps to: (1)

- [Maintain the corpus luteum](#)
- [Stimulate the growth of placenta](#)
- [Enhance the growth of endometrium](#)
- [Increase the contractility of myometrium](#)

16) Individuals with XXY pattern have genitalia of normal males; testosterone secretion is great enough to produce male characteristics, but have abnormal seminiferous tubules and the incidence of mental retardation is higher than normal. The above features are characteristic of: (1)

- [Klinefelter syndrome](#)
- [Androgen-resistance syndrome](#)
- [Down syndrome](#)
- [Male pseudo hermaphroditism](#)

17) Which of the following is the correct sequence of events occurs after cervical stretching induced by fetal descent during parturition? (1)

- [Enhanced uterine contractions, Expulsion of placenta, Stimulation for oxytocin release, Expulsion of fetus.](#)
- [Stimulation for oxytocin release, Enhanced uterine contractions, Expulsion of fetus, Expulsion of placenta.](#)
- [Expulsion of placenta, Stimulation for oxytocin release, Enhanced uterine contractions, Expulsion of fetus.](#)
- [Expulsion of fetus, Stimulation for oxytocin release, Enhanced uterine contractions, Expulsion of placenta.](#)

18) Which of the following actions is mediated by the gastrointestinal hormone, Secretin? (1)

- [Stimulation of D cells of islets of Langerhans](#)
- [Stimulation of alkaline pancreatic secretion](#)
- [Inhibition of action of CCK in producing enzyme-rich pancreatic secretion](#)
- [Relaxation of pyloric sphincter and hastened gastric emptying](#)

19) Which of the following is TRUE regarding the response of the gallbladder following a fat-rich-meal? (1)

- [The fatty meal causes closure of sphincter of Oddi and relaxes gall bladder smooth muscle](#)
- [Smooth muscles of gall bladder are inhibited by the fatty acids in the meal](#)
- [Atropine blocks the effect of cholinergic action on sphincter of Oddi](#)
- [Release of cholecystokinin causes vagovagal reflex to cause contraction of gall bladder](#)

20) Which of the following functions of the gastrointestinal tract is mediated by the myenteric plexus? (1)

- [Activation of brush border enzymes](#)
- [Afferent discharge from the gut distension receptors](#)
- [Peristalsis in the small and large intestines](#)
- [Secretion of water and electrolytes in intestine](#)

Answer all the questions.

Essays:

1. A 60 year old woman is referred to an ophthalmologist for visual field evaluation by her family physician. She is diagnosed with a pituitary tumor compressing the central portion of optic chiasm.

- 1A) Using a labeled diagram explain the visual pathway. (5)
- 1B) Explain the type of visual field defect that would be observed in the above case. (2)
- 1C) Explain the cortical representation of the retina. Write briefly on macular sparing. (3)

2. A 50 year old housewife complains of progressive weight gain of 8 kg in one year, fatigue, loss of memory, slow speech, deepening of her voice, dry skin, constipation, and cold intolerance. She is moderately obese and speaks slowly and has a puffy face, with pale, cool, dry, and thick skin. She has diffuse goiter; her serum T₄ concentration is low and serum TSH concentration is elevated. Serum cholesterol is slightly elevated.

- 2A) Comment on the thyroid status in this patient and give reasons for the clinical manifestations. (3)
- 2B) Describe the actions of thyroid hormones on intermediary metabolism and on the cardiovascular system. (4)
- 2C) Mention the role of TSH in normal thyroid function. Justify the reason for high TSH and cholesterol levels in this patient. (3)

3. Short note questions:

- 3A) Using a suitable example, explain the generation of receptor potential. List the properties of receptor potential. (4)
- 3B) Briefly explain any one homeostatic function of the hypothalamus. (4)
- 3C) Explain in detail the different waves in an electroencephalogram (EEG). (4)
- 3D) Draw a labeled diagram of dorsal column-medial lemniscal pathway. Explain how this tract is different from the anterolateral system? (4)
- 3E) Explain the role of gamma motor neuron in regulation of muscle tone. (4)
- 3F) Explain the neural connections and functions of cerebocerebellum. (4)
- 3G) Using appropriate examples, explain the role of conditioning in learning. (4)
- 3H) Based on middle ear function, explain how middle ear damage can cause hearing loss. (4)
- 3I) Outline the steps in synthesis of steroid hormones from the adrenal cortex. Write briefly on congenital adrenal hyperplasia. (4)
- 3J) Briefly explain immunological test for pregnancy. Add a note on fetoplacental unit. (4)
- 3K) Explain the changes that occur in the ovary during a normal menstrual cycle. Give the hormonal basis for these changes. (4)
- 3L) Briefly explain the factors that regulate spermatogenesis. (4)
- 3M) Briefly explain the intestinal digestion and absorption of fat. (4)
- 3N) Explain the pharyngeal phase of deglutition. (4)
- 3O) Explain the role of the vagus nerve in regulation of gastric acid secretion. (4)

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