Long Answer Type Question

Q. 1. How can you distinguish hypothyroidism and hyperthyroidism? (KVS Silchar 2017)

Ans. (i) Hyperthyroidism is increased levels of thyroid hormones whereas hypothyroidism is decreased levels of thyroid hormones.

(ii) Hyperthyroidism can lead to Grave's disease whereas hypothyroidism does not produce these diseases.

(iii) There is faster metabolism in hyperthyroidism while there is a slow metabolism in hypothyroidism.

(iv) Hypothyroidism is treated by supplements of thyroid hormones and hyperthyroidism is treated by anti-thyroid drugs.

(v) Hypothyroidism shows decreased levels of T3 and T4 and increased levels of TSH whereas in hyperthyroidism, there is an increased levels of T3 and T4 and a decreased level of TSH.

Q. 2. Suggest five measures that can be proposed at global level for the prevention and control of diabetes and its complications. (KVS Agra 2017)

Ans. (i) Follow a meal plan that is planned for you with your healthcare team: Look for recipes that are low in saturated fats, trans fats, cholesterol, salt (sodium), and added sugars. Include in your diet fruits and vegetables, fish, lean meats, chicken or turkey without the skin, dried peas or beans, and low-fat or non fat milk and cheese.

(ii) Limit your portion sizes (use the plate method): Make half your plate vegetables and fruit, one quarter of the plate a lean protein food, and one quarter of the plate a whole grain food.

(iii) Exercise safely every day: Talk to your healthcare provider before staring any exercise program, and take small steps until you can build up to at least 30 minutes most days of the week. A brisk walk is excellent exercise.,

(iv) Do not smoke cigarettes or use any tobacco products: As they can make diabetic complications worse.

(v) Take your medicines the way your healthcare provider asks you to.

(vi) Have our eyes checked regularly : People with diabetes should see an eye care specialist, an ophthalmologist, at least once a year to check for damage to their retinas. **(Any five)**

Q. 3. What are the properties of hormones ? And how are they different from enzymes ?

Ans. The properties of hormones are :

(i) They are synthesized and secreted by living glandular cells within the body.

(ii) They are transported by blood stream to serve as chemical messengers which act on target cells.

(iii) They do not provide energy but they do have effects on growth differentiation and metabolic activities of their target cells.

(iv) They are effective in low concentration. Their excess or deficiency leads to disorders.

(v) They may accelerate or inhibit physiological process.
(Any five)

Differences between Hormone and Enzyme:

S. No.	Hormone	Enzymes
(i)	They are produced at one site and are passed through blood to another site for action.	They may act at site where they are produced or carried to another site for action.
(ii)	They have low molecular weight.	They have high molecular weight.
(iii)	They may accelerate or retard the specific reactions.	They speed up the reactions.
(iv)	They are effective in low concentration.	They are effective in low concentration and can increase the reaction with an increase in the concentration.
(v)	Hormone controlled reactions are irreversible.	Enzyme controlled reactions are reversible.

Q. 4. Explain the structure of pancreas and also mention the roles of the hormone secreted by it. [KVS 2013-14]

Ans. Structure of Pancreas : The pancreas lies inferior to the stomach in the first C-shaped bend of the duodenum. It acts both an exocrine and endocrine gland and thus is a composite gland. The tissue of the pancreas has in addition to the acinar cells, groups of cells called islets of Langerhans, which produce endocrine secretions. **Four kinds of cells that have been identified in the islets :** (a) Alpha cells produce glucagon, (a) Beta cells produce insulin, (c) Delta cells produce somatostatin, (d) PP cells produce pancreatic polypeptide.
Hormone of Pancreas and their Roles :

(i) Glucagon : It stimulates the liver to convert stored glycogen into glucose. It is controlled by feedback in accordance with the glucose in the blood.

(ii) Insulin : It is antagonistic to glucagon. Insulin decreases the level of glucose in the blood. It acts by increasing the rate at which glucose is transported out of the blood and into cells and by stimulating muscles cells to take up sugar from the blood and convert it to glycogen.

(iii) Somatostatin : It suppresses the release of other hormones from the pancreas. It also appears to suppress the release of hormone from the digestive tract.

(iv) Pancreatic polypeptide : It appears that pancreatic polypeptide inhibits the release of digestive secretion of the pancreas.

Q. 5. Name the hormones that regulate each of the following and mention the source of it:

(i) Uterine contraction,

(ii) Ovulation,

(iii) Rise in blood sugar,

(iv) Fall in calcium ion level in blood,

(v) Urinary elimination of water.

Ans. (i) Uterine contraction : Oxytocin is secreted by posterior pituitary (Neurohypophysis). It regulates uterine contraction of smooth muscles during child birth.

(ii) Ovulation : Luetinizing Hormone (LH) secreted by anterior pituitary (adenolypophysis) regulates the ovulation.

(iii) Rise in blood sugar : Insulin secreted by Islets of Langerhans regulate rise in blood sugar.

(iv) Fall in calcium ion level in blood : Parathormone secreted by parathyroid gland regulate rise in blood sugar.

(v) Urinary elimination of water : ADH secreted by posterior pituitary (neurohypophysis) is called **vasopressin**. It decreases the volume of water by increasing reabsorption from urine.

Q. 6. Illustrate the summary of the hormones secreted by hypothalamus. (Any five)

Ans. The neurosecretory cells (neurons) of hypothalamus secrete hormones called neurohormones (releasing factors) which are summarised below.

(i) Adrenocorticotropic releasing hormone (ACTRH) : It stimulates the anterior lobe of the pituitary gland to secrete adrenocorticotropic hormone (ACTH).

(ii) Thyrotropin releasing hormone (TRH): It stimulates the anterior lobe of the pituitary gland to secrete thyroid stimulating hormone (TSH) or thyrotropin.

(iii) Somatotropin Releasing hormone (SRH) : It stimulates the anterior lobe of the pituitary gland to release growth hormone (GH) or somatotropin.

(iv) Growth inhibiting hormone (GIH): This hormone is also called somatostatin (SS). It inhibits the secretion of growth hormone from the anterior lobe of the pituitary gland.

(v) Gonadotropin releasing hormone (GnRH) : It stimulates the anterior lobe of the pituitary gland to secrete two gonadotropic hormones : follicle stimulating hormone (FSH) and luteinizing hormone (LH). **(Any five)**

Q. 7. Differentiate between vitamin, hormone and enzyme.

Ans. Differences between vitamin, hormone and enzyme:

S. No.	Vitamin	Hormone	Enzyme
(i)	It is carried in the food.	It is carried by the food.	It is not carried in the food.
(ii)	It is used up during the process.	It is consumed during the metabolic process.	It remains unchanged after the reaction.
(iii)	It is obtained from food.	It is produced by an endocrine gland.	It is produced by exocrine gland.
(iv)	It may be organic acid, amide, amine, ester, alcohol or steroid.	It is a glycoprotein, steroid or polypeptide.	It is always proteinaceous in nature.
(v)	It act as coenzyme.	It act as a stimulating substance.	It act as a biocatalyst.
(vi)	Its deficiency causes deficiency diseases.	Its excess as well deficiency causes many hormonal disorders and diseases.	It is required in small amount.

Q. 8. Give a brief account of the hormones secreted by adrenal cortex.

Ans. Adrenal cortex secretes cortical steroids that are grouped into three catagories: mineralocorticoids, glucocorticoids and gonadocorticoids.

(i) Mineralocorticoids : (a) These hormones are secreted by the cells of zona glomerulosa or adrenal cortex. **(b)** Aldosterone (salt-retaining hormone) is the principal mineralocorticoid in humans. Its main function is to regulate the balance of water and electrolytes in our body. Aldosterone acts mainly at the renal tubules and stimulates the reabsorption ion of Na^+ and water and excretion of K^+ and phosphate ions.

(ii) Glucocorticoids : (a) They effect carbohydrate metabolism, however, they also affect the metabolism of proteins and fats. Glucocorticoids stimulate gluconeogenesis, lipolysis and proteolysis and inhibit cellular uptake and utilisation of amino acids.

(iii) Gonadocorticoids : (a) They are also called sex hormones of adrenal glands. **(b)** These male sex hormones are called androgens which are important in the development of a male foetus. **(c)** A male foetus develops normal male characteristics only if the foetal gonads and adrenal glands produced sufficient quantities of androgens **(d)** Androgens stimulate the development of male secondary sexual characters like distribution of body hair. **(f)** Female sex hormones secreted by the adrenal cortex are oestrogens which maintain the development of female secondary sexual characters.

Q. 9. What are the hormones produced by anterior pituitary ? What function does each serve ?

Ans. The principal hormone produced by anterior lobe of pituitary are following :

(i) Follicle Stimulating Hormone (FSH) : It stimulates the testis in man to produce sperms i.e., spermatogenesis and ovaries in female to produce ova (oogenesis). It also stimulates ovaries to secrete female sex hormone called estrogens.

(ii) Luteinizing Hormone (LH): It stimulates testis to secrete male sex hormone named androgens and testosterone. It also stimulates ovaries to secrete the female sex hormone called progesterone. In females together with FSH it triggers ovulation, stimulates conversion of ovarian follicles into corpus luteum which secretes oestrogen and progesterone.

(iii) Prolactin Hormone (PLH) or Luteotropic Hormone (LTH) : It stimulates milk production and secretion, reproduction, osmoregulation, growth and metabolism.

(iv) Thyroid stimulating hormone : It stimulates the growth of thyroid gland and the secretions of thyroid hormones.

(v) Adrenocorticotropic Hormone: It stimulates the adrenal cortex to grow and secrete glucocorticoids, mineralocorticoids and gonadocorticoids.

(vi) Growth Hormone (GH) : It stimulates growth of a body by stimulating retention of proteins and calcium in the body, synthesis and deposition of proteins in tissues, growth and elongation in long bones and proportionate growth of muscles and visceral organs.

(vii) Melanocyte Stimulating Hormone (MSH) : It appears to be functional only in cold blooded animals such as fishes, amphibians and reptiles. It makes the skin darker or lighter so that animals can protect themselves from the attack of enemies.

Q. 10. Write any five reasons by which a person can become type 2 diabetes patients.
(KVS Silchar 2017)

Ans. Following are the five reasons :

(i) Insulin resistance is the most common cause of type 2 diabetes.

(ii) It can be hereditary.

(iii) Lifestyle choices that affect the development of type 2 diabetes include :

(a) Lack of exercise : Physical activity has many benefits-one of them being that it can help you avoid type 2 diabetes, if you're susceptible.

(b) Unhealthy meal planning choices : A meal plan filled with high-fat foods and lacking in fibre increases the likelihood of type 2 diabetes.

(c) Overweight/Obesity : Lack of exercise and unhealthy meal planning choices can lead to obesity, or make it worse. Being overweight makes it more likely that you'll become insulin resistant and can also lead to many other healthy conditions.

Q. 11. Explain the following :

(i) Insulin lowers the blood sugar level.

(ii) Hypothalamus and pituitary function as an integrated and co-ordinated system.

(iii) Body growth is generally accelerated at puberty in the male.

Ans. (i) Insulin hormone is secreted by pancreatic islets. Insulin increases the utilization of glucose in tissues and facilitates the storage of glucose as glycogen in muscles and liver. By these actions insulin lowers the blood sugar level.

(ii) It is fact that Hypothalamus and Pituitary function as an integrated coordinated system. In hypothalamus, the hormones are synthesized in the neurosecretory cells body and then transported along the axon to its tip where the hormones are stored in droplets. Hypothalamic neuro-secreting cells secrete several hormones called neurohormones into this blood. These reach the anterior pituitary through the portal blood and control the secretion of hormones by the cells of that gland.

For example : Thyrotropin releasing hormone, corticotropin releasing hormone and gonadotropin releasing hormone of hypothalamus stimulates the anterior pituitary to secrete the hormones called thyrotropin, corticotropin and gonadotropins respectively. On the other hand the hormone somatostatin of the hypothalamus inhibits the secretion of growth hormone (GH) from the anterior pituitary.

(iii) Sex hormones are secreted near the age of puberty or sexual maturity. Testosterone stimulates the development of the external male sex characters such as beards, moustaches, and low pitch male voice in man. Thus, testosterone promotes the growth of many body tissues including bones and muscles. Androgens are such substances which stimulate the development of male sex characters.