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CALICUT UNIVERSITY
FIFTH SEMESTER B.Sc. DEGREE EXAMINATION
(CBCSS-UG)
Core Course- Family and Community science
FCS5B05 –HUMAN PHYSIOLOGY AND MICROBIOLOGY

Time: 2 Hours

Maximum Marks: 60

SECTION A

Short answer questions.

Answer all questions. Each question carries 2 marks.

1. Define menstrual cycle.

The menstrual cycle is the monthly series of changes a woman's body goes through in preparation for the possibility of pregnancy. Each month, one of the ovaries releases an egg — a process called ovulation. At the same time, hormonal changes prepare the uterus for pregnancy. If ovulation takes place and the egg isn't fertilized, the lining of the uterus sheds through the vagina. This is a menstrual period

2. State the importance of pulse.

Measuring the pulse gives important information about your health. Any change from your normal heart rate can indicate a health problem. Fast pulse may signal an infection or dehydration. In emergency situations, the pulse rate can help determine if the person's heart is pumping.

3. List down the functions of salivary glands.

- Salivary glands play an important role in digestion because they make saliva. Saliva helps moisten food so we can swallow it more easily.
- It also has an enzyme called amylase that makes it easier for the stomach to break down starches in food. Saliva also has an important role in our oral health.

4. Illustrate the structure of heart.

The heart is a complex muscle that pumps blood through the three divisions of the circulatory system: the coronary (vessels that serve the heart), pulmonary (heart and lungs), and systemic (systems of the body). Coronary circulation intrinsic to the heart takes blood directly from the main artery (aorta) coming from the heart. For pulmonary and systemic circulation, the heart has to pump blood to the lungs or the rest of the body.

5. What do you mean by implantation pregnancy?

Implantation is a process that occurs after an embryo — i.e., a fertilized egg — travels down the fallopian tube and burrows deep into the lining of the uterus, where it will remain until delivery.

6. Write a short note about testis.

The testes — also called testicles — are two oval-shaped organs in the male reproductive system. They're contained in a sac of skin called the scrotum. The scrotum hangs outside the body in the front of the pelvic region near the upper thighs.

7. Mention any four functions of blood.

- Transporting oxygen and nutrients to the lungs and tissues.
- Forming blood clots to prevent excess blood loss.
- Carrying cells and antibodies that fight infection.
- Bringing waste products to the kidneys and liver, which filter and clean the blood.
- Regulating body temperature.

8. What do you mean by micturition?

- Micturition is a process where urine is expelled from the body. Animals and humans have a specialised system of organs known as the excretory system to eliminate the waste products from the body. In other words, the process of expelling urine from the body is called micturition.
- The human excretory system consists of a pair of kidneys and ureters, a urinary bladder, and a urethra. The kidneys play a major role in the process of urine formation and its excretion. The urine formed is stored in the urinary bladder.
- As the bladder becomes full, the stretch receptors increase their firing rate. This increase the urge to urinate and causes micturition reflex. It sometimes even causes involuntary urination. Micturition is also termed as the voiding phase to expel the stored urine.

9. List out the economic importance of yeast.

- **Baking industry:** In bread preparation. *S. cerevisiae* is added to the needed flour. Fermentation activity of yeast produces alcohol of CO_2 . The CO_2 evaporate and makes the bread spongy.
- **Brewing industry:** *S. cerevisiae* (brewer's yeast) and *S. ellipsoidens* (wine yeast) perform alcoholic fermentation in a large fermentor or bioreactor. This forms a variety of alcoholic beverages like beer, wine, brandy, cider, Champagne etc. All of them differ in ethanol percentage. Ethanol used as solvent, liquid fuel (gasohol) and antifreeze.
- **Yeast cake:** In brewing industry, excess yeasts are harvested and pressed into yeast cakes or tablets which are a rich source of proteins and vitamins.

10. Enumerate the impact of AIDS upon an individual.

HIV-positive diagnosis had a profound impact on the individual's psychosocial aspects of life, particularly interactions with others. Most of those infected by the virus were lonely, had to cope with stigmatization, and suffered disruption of family and peer relationships. HIV makes it hard to fight off respiratory problems such as the common cold and flu. In turn, an HIV-positive person may develop related infections, such as pneumonia. Without treatment for HIV, advanced disease puts an HIV-positive person at an even greater risk for infectious complications, such as tuberculosis and pneumonia.

11. Define microbiology

Microbiology is the study of all living organisms that are too small to be visible with the naked eye. This includes bacteria, archaea, viruses, fungi, prions, protozoa and algae, collectively known as 'microbes'. These microbes play key roles in nutrient cycling, biodegradation/bio deterioration, climate change, food spoilage, the cause and control of disease, and biotechnology. Thanks to their versatility, microbes can be put to work in many ways: making life-saving drugs, the manufacture of biofuels, cleaning up pollution, and producing/processing food and drink.

12. Name the hormones secreted by adrenal gland.

The adrenal cortex produces hormones that control sex (androgens, estrogens), salt balance in the blood (aldosterone), and sugar balance (cortisol). The adrenal medulla produces hormones involved in the fight-or-flight response (catecholamines, or adrenaline type hormones such as epinephrine and norepinephrine).

(Ceiling marks=20)

SECTION B

Answer all questions in a paragraph. Each question carries 5 marks

13. Describe the function of uterus.

- The primary function of the uterus during pregnancy is to house and nurture your growing baby, so it is important to understand its structure and function, and what changes you can expect the uterus to undergo during pregnancy.
- Uterus receives the ovum from fallopian tube.
- It forms placenta for developing of foetus.
- It expels young one at birth.

14. Name the secretions of pituitary gland and write the functions.

- There are four hormones secreted by the anterior pituitary gland that control the functions of other endocrine glands. These hormones include thyroid-stimulating hormone (TSH), adrenocorticotrophic hormone (ACTH), follicle-stimulating hormone (FSH), and luteinizing hormones (LH).
- Through secretion of its hormones, the pituitary gland controls metabolism, growth, sexual maturation, reproduction, blood pressure and many other vital physical functions and processes.

15. Write a detailed note on pancreas.

The pancreas is a long, flat gland that lies in the abdomen behind the stomach. It produces enzymes that are released into the small intestine to help with digestion. It also contains clusters of cells called islets. The pancreas secretes digestive enzymes such as amylase, proteases and lipase into the duodenum. These enzymes help in digesting sugar, proteins and fat respectively. Islets of Langerhans are embedded in the pancreas that secretes hormones such as insulin and glucagon into the blood.

16. Explain viral diseases in brief

Viral diseases are infections caused by viruses. Different types of viruses cause different infections. Common cold is the most common type of viral infection that is caused by infections in the respiratory tract. Other viral diseases include:

- Chickenpox
- Herpes
- Influenza
- AIDS
- Mumps
- Measles
- Viral Hepatitis

17. Define food infection with examples.

Food borne infection is caused by the ingestion of food containing live bacteria which grow and establish themselves in the human intestinal tract. Food borne intoxication is caused by ingesting food containing toxins formed by bacteria which resulted from the bacterial growth in the food item. Infectious organisms — including bacteria, viruses and parasites — or their toxins are the most common causes of food poisoning. Infectious

organisms or their toxins can contaminate food at any point of processing or production. Contamination can also occur at home if food is incorrectly handled or cooked.

18. Point out the methods of transmission of infection.

The mode of transmission can include direct contact, droplets, a vector such as a mosquito, a vehicle such as food, or the airborne route. The susceptible host has multiple portals of entry such as the mouth or a syringe. The modes (means) of transmission are: Contact (direct and/or indirect), Droplet, Airborne, Vector and Common Vehicle. The portal of entry is the means by which the infectious microorganisms gains access into the new host. This can occur, for example, through ingestion, breathing, or skin puncture.

19. Note down the morphology of yeasts.

- Yeasts are classified as fungi whose primary morphological form is a unicellular cell form that divides by budding or fission.
- They are single celled fungi · Size: generally larger than most bacteria; (1-5) μm wide and (5-30) μm length.
- Yeast with a circular or ovoid morphology appears as cells that are round to oval in shape. If oval, the ends are rounded but not pointy. It is not uncommon for a pure strain of yeast to show a mix of circular and ovoid cells, with ovoid cells being those which are about to divide, or which have divided recently.
- Apiculate: Apiculate yeasts are oval yeast with pointed ends. Often, these are described as appearing similar to the shape of a lemon.
- Yeast with an elongated morphology has cells which are long rod-like cells with straight edges, or highly elongated ovals.
- With only one exception (*Schizosaccharomyces*), yeast divides by budding. What this means is that a new yeast cell (called the daughter cell) will be formed as a miniature yeast cell extending off of the mother yeast cell. While all yeast bud, they show two predominant budding patterns: end-budding (technically called polarized budding) and budding (or unpolarized budding).

(Ceiling marks=30)

Section C

Essay Questions

Answer any one Questions. Each question carries 10 marks

20. State the importance of the study of microbiology and classify microorganisms.

- Microbiology has proved to be one of the most important disciplines in biology, making it possible to identify how some of these organisms cause diseases, discover cures for such diseases and even use some microbes for industrial purposes etc.
- Microbiology is the study of all living organisms that are too small to be visible with the naked eye. This includes bacteria, archaea, viruses, fungi, prions, protozoa and algae, collectively known as 'microbes'. These microbes play key roles in nutrient cycling, biodegradation/bio deterioration, climate change, food spoilage, the cause and control of disease, and biotechnology. Thanks to their versatility, microbes can be

put to work in many ways: making life-saving drugs, the manufacture of biofuels, cleaning up pollution, and producing/processing food and drink.

- Microorganisms are prokaryotic, such as bacteria, archaea, etc., as well as eukaryotic, such as protozoa, algae, fungi, etc. R.H. Whittaker elucidated the Five Kingdom Classification, which was based on the following characteristics:
- Cell type (prokaryotic and eukaryotic) and presence of nuclear membrane
- Presence of cell wall and its constituents
- Body organisation
- Mode of nutrition
- Mode of reproduction
- Phylogenetic relationships

Based on the following characteristics, R. H. Whittaker divided living organisms into five kingdoms. They are as follows:

1. Monera – Unicellular prokaryotes
2. Protista – Unicellular eukaryotes
3. Fungi – Eukaryotic, heterotrophic (saprophytic/ parasitic) and with a cell wall (chitin)
4. Plantae – Eukaryotic, autotrophic (photosynthetic) and with a cell wall (cellulose)
5. Animalia – Eukaryotic, heterotrophic (holozoic/ saprophytic etc.) and without a cell wall

21. What is erythropoiesis? Describe the stages of erythropoiesis and write the factors influencing the same.

- Erythropoiesis (from Greek 'erythro' meaning "red" and 'poiesis' "to make") is the process which produces red blood cells (erythrocytes), which is the development from erythropoietic stem cell for mature red blood cell.
- Erythropoiesis is the process whereby a fraction of primitive multipotent HSCs becomes committed to the red-cell lineage. Erythropoiesis involves highly specialized functional differentiation and gene expression. The main role of RBCs is to carry O₂ in the blood by the hemoglobin molecule.
- Erythropoiesis. The life cycle of erythrocytes involves three stages: production, maturity and destruction. Production of erythrocytes (erythropoiesis) is one of the sub-processes of hematopoiesis, happening in the red bone marrow.
- Severe hyperparathyroidism and aluminum overload lead to a reduced number of responsive erythroid progenitor cells. Finally, a number of nutritional factors, such as deficiencies of carnitine, vitamin B12, folic acid, and vitamin C, are susceptible to alter erythropoiesis.

(1x10=10 Marks)