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Anatomy & Physiology Nursing

for GNM (1st Year)

Most Authentic & Updated Solved Question Papers

As per INC Syllabus

Solved Papers with Important Theory

2016-2005

Poonam Sharda

3rd Edition

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Important Theory

FUNCTIONS OF FOLLOWING

- Kidney
- Cerebrospinal fluid (CSF)
- Thyroid gland
- Bile
- Internal ear
- Cerebrum
- Lungs
- Spleen
- Skull
- Tongue
- Skin
- Liver
- Gallbladder
- Blood
- Saliva
- Retina
- Heart
- Bones
- Ovaries
- Salivary gland
- Hormones of pituitary gland

FUNCTIONS OF KIDNEY

Formations of urine: The kidney forms urine, which passes through the ureters to the bladder for storage before excretion. There are three processes involved in the formation of urine:

1. Filtration
2. Selective reabsorption
3. Secretion

Filtration

- It takes place through semipermeable walls of glomerular capsule and glomerulus.
- Water and large number of small molecules pass through it but other large molecules like blood cells, plasma protein do not pass.
- Filtration takes place by difference between the blood pressure in glomerulus and pressure of filtrate in the glomerular capsule.
- The capillary hydrostatic pressure of about 55 mm Hg builds up in the glomerulus due to the less diameter of efferent arteriole than afferent arteriole.

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- This pressure is opposed by osmotic pressure of the blood (30 mm Hg) and by filterate hydrostatic pressure of 15 mm Hg 55 - (30+15) =10 mm Hg.

Selective Reabsorption

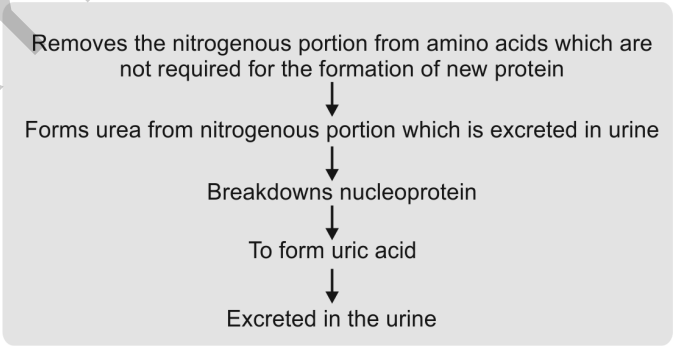
- It is a process by which the composition and volume of the glomerular filterate are altered during its passage through the tubules, the medullary loop and the collecting tubule.
- In this process, it helps in reabsorption into the blood, which is needed for maintaining electrolyte balance and pH of blood. The maximum capacity of kidneys to reabsorb the substance is called as transport maximum.

Secretion

Substances, which are not required such as drugs including penicillin, aspirin, may not be cleared from the blood by filtration, such substances are excreted from the body in the urine.

FUNCTIONS OF LIVER

- **Carbohydrate Metabolism:** The liver has an important role in maintaining plasma glucose level. After meal, glucose converts into glycogen in the presence of insulin and liver changes glycogen into glucose in the presence of glucagons.
- **Fat Metabolism:** Stores fat converted into lipid form, which provide energy to body.
- **Protein Metabolism:**
  a. Deamination of amino acids



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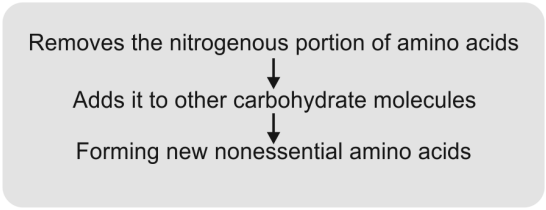
b. Transamination



c. Synthesize plasma proteins and most clotting factors from amino acids:
- Breakdown of erythrocytes and defense against microbes
- Detoxification of drugs and noxious substance
- Inactivation of hormones
- Production of heat
- Secretion of bile
- Storage of substance—glycogen, fat-soluble vitamin, A, D, E, K, iron, copper, water-soluble vitamins, e.g. B_{12}, etc.

FUNCTIONS OF CEREBROSPINAL FLUID

- It supports and protects the brain and spinal cord.
- It maintains a uniform pressure around the structures of brain and spinal cord.
- It acts as a cushion and shock absorber between the brain and the cranial bones.
- It keeps the brain and spinal cord moist and there may be interchange of substances between CSF and nerve cells such as nutrients and waste products.

FUNCTIONS OF GALLBLADDER

These include:
- Reservoir for bile.
- Concentration of the bile by up to 10 to 15-fold by absorption of water through the wall of gallbladder.
- Release of stored bile.

FUNCTIONS OF THYROID GLAND

- It secretes hormones T3 and T4, which are essential for growth and mental development.

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- They helps in regulation of:
  - Basal metabolic rate.
  - Carbohydrate, protein and lipid metabolism.
  - Normal functioning of the nervous and cardiovascular systems.
  - Motility of the gastrointestinal tract.
  - The female reproductive cycle and lactation.
- Calcitonin hormone secreted by gland acts on bone and the kidneys to reduce the blood calcium level.
- It reduces the reabsorption of calcium from the bones and inhibits the reabsorption of calcium by the renal tubules.

FUNCTIONS OF BLOOD

- It transports oxygen from the lungs to all cells of the body.
- It transports CO_2 from the cells to the lungs.
- It transports nutrients from the digestive organs to the cells.
- It transports waste products from the cells to the kidneys, lungs, and sweat glands.
- It transports enzymes to various cells.
- It transports hormones from the endocrine glands to cells.
- It carries heat produced in active tissues to other less active -tissues.
- It carries protective substances, e.g. antibodies to areas of infection.

FUNCTIONS OF BILE

- The bile salts emulsify fats in the small intestine.
- The bile pigment, bilirubin, is a waste product of the breakdown of erythrocytes.
- Bilirubin is altered by microbes in the large intestine. Some reabsorbed and then excreted in the urine, but converted to stercobilin and excreted in the feces.
- It helps in absorption of vitamin K and digestive fats.

FUNCTIONS OF SALIVA

- ***Chemical digestion of polysaccharides*:** Saliva contains the enzymes amylase that begins the breakdown of starch, reducing them to the disaccharide maltose.
- ***Lubricating of food*:** Dry food entering the mouth and lubricated by saliva and it helps in swallowing.
- ***Cleansing and lubricating*:** Adequate flow of saliva cleanse the mouth and keep its tissue soft, moist and helps to prevent damage to the mucous membrane by rough food stuff.

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- ***Nonspecific defense*:** Lysozyme, immunoglobulins and clotting factors combat invading microbes.
- ***Taste*:** The taste buds are stimulated and sense of taste with mixing with dry food stuff.

FUNCTIONS OF INTERNAL EAR

- It is semicircular canals, utricle, and saccule are concerned with balance.
- It receives impulses from eyes, muscles, joints, impulses pass through cerebellum to muscles to maintain posture and balance.
- Any change of the position of head cause movement on perilymph and endolymph which vestibulocochlear nerve.
- The impulses are transmitted to the cerebellum.

FUNCTIONS OF RETINA

- It helps to pass the light rays to the occipital lobes of the cerebrum via the optic nerve.
- The rods and cones of retina emit nerve impulses, which pass to the occipital lobes of the cerebrum via the optic nerve. Rods are sensitive to dim lights and cones to high lights.
- Rhodopsin is a photosensitive pigment present only in the rods. Rhodopsin is quickly reconstituted when an adequate supply of vitamin A is available. The time taken for regeneration of the rhodopsin is called dark adaptation. It is experienced when an individual moves from an area of bright light to one of darkness.

FUNCTIONS OF CEREBRUM

- The main area of cerebrum is associated with sensory perception and motor activity.
- It helps in mental activities involved in memory, intelligence, sense of responsibility, thinking, reasoning learning, etc.
- Sensory perception includes perception of pain, temperature, touch, sight, hearing, taste, smell.
- It helps in initiation and control of skeletal muscle contraction.

FUNCTIONS OF HEART

- It is to maintain a constant circulation of blood throughout the body.
- Circulation happens with help of cardiac cycle.
- Then it pushes the blood into pulmonary artery and aorta.

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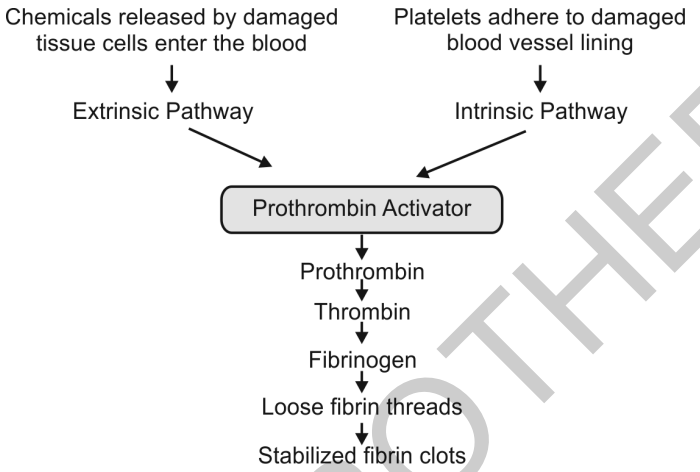
– Cardiac cycle is main function of heart. The heart acts as a pump and its action consists of a series of contraction and relaxation. These events are known as cardiac cycle. Each cycle lasts about 0.8 of a second.



– The contraction of impulse from SA node spreads over the myocardium of both atria and atria contracts and ventricular filling takes place. This results in contraction of ventricles and emptities the contents. After ventricular contracting, there is complete cardiac diastole (0.4 sec), both atria and ventricles are relaxed.

FUNCTIONS OF LUNGS

Lungs make a regular exchange of gases between the alveoli and the external air. It is dependent upon the contraction and relaxation of muscles of respiration. This process occurs about 15 to 18 times per minute and it consists of three phases:

1. Inspiration
2. Expiration
3. Pause.

- **Inspiration:** The expansion of chest during inspiration occurs as a result of muscular activity, by voluntary and partly involuntary. During deep breathing, they are assisted by the muscles of the neck and abdomen.
  – *Intercostal muscles:* They are in pairs. They occupy between 12 pairs of ribs. They are arranged in two layers.
- **Expiration:** Relaxation of intercostal muscle and the diaphragm result in downward and inward movement of rib cage and elastic recoil of the lungs. As this occur, pressure inside the lungs increases more than

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the atmosphere pressure and therefore air is expelled from respiratory tract.

- **Pause:** After expiration, 3rd stage occurs that is pause before the next cycle begins.

FUNCTIONS OF BONES

- It provides the framework of the body.
- It gives attachment to muscles and tendon.
- It permits joints movement of the body, by forming joints that are moved by muscles.
- It forms the boundaries of the cranial, thoracic and pelvic cavities.
- It protects the organs.
- It contains red bone marrow in which blood cells develop.
- It provides a reservoir of minerals, especially calcium phosphate.

FUNCTIONS OF SPLEEN

- **Phagocytosis:** Old and abnormal erythrocytes are destroyed in the spleen and breakdown products (bilirubin and iron) are passed to the liver by splenic and portal veins.
- Other material, e.g. leukocytes, platelets and microbes are phagocytosed in the spleen.
- **Storage of blood:** The spleen contains up to 350 mL of blood.
- **Immune response:** The spleen contains T and B lymphocytes which are activated by the presence of antigens.
- **Erythropoietin:** The spleen and lines are important sites of fetal blood cell production.

FUNCTIONS OF OVARIES

- Maturation of the follicle is stimulated by follicle stimulating hormone from the anterior pituitary and estrogens secreted by the follicle lining cells.
- Ovulation is triggered by a surge of luteinizing hormones from the anterior pituitary, which occurs few hours before ovulation.
- After ovulation the follicle lining cells develop into the corpus luteum.
- The corpus luteum produces the hormone progesterone and some estrogen.
- If ovum is fertilized, it embeds within wall of the uterus and produces human chorionic gonadotropin, which stimulates the corpus luteum to continue secreting progesterone and estrogen for the first 3 months of the pregnancy.

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- If ovum is not fertilized, the corpus luteum degenerates and new cycle begins with menstruation.
- Sex hormones are produced by ovaries.

FUNCTIONS OF SKULL

The various parts of the skull have specific and different functions:

- The cranium protects the delicate tissues of the brain.
- The temporal bone protects the structures of the ear.
- The bony eye sockets provide the eyes with some protection against injury and give attachment to the muscles which moves the eyes.
- Some bones of the face and the base of the skull give resonance to the voice because they have cavities called sinuses containing air.
- The bones of the face form the walls of the posterior part of the nasal cavities. They keep the air passage open, facilitating breathing.
- The maxilla and the mandible provide alveolar ridges in which the teeth are embedded.
- The mandible is the only movable bone of the skull and chewing food is the result of raising and lowering the mandible by contracting and relaxing some muscles of the face, the muscles of mastication.

FUNCTIONS OF SALIVARY GLAND

Salivary glands pour their secretion into the mouth.

Functions

- Chemical digestion of polysaccharides by enzymes salivary amylase.
- Lubrication of food before it can be made into bolus.
- Clearing and lubricating the mouth and keep its tissue soft, moist pliable.
- Nonspecific defense by lysozyme, immunoglobulins and clotting factors invading microbes.
- Taste buds stimulated only by chemical substance in solution.

FUNCTIONS OF TONGUE

The tongue plays an important role in:

- Mastication (chewing)
- Deglutition (swallowing)
- Speech
- Taste.

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FUNCTION OF HORMONES OF PITUITARY GLAND

Hormone	*Function*
Growth hormone	Regulates metabolism, promotes tissue growth especially of bones and muscles
Thyroid stimulating hormone	Stimulates growth and activity of thyroid gland and secretion of T3 and T4
Adenocorticotropic hormone	Stimulates the adrenal cortex to secrete glucocorticoids
Prolactin	Stimulates milk production in the breasts
Folic stimulating hormones	Stimulates production of sperm in the testes, stimulates secretion of estrogen by the ovaries, maturation of ovarian follicles, ovulation
Luteinizing hormone	Stimulates secretion of testosterone by the testes. Stimulates secretion of progesterone by the corpus luteum
Oxytocin	It stimulates the uterine contractions
Antidiuretic hormone	The main effect of antidiuretic hormones is to reduce urine output

FUNCTIONS OF SKIN

- **Protection:** The skin forms a waterproof layer that protects the deeper structures. It acts as a barrier against: 1. Invasion by microbes, chemicals, physical agents, e.g. UV rays, dehydration.
- **Regulation of body temperature:** It helps to maintain body temperature. Skin helps in balance between production and loss of heat. Heat loss by the skin through sweating.
- **Sensation:** Sensory receptors consist of nerve endings in the dermis that are sensitive to touch, pressure, temperature and pain. They are stimulated by environmental stimuli and impulses that travel to cerebral cortex.
- **Absorption:** Some drugs, e.g. hormones, nicotine and some toxic substances are absorbed by the skin.
- **Excretion:** The skin is a major excretory organ for some substances including.
- Sodium chloride in sweat.
- Urea, especially when kidney function, impaired.
- Aromatic substances, e.g. garlic and other spices.
- **Formation of vitamin D:** It prepares vitamin D in the presence of sun and with calcium and phosphorus, vitamin D helps in formation of bone.

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REVIEW QUESTIONS AND ANSWERS

1. Bones of appendicular skeleton.

Ans. It consists of shoulder girdle with upper limbs and pelvic girdle with lower limbs.

- *Each shoulder girdle consists of:*
  - 1 clavicle .
  - 1 scapula.
- *Each upper limb consists of:*
  - Humerus
  - 8 carpal bones
  - 1 radius
  - 1 ulna
  - 5 metacarpal bones, 14 phalanges.
- *The bones of lower limbs are:*
  - 1 femur
  - 1 tibia
  - 1 fibula
  - 1 patella
  - 7 tarsal bones
  - 5 metatarsal bones
  - 14 phalanges.

2. Four main cavities of the body.

Ans.
- Cranial cavity
- Abdominal cavity
- Thoracic cavity
- Pelvic cavity.

3. Name of sense organs of the body

Ans.
- Ear
- Eye
- Nose
- Tongue
- Skin.

4. Layers of heart?

Ans.
- Pericardium
- Myocardium
- Endocardium.

5. Organs of the digestive system

Ans.
- Mouth
- Pharynx

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- Esophagus
- Stomach
- Small intestine
- Rectum and anal canal.

Accessory organs:

- Pairs of salivary glands
- Pancreas
- Liver and biliary tract.

6. Types of bones with example

Ans.
- Long bones, e.g. femur, humerus
- Short bones, e.g. tarsals carpals
- Irregular bones, e.g. vertebral, skull bones
- Flat bones, e.g. vertebrae, skull bones
- Sesamoid bones, e.g. patellar.

7. Type of tissues of body.

Ans.
- Epithelial tissues
- Connective tissues
- Muscle tissues
- Nervous tissues.

8. Various endocrine glands.

Ans.
- 1 pituitary gland
- 1 thyroid gland
- 4 parathyroid glands
- 2 adrenal glands
- 1 pineal gland or body
- 1 thymus gland
- 2 ovaries in the female
- 2 testes in the male.

9. Female reproduction organs.

Ans. External Genitalia:

- Labia majora
- Labia minora
- Clitoris
- Vestibule
- Hymen
- Greater vestibular glands.

Internal Organs:

- Vagina
- Uterus

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- Fallopian tubes
- Ovaries.

10. Cranial nerves.

Ans. There are 12 pairs of cranial nerves:

1. **Olfactory:** Sensory (smell)
2. **Optic:** Sensory (sight)
3. **Oculomotor:** Motor (movement of eyeball)
4. **Trochlear:** Motor (movement of eyeball)
5. **Trigeminal:** Mixed (Pain, touch, temperature)
6. **Abducent:** Motor (movement of eye)
7. **Vestibulocochlear:** Auditory (sensory) hearing
8. **Glossopharyngeal:** Mixed (taste, secretion of saliva)
9. **Facial:** Mixed (Facial expression, taste)
10. **Vagus:** Mixed (movement and secretion)
11. **Accessory:** Motor (movement of head, shoulder)
12. **Hypoglossal:** Motor (movement of tongue).

11. Four proceses by which heat is lost from the body:

Ans. 1. Conduction
2. Convection
3. Radiation
4. Evaporation.

12. Bones of axial skeleton

Ans. •. Skull
- Vertebral column
- Sternum or breast bone
- Ribs.

13. Organs of urinary system

Ans. • 2 kidneys
- 2 ureters
- 1 urinary bladder
- 1 urethra.

14. Covering of brain and spinal cord

Ans. • Dura mater
- Arachnoid mater
- Pia mater.

15. Glands in the human body

1. Endocrine glands (ductless glands)
    - Pituitary gland – 1
    - Thyroid gland – 1

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Anatomy & Physiology Nursing
for GNM (1st Year)

Salient Features

- This book is written with an intention, keeping in mind the basic requirements of first year nursing students
- Text related to Nursing for GNM with detailed explanation and important theory of the subject
- Includes solved question papers (2016–2005) with INC syllabus
- Helpful for students to prepare for the examination in an easy and meaningful way
- The book is designed in a comprehensive way to meet the needs of nursing students.

Nursing is an extremely rewarding profession. This book is a great guide for GNM 1st year nursing students on how to perform in the first year and get more material for gaining best achievement in final examination. This book has become like a best friend to the nurses, guiding them not only how to associate with the first year but also providing encouragement for the examination days.



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