1. Regarding Caisson's disease which statement among the following is CORRECT?

a) Lung damage is caused by air embolism

b) Pain in the joints is due to nitrogen bubbles

c) Tremors are seen due to nitrogen narcosis

d) High pressure Nervous syndrome can be prevented by using mixtures of Oxygen & Helium

Correct Answer - B

Ans. is. B. ain in the joints is due to nitrogen bubbles

[REF: Ganong 22ed chapter 37, http://en.wikipedia.org/wiki/Decompression_sickness]

Decompression Sickness:

As a diver breathing 80% N2 ascends from a dive, the elevated alveolar PN2 falls. N2 diffuses from the tissues into the lungs along the partial pressure gradient. If the return to atmospheric pressure (decompression) is gradual, no harmful effects are observed; but if the ascent is rapid, N2 escapes from solution. Bubbles form in the tissues and blood, causing the symptoms of decompression sickness (the bends, caisson disease). Bubbles in the tissues cause severe pains, particularly around joints, and neurologic symptoms that include paresthesias and itching

Lung damage causes air embolism and not vice versa. The problem of nitrogen narcosis can be avoided by breathing mixtures of 02 and helium, and deeper dives can be made. However, the high-pressure nervous syndrome (HPNS) develops during deep dives with such mixtures. Tremors are symptoms of high pressure Nervous syndrome

syndrome

Signs and symptoms of decompression sickness

DCS type	Bubble location	Signs & symptoms (clinical manifestations)
Musculoskeletal	Mostly large joints (elbows, shoulders, hip, wrists, knees, ankles)	Localized deep pain, ranging from mild to excruciating. Sometimes a dull ache, but rarely a sharp pain, Active and passive motion of the joint aggravates the pain, The pain may be reduced by bending the joint to find a more comfortable position, If caused by altitude, pain can occur immediately or up to many hours later.
Cutaneous	Skin	Etching, usually around the ears, face, neck, arms, and upper torso, Sensation of tiny insects crawling over the skin (formication), Mottled or marbled skin usually around the shoulders, upper chest and abdomen, with itching, Swelling of the skin, accompanied by tiny scar-like skin depressions (pitting edema)
Neurologic	Brain	Altered sensation, tingling or numbness paresthesias, increased sensitivity hyperesthesia, Confusion or memory loss (amnesia), Visual abnormalities, Unexplained mood or behaviour changes, Seizures, unconsciousness
Neurologic	Spinal cord	Ascending weakness or paralysis in the legs, Girdling abdominal or chest pain, Urinary incontinence and faecal incontinence
Constitutional	Whole body	Headache, Unexplained fatigue, Generalised malaise, poorly localised aches

		localised aches
Audiovestibular	Inner ear	Loss of balance, Dizziness, vertigo, nausea, vomiting, Hearing loss
Pulmonary	Lungs	Dry persistent cough, Burning chest pain under the sternum, aggravated by breathing, Shortness of breath

2. Preload measures?

a) End systolic volume

b) End diastolic volume

c) Peripheral resistance

d) Stroke volume

Correct Answer - B
End diastolic volume REF: Guyton's physiology 22nd edition page 111, http://en.wikipedia.org/wiki/Preload_ %28cardiology%29
"For cardiac contraction, the preload is usually considered to be the end-diastolic pressure when the ventricle has become filled"
Quantitatively, preload can be calculated as

$$\frac{LVEDT.LVEDR}{2h}$$

Where LVEDP = Left ventricular end diastolic pressure, LVEDR = Left ventricular end diastolic radius (at the ventricle's midpoint), and h = thickness of the ventricle. This calculation is based on the Law of Laplace.

3. Central Chemoreceptors are most sensitive to following changes in blood:

a) $^{T}PCO2$

b) I PCO2

c) TH+

d) T PO2

Correct Answer - A
$_{T}$ PCO2

4. **Which of the following statement is TRUE about Bohr's effect?**

a) Decreased affinity of Hb to 02 is associated with decreased pH & increased C02

b) Decreased affinity of Hb to 02 is associated with increased pH & decreased C02

c) Decreased affinity of Hb to 02 is associated with decreased pH & C02

d) Decreased affinity of Hb to 02 is associated with increased pH & C02

Correct Answer - A

- The decrease in O2 affinity of hemoglobin when the pH of blood falls is called the **Bohr effect.**
- It is closely related to the fact that deoxygenated hemoglobin (deoxyhemoglobin) binds H+ more actively than does oxygenated hemoglobin (oxyhemoglobin).
- The pH of blood falls as its CO2 content increases, so that when the PCO2 rises, the curve shifts to the right and the P50 rises.

Ref: Barrett K.E., Barman S.M., Boitano S., Brooks H.L. (2012). Chapter 35. Gas Transport & pH. In K.E. Barrett, S.M. Barman, S. Boitano, H.L. Brooks (Eds), Ganong's Review of Medical Physiology, 24e.

5. Glands are classified depending upon their mode of secretion. Sebaceous gland is an example of which of the following type of gland?

a) Eccrine

b) Apocrine

c) Holocrine

d) Paracrine

Correct Answer - C

Sebaceous glands are holocrine glands. Holocrine glands are those in which the cell after filling with secretory product dies and is expelled along with its content.

- **Eccrine glands** are those in which secretory product is expelled by exocytosis. Eg sweat glands involved in thermoregulation and receiving cholinergic sympathetic innervation.
- **Apocrine glands** are those in which the secretory product accumulates in the apical cytoplasm and is expelled out by pinching of the apical plasma membrane. Eg mammary gland and apocrine type of sweat glands that are active after puberty and are found in the skin of axilla and around genital organs.

Ref: Clinical Anatomy: (a Problem Solving Approach) By Kulkarni page 9

6. **Ruffini end organ is associated with sensation of:**

a) Sustained Pressure

b) Heat

c) Touch

d) None of the above

Correct Answer - A

Meissner's corpuscles are dendrites encapsulated in connective tissue and respond to changes in texture and slow vibrations. Merkel cells are expanded dendritic endings, and they respond to sustained pressure and touch. ***Ruffini corpuscles are enlarged dendritic endings with elongated capsules, and they respond to sustained pressure.*** Pacinian corpuscles consist of unmyelinated dendritic endings of a sensory nerve fiber, 2 m in diameter, encapsulated by concentric lamellae of connective tissue that give the organ the appearance of a cocktail onion. Theses receptors respond to deep pressure and fast vibration.

Ref : Barrett K.E., Barman S.M., Boitano S., Brooks H.L. (2012). Chapter 8. Somatosensory Neurotransmission: Touch, Pain, and Temperature. In K.E. Barrett, S.M. Barman, S. Boitano, H.L. Brooks (Eds), *Ganong's Review of Medical Physiology*, 24e.

7. Lower esophageal sphincter pressure is increased by all of the following substances, EXCEPT:

a) Gastrin

b) Vasopressin

c) Glucagon

d) Secretin

Correct Answer - D

The lower esophageal sphincter, a physiologic entity but not an anatomic structure, plays an important part in preventing gastroesophageal reflux. Neural, hormonal, myogenic, and mechanical factors influence the tone of the sphincter. Gastrin, vasopressin, glucagon, adrenergic agonists, and cholinergic agents increase the pressure. Secretin has the opposite effect.

8. **Colipase is:**

a) Is secreted by Oxyntic cells

b) Is secreted in the active form

c) Helps gastric lipase

d) Encoded by the gene CLPS

Correct Answer - D

Colipase is a small protein cofactor needed by pancreatic lipase for efficient dietary lipid hydrolyisis. It is secreted as an inactive form procolipase by the pancreas and in the intestinal it is converted to the active form by trypsin. Efficient absorption of dietary fats is dependent on the action of pancreatic triglyceride lipase. Colipase binds to the C-terminal, non-catalytic domain of lipase, thereby stabilising as active conformation and considerably increasing the overall hydrophobic binding site. It is encoded by the gene CLPS.

Ref: Ganong's Review of Human Physiology, 21st Edition, Page 476

9. **Iron absorption is increased by the following factor in diet:**

a) Vitamin-C

b) Phytic acid

c) Fibre diet

d) Phosphates

Correct Answer - A

In a vegetarian diet, nonheme iron is absorbed very poorly because of the inhibitory action of a variety of dietary components, particularly phosphates, phytates and high fibre content. *Ascorbic acid and meat facilitate the absorption of nonheme iron.* Ascorbate forms complexes with and/or reduces ferric to ferrous iron. Meat facilitates the absorption of iron by stimulating production of gastric acid; other effects also may be involved. Either of these substances can increase availability several fold.

Ref: Kaushansky K., Kipps T.J. (2011). Chapter 37. Hematopoietic Agents: Growth Factors, Minerals, and Vitamins. In B.C. Knollmann (Ed), *Goodman & Gilman's The Pharmacological Basis of Therapeutics*, 12e.

10. **Which of the following statement regarding lower esophageal sphincter is TRUE?**

a) It has no tonic activity

b) It has a tone which is provided by the sympathetic system

c) Relaxes on increasing abdominal pressure

d) Relaxes ahead of the peristaltic wave

Correct Answer - D
During swallowing when the peristaltic wave sweep down the esophagus the gastroesophageal sphincter relaxes so that the bolus of food can pass into the stomach.
Distance of the Lower Esophageal Sphincter from the upper incisors is 37.5cm
the lower esophageal sphincter is tonically active but relaxes on swallowing. This tonic activity of the LES between meals prevents reflux of gastric contents into the esophagus. its tone is under neural control by the parasympathetic nervous system. Contraction of LES is caused by the release of acetylcholine from the vagus and release of NO and VIP from interneurons innervated by other vagal fibers causes it to relax.
Ref: Fundamentals of Human Physiology By Lauralee Sherwood page 447. Ganong's Review of Medical Physiology, 24e CHAPTER 27.

11. **True about volume receptors are all, EXCEPT:**

a) They are low pressure receptors

b) They provide afferents for thirst control

c) They are located in carotid sinus

d) They mediate vasopressin release

Correct Answer - C
The low-pressure baroreceptors are located in the venae cavae and the pulmonary veins, and in the atria. They are also called volume receptors. These receptors respond to changes in the wall tension, which is proportional to the filling state of the low pressure side of circulation (below 60mmHg). Their impulses regulate the secretion of antidiuretic hormone (ADH/Vasopressin), renin and aldosterone.

The low-pressure baroreceptors have both circulatory and renal effects; they produce changes in hormone secretion, resulting in profound effects on the retention of salt and water; they also influence intake of salt and water.

12. **In an ECG the cardiac event corresponding to the ST segment is:**

a) Atrial depolarisation

b) Ventricular depolarisation

c) Atrial repolarisation

d) Ventricular repolarisation

Correct Answer - D

PR – Interval corresponds with atrial depolarisation and conduction through AV node
QRS – corresponds with Ventricular depolarisation + atrial repolarisation
QT – corresponds with ventricular depolarisation + ventricular repolarisation

Ref: Review of Medical Physiology by Ganong, 20th Edition, Page 532.

13. Which one of the following is the CORRECT statement regarding coronary blood flow?

a) Coronary blood flow is directly related to perfusion pressure and inversely related to resistance

b) Coronary blood flow is inversely related to perfusion pressure and directly related to resistance

c) Coronary blood flow is directly related to perfusion pressure and also to resistance

d) Coronary blood flow is inversely related to both pressure and resistance

Correct Answer - A

Coronary blood flow is directly related to the perfusion pressure (aortic diastolic pressure) and the duration of diastole. Because coronary flow drops to negligible values during systole, the duration of diastole becomes a limiting factor for myocardial perfusion during tachycardia.

Coronary blood flow is inversely proportional to coronary vascular resistance. Resistance is determined mainly by intrinsic factors—including metabolic products and autonomic activity—and by various pharmacologic agents. Damage to the endothelium of coronary vessels has been shown to alter their ability to dilate and to increase coronary vascular resistance.

Ref: Katzung B.G. (2012). Chapter 12. Vasodilators & the Treatment of Angina Pectoris. In B.G. Katzung, S.B. Masters, A.J. Trevor (Eds), Basic & Clinical Pharmacology, 12e.

14. **Depressor reflex, Bezold-Jarisch reflex, produced by the following stimulus:**

a) Atrial overload

b) Myocardial infarction

c) Ventricular distension

d) Isotonic exercise

Correct Answer - C

Ventricular distension can produce a powerful depressor reflex called the ***Bezold-Jarisch reflex***; vagal afferents of this cardiopulmonary reflex are also activated by chemical stimulation (eg, prostanoids, cytokines, serotonin, and classically, Veratrum alkaloids). The central connections for this reflex are in the nucleus tractus solitarii, which has both sympathetic and parasympathetic synapses.

Ref: Hoit B.D., Walsh R.A. (2011). Chapter 5. Normal Physiology of the Cardiovascular System. In V. Fuster, R.A. Walsh, R.A. Harrington (Eds), *Hurst's The Heart*, 13e.

15. **All of the following cell types undergo cell division, EXCEPT:**

a) Pericyte

b) Cardiac muscle cell

c) Smooth muscle cell

d) Satellite cell of skeletal muscle

Correct Answer - B
Myocyte cell division in the human heart ceases a few weeks after birth. Thereafter, enlargement of the heart is as a result of cell hypertrophy or the laying down of collagen in the extracellular space. DNA turnover is almost undetectable except in pathologic states. Approximately 20% of myocytes in the human heart have two nuclei, so that cell separation, rather than mitosis, could bring about a small increase in the total cell number.
Ref: Francis G.S., Tang W., Walsh R.A. (2011). Chapter 26. Pathophysiology of Heart Failure. In V. Fuster, R.A. Walsh, R.A. Harrington (Eds), *Hurst's The Heart,* 13e.

16. **Direct Fick method of measuring cardiac output requires estimation of:**

a) O2 content of arterial blood

b) O2 consumption per unit time

c) Arteriovenous O2 difference

d) All of the above

Correct Answer - D

Direct Fick method and the indicator dilution method are used for measuring cardiac output.

The **Fick principle** states that the amount of a substance taken up by an organ (or by the whole body) per unit of time is equal to the arterial level of the substance minus the venous level **(A-V difference)** times the blood flow. Both arterial and mixed venous (which is equal to pulmonary artery) blood must be sampled in this method.

The principle can be used to determine cardiac output by measuring the amount of O2 consumed by the body in a given period and dividing this value by the A-V difference across the lungs.

Ref: Barrett K.E., Barman S.M., Boitano S., Brooks H.L. (2012). Chapter 30. The Heart as a Pump. In K.E. Barrett, S.M. Barman, S. Boitano, H.L. Brooks (Eds), *Ganong's Review of Medical Physiology*, 24e.

17. **Primitive red cells first originates in the early embryonic life is in:**

a) Liver

b) Yolk sac

c) Bone marrow

d) Spleen

Correct Answer - B

During embryogenesis, hematopoiesis occurs in extraembryonic yolk sac, the fetal liver, the thymus, and the preterm marrow. The origin of hematopoietic cells is closely tied to gastrulation, the formation of mesoderm cells, and to the emergence of the endothelial lineage. *Hematopoiesis is first established soon after implantation of the blastocyst, with the appearance of primitive erythroid cells in blood islands of the yolk sac beginning at day 18 of gestation.*

"Primitive" red cells derived from the yolk sac constitute a distinct transient erythroid lineage that differs from "definitive" red cells that subsequently mature in the fetal liver and marrow.

Ref: Palis J., Segel G.B. (2010). Chapter 6. Hematology of the Fetus and Newborn. In J.T. Prchal, K. Kaushansky, M.A. Lichtman, T.J. Kipps, U. Seligsohn (Eds), *Williams Hematology,* 8e.

18. **Transpulmonary pressure is the difference between:**

a) The bronchus and atmospheric pressure

b) Pressure in alveoli and intrapleural pressure

c) Atmosphere and intrapleural pressure

d) Atmosphere and intraalveolar pressure

Correct Answer - B
Transpulmonary pressure is the pressure difference between alveolar pressure and intrapleural pressure. Before the start of inspiration or at the end of expiration it is about +5cm H2O. Positive transpulmonary pressure keeps the alveoli open.

- **Intrapleural pressure** is the pressure between two layers of pleura. It is about -5cm H2O before the start of inspiration or at the end of expiration.
- **Alveolar pressure** is the pressure within the terminal air spaces. It is the sum of pleural pressure and elastic recoil pressure of the lung. It is atmospheric before the start of inspiration or at the end of expiration.
- **Transthoracic pressure** is the pressure difference between alveolar pressure and pressure at the body surface.

Ref: Fundamentals of Respiratory Physiology By A S Chakrabarty, Page 32

19. **What is the partial pressure of oxygen at 760mmHg atmospheric pressure?**

a) 76

b) 160

c) 120

d) 130

Correct Answer - B

The pressure of a gas is proportional to its temperature and the number of moles per volume.

P= nRT/V, where,

n= number of moles

P= Pressure

R = Gas constant

T= Absolute temperature

V= Volume

The pressure exerted by one gas in a mixture of gases is equal to the total pressure times the fraction of the total amount of gas it represents.

The partial pressure of oxygen in dry air is therefore 0.21 x 760= 160 mm of Hg at sea level.

Ref: Ganong, 23rd Ed, Page 588

20. The primary active step for sodium reabsorption in the proximal tubule involves:

a) Sodium-glucose cotransport across the luminal membrane

b) Sodium/hydrogen ion countertransport across the luminal membrane

c) Sodium transport via the Na+-K+-ATPase at the basolateral membrane

d) Sodium-amino acid cotransport across the luminal membrane

Correct Answer - C

Sodium transport via the Na-K-ATPase at the basolateral membrane. This is the only transport step for sodium in the proximal tubule that involves the direct input of energy to move sodium against its electrochemical gradient (in this case from the inside of the cell to the outside).

21. **Angiotensin II causes all of the following, EXCEPT:**

a) Stimulation of thirst

b) Aldosterone secretion

c) Increased ADH secretion

d) Vasodilation

Correct Answer - D

"Angiotensin II is one of the most potent vasoconstrictors known, being four to eight times as active as norepinephrine on a weight basis in normal individuals". It produces arteriolar constriction and a rise in systolic and diastolic blood pressure. - Ganong

It also acts on the adrenal cortex to increase secretion of aldosterone.
It facilitates the release of norepinephrine by a direct action on postganglionic sympathetic neurons, contraction of mesangial cells with a resultant decrease in GFR and a direct effect on the renal tubules to increase Na+ reabsorption.

It acts on the brain to increase water intake (through subfornicial organ) and increase the secretion of vasopressin and ACTH.

22. **Which of the following is the cause of nonshivering thermogenesis in adults?**

a) Noradrenaline

b) Thyroid hormone

c) Muscle metabolism

d) Brown fat between the shoulders

Correct Answer - A

Nonshivering thermogenesis refers to increase in metabolic rate that is not a result of muscle activity. It appears to be elicited through sympathetic stimulation and circulating catecholamines. Epinephrine and norepinephrine which are released increases metabolic activity and heat generation.

Ref: Guyton and Hall - Textbook of Medical Physiology, 10th Edition, Pages 821, 828-829; Medical Physiology: Principles for Clinical Medicine By Rodney A. Rhoades, 4th Edition, Page 568; Fundamentals of Human Physiology By Lauralee Sherwood, Page 489

23. **The nucleus involved in Papez circuit is:**

a) Pulvinar

b) Intralaminar

c) VPL nucleus

d) Anterior nucleus of Thalamus

Correct Answer - D
Nucleus involved in Papez circuit is anterior nucleus of thalamus.
Ref: Review of Medical Physiology by William ganong, 22nd Edition, Page 256

24. **Which of the following is NOT TRUE about CSF?**

a) Removal of CSF during dural tap causes intense intracranial headache

b) Normally contain no neutrophils

c) Formed by arachnoid villi within the ventricles

d) pH is less than that of plasma

Correct Answer - C

The CSF is formed in the choroid plexuses and the remainder is formed around blood vessels and along ventricular walls. CSF fills the ventricles and subarachnoid space. In humans, the volume of CSF is about 150 mL and the rate of CSF production is about 550 mL/d. Thus the CSF turns over about 3.7 times a day. The composition of CSF is essentially the same as that of brain extracellular fluid (ECF), which in living humans makes up 15% of the brain volume. pH (7.31 - 7.34) slightly less than plasma (7.35 - 7.45). CSF contain no neutrophils. Its differential count is: Lymphocyte - 60-70%, Monocytes - 30-50%, Neutrophils - None.

Ref: Barrett K.E., Barman S.M., Boitano S., Brooks H.L. (2012). Chapter 33. Circulation through Special Regions. In K.E. Barrett, S.M. Barman, S. Boitano, H.L. Brooks (Eds), Ganong's Review of Medical Physiology, 24e.

25. **Cerebral blood flow is regulated by all, EXCEPT:**

a) Intracranial pressure

b) Arterial PC02

c) Potassium ions

d) Cerebral metabolic rate

Correct Answer - C

Factors affecting overall cerebral blood flow include:

- Intracranial pressure
- Local constriction & dilation of cerebral arterioles
- Mean arterial pressure at brain level
- Viscosity of blood
- Mean venous pressure at brain level

The most important extrinsic influences on CBF are respiratory gas tensions particularly arterial PC02. Cerebral blood flow is directly proportional to arterial PC02 between tensions of 20 and 80 mm of Hg.

Ref: Barrett K.E., Barman S.M., Boitano S., Brooks H.L. (2012). Chapter 33. Circulation through Special Regions. In K.E. Barrett, S.M. Barman, S. Boitano, H.L. Brooks (Eds), Ganong's Review of Medical Physiology, 24e.

26. **Withdrawal reflex is an example of which of the following?**

a) Monosynaptic reflex

b) Polysynaptic reflex

c) Both A and B of the above

d) None of the above

Correct Answer - B
The withdrawal reflex is a typical polysynaptic reflex that occurs in response to a usually painful stimulation of the skin or subcutaneous tissues and muscle.
When a reflex arc consists of only two neurons in an animal (one sensory neuron, and one motor neuron), it is defined as monosynaptic. **Monosynaptic** refers to the presence of a single chemical synapse. In the case of peripheral muscle reflexes (patellar reflex, achilles reflex), brief stimulation to the muscle spindle results in contraction of the agonist or effector muscle.
In **polysynaptic reflex** pathways, one or more interneurons connect afferent (sensory) and efferent (motor) signals. All but the most simple reflexes are polysynaptic, allowing processing or inhibition of polysynaptic reflexes within the brain.

Ref: Ganong's Review of Medical Physiology 23rd edition, Chapter 9.

27. Which of the following is referred to as the "Window of the limbic system"?

a) Hypothalamus

b) Amygdala

c) Hippocampus

d) Thalamus

Correct Answer - B
Ans. B i.e. Amygdala.
* The amygdala has been called the “window” through which the limbic system sees the place of the person in the world.
* The amygdala receives neuronal signals from all portions of the limbic cortex, as well as from the neocortex of the temporal, parietal, and occipital lobes, especially from the auditory and visual association areas.

28. Broca's area is concerned with:

a) Word formation

b) Comprehension

c) Repetition

d) Reading

Correct Answer - A
A i.e. **Word formation**
Wernicke's area -) Site of integration.
Broca's area -+ Motor part of speech.

29. Nucleus of basal ganglia

a) Dentate

b) Thalamus

c) Caudate

d) Red nucleus

Correct Answer - C
Ans: C i.e. Caudate nucleus
The basal ganglia have five nuclei on each side of the brain.
- Caudate nucleus
- Putamen
- Globus pallidus
- Subthalamic nucleus
- Substantia nigra

The caudate nucleus and putamen collectively form the striatum.
The putamen and globus pallidus collectively form the lentiform nucleus.
The globus pallidus is divided into external and internal segments

30. Resting membrane potential in nerve fibre

a) Is equal to the potential of ventricular muscle fibre

b) Can be measured by surface electrodes

c) Increases as extra cellular K+ increases

d) Depends upon K+ equilibrium

Correct Answer - D
D i.e. Depends on potassium ion equilibrium

31. Alveolar hypoventilation is present in A/E:

a) Bulber poliomyelitis

b) COPD

c) Kyphoscoliosis

d) Lobar pneumonia

Correct Answer - D

D i.e Lobar Pneumonia

- The important causes of hypoventilation :-

i) Obstruction in airways :- *Foreign body,* COPD *(chronic bronchitis, emphysema).*

ii) *Decrease in respiratory drive :-* It is due to decrease in stimulation of respiration from CNS e.g. brain injury, meningitis, bulbar poliomyelitis, Drugs (morphine, sedative, anesthetics), hypothyroidism.

iii) *Decrease in functioning of respiratory muscles :-* Mysthenia gravis, poliomyelitis, kyphoscoliosis, myopathy, polymyositis, GB syndrome, interstitial lung disorders, AML.

iv) *Increased load on respiratory system :-* It may be due to :?

a) *Reduced chest wall compliance :-* Pleural effusion, pneumothorax, ascitis, rib cage disorder (kyphoscoliosis), ankylosing spondylitis.

b) *Reduced lung compliance :-* Atelectasis, lung resection, alveolar edema, PEEP.

32. Which of the following does NOT stimulate peripheral chemoreceptors:

a) Hypoxia

b) Hypocapnia

c) Acidosis

d) Low perfusion pressure

Correct Answer - B
B i.e. Hypocapnia

33. Stability of alveoli is maintained by?

a) Lung compliance

b) Negative intrapleural pressure

c) Increase in alveolar surface area by the surfactant

d) Residual air in alveoli

Correct Answer - C
C i.e. Increase in alveolar surface area by the surfactant

34. Mean arterial pressure is calculated as:

a) (SBP + 2DBP)/ 3

b) (DBP + 2SBP)/ 3

c) (SBP + 3DBP)/ 2

d) (DBP + 3SBP)/ 2

Correct Answer - A
A i.e. (SBP + 2DBP) /3

35. Cerebral blood flow is regulated by all except:

a) Blood pressure

b) Arterial PCO_2

c) Potassium ions

d) A & C

Correct Answer - D
Ans. A & C. i.e. Blood pressure & Potassium ions
The total cerebral blood flow is held constant in face of considerable changes in the systemic blood pressure (60-150 mm Hg)". - Principles of medical physiology.
"Cerebral blood flow is not affected over a fairly wide variation in arterial blood pressure". - RK Marya.
Regulation of cerebral blood flow:
l) Autoregulation:- Due to the inherent property of blood vessels, explained by myogenic theory.
2) Metabolic regulation: CBF varies directly with metabolic activity. Factors affecting regulation are PCO2, PO2, K+, and adenosine. Among this PCO2 is the most important one.
3) Sympathetic innervation:- Important only in cases with very severe elevation of BB e.g. in very strenuous exercises.
4) Intracranial pressure:- By Cushing reflex.
5) Others: Blood viscosity.

36. Gastrin is produced by :

a) Pancreas

b) Gastric antral cells

c) Pituitary

d) All

Correct Answer - D
D i.e. All

37. Gastric secretion is :

a) Inhibited by curare

b) Stimulated by nor adrenaline

c) Increased by stomach distention

d) Stimulated by an increase in tonic activity

Correct Answer - C
C i.e. Increased by stomach distension

38. Which inhibits gastric secretion ?

a) Secretin

b) Insulin

c) High gastric pH

d) Calcium

Correct Answer - A
A i.e. Secretin
Gastrin is a hormone which is *produced by G-cells in the lateral wall of glands in the antral portion of gastric mucose.* It is also found in *pancreatic islets in fetal life, gastrinomas of pancreas,* and *pituitary glandQ,* hypothalamus, medulla oblongata and in vagus & sciatic nerves.

39. Pancreatic juice rich in water and electrolytes poor in enzymes is secreted in response to :

a) Pancreatozymin

b) Cholecystokinin

c) Secretin

d) Proteins

Correct Answer - C
C i.e. Secretin

40. Small intestinal peristalsis is controlled by :

a) Myentric plexus

b) Meissners plexus

c) Vagus nerve

d) Para sympathetic system

Correct Answer - A
A i.e. Myentric plexus
Myenteric (Auerbach's) plexus is situated b/w and innervates *outer longitudinal & middle circular muscular* layers and is *primarily concerned with motor controlQ.* Submucosal (meissner's) plexus situated between middle circular layer and mucosa is primarly concerned with *control of intestinal secretionQ* as it innervates glandular epithelium, intestinal endocrine cells & submucosal blood vessels.

41. Ovarian reserve is best indicated by

a) LH

b) FSH

c) LH/ FSH ratio

d) Estrogen

Correct Answer - B
B i.e. FSH
Ovarian reserve can be best assessed by measuring *FSH levels on 3rd day of menstrual cycle,* clomiphene citrate challenge / provocative test (measures FSH levels on cycle day 10 after antiestrogen clomiphene citrate 100 mg administration from day 5 to 9). Serum inhibin B level and ultrasonic scanning to count the number of antral follicles in ovary are other methods.
Ovarian Reserve
- It refers to the *size of resting / nongrowing /primordial follicle population,* which reflects the *quantity (no) of growing follicles and quality of oocytes within it.* So ovarian reserve determines the *functional reproductive potential of* ovary.
- Under the influence of FSH and LH, there is rapid growth of several follicles in ovary, during first few days of each menstrual cycle. But after a week only 1 follicle begins to outgrow all the others /which involute by a process called atresia and thus preventing more than one child from developing with each pregnancy).
- Ovarian reserve (& capacity of ovary to produce eggs) decline with *advancing age.* Best predictor of ovarian reserve is age. Tests that can determine ovarian reserve include

42.

Which of these is not a part of extracellular matrix:

a) Laminin

b) Fibronectin

c) Integrins

d) Collagen

Correct Answer - C
C i.e. Integrins
- Extracellular matrix proteins are collagen, elastin, fibrillin, fibronectin, laminin and proteoglycans (GAGs) Mn- "Call Ela For Last Prose" Whereas cell adhesion molecules present in cytoplasm or cell membrane include *integrins, selectins, cadherins and immunoglobulin family CAMsQ.*
- Integrins are *cell surface adhesion protein* that provide linkage between cell outside & inside, between cell- cell and between cell & extracellular matrix.

43. All of the following occur in mitochondria except

a) Citric acid cycle (Kreb's cycle)

b) Glycogenolysis

c) Fatty acid oxidation

d) Electron transport chain

Correct Answer - B
B i.e. Glycogenolysis

44. QRS complex is due to:
September 2008

a) Ventricular repolarization

b) Atrial depolarization

c) Conduction through AV node

d) Ventricular depolarization

Correct Answer - D
Ans. D: Ventricular depolarization
QRS complex is due to ventricular depolarization and atrial repolarization. Normal duration is 0.08 sec.

45. Coronary blood flow is maximum during which phase of cardiac cycle:

a) Isovolumic relaxation phase

b) Isovolumic contraction phase

c) Ejection phase

d) Isovolumic contraction phase

Correct Answer - A

Ans. A: Isovolumic relaxation phase

Maximum coronary blood flow occurs during the phase of isovolumetric ventricular relaxation phase

Isovolumetric/isometric relaxation time/IVRT

- An interval in the cardiac cycle, from the aortic component of the second heart sound, that is, closure of the aortic valve, to onset of filling by opening of the mitral valve.
- Ventricular pressure decreases to zero rapidly while aortic pressure decreases only to 80 mm Hg i.e. it remains fairly high.
- Therefore, intra myocardial compression of blood vessels is minimal and perfusion pressure is maintained fairly high.
- So coronar^{y} blood flow rises sharply
- Maximum coronary blood flow occurs during this phase
- It can be used as an indicator of diastolic dysfunction.
- Prolonged IVRT indicates poor myocardial relaxation.
- A normal IVRT is about 70 ± 12 ms, and approximately 10ms longer in people over forty years.
- In abnormal relaxation, IVRT is usually in excess of 110ms.
- With restrictive ventricular filling, it is usually under 60 ms

46. Aortic valve closure corresponds to the beginning of:

September 2011

a) Systole

b) Parasystole

c) Isovolumetric relaxation

d) Isovolumetric contraction

Correct Answer - C

Ans. C: Isovolumetric relaxation

Cardiac Diastole

- It is the period of time when the heart relaxes after contraction in preparation for refilling with circulating blood.
- During ventricular diastole, the pressure in the (left and right) ventricles drops from the peak that it reaches in systole.
- When the pressure in the left ventricle drops to below the pressure in the left atrium, the mitral valve opens, and the left ventricle fills with blood that was accumulating in the left atrium.
- The isovolumic relaxation time (IVRT) is the interval from the aortic component of the second heart sound, that is, closure of the aortic valve, to onset of filling by opening of the mitral valve.
- Likewise, when the pressure in the right ventricle drops below that in the right atrium, the tricuspid valve opens, and the right ventricle fills with blood that was accumulating in the right atrium.
  - During diastole the pressure within the right ventricle is lower than that in aorta, allowing blood to circulate in the heart itself via the coronary arteries.

47. Chymotrypsinogen is activated into chymotrypsin by:

a) Trypsin

b) Pepsin

c) Renin

d) HCl

Correct Answer - A
Ans. A: Trypsin

- Trypsin is secreted into the duodenum, where it hydrolyzes peptides into its smaller building blocks, namely amino acids. Trypsin catalyzes the hydrolysis of peptide bonds.
- Trypsins have an optimal operating pH of about 8.
- Trypsins are considered endopeptidases, i.e., the cleavage occurs within the polypeptide chain rather than at the terminal amino acids located at the ends of polypeptides.
- Trypsin is produced in the pancreas in the form of inactive trypsinogen.
- It is then secreted into the small intestine, where the enzyme enteropeptidase activates it into trypsin by proteolytic cleavage. The resulting trypsins themselves activate more trypsinogens (autocatalysis), chymotrypsinogen, Elastase/ proelastase, Carboxypeptidase A and B, Colipase and Phospholipase A2.

48. Shivering is controlled by:
***September 2012, March* 2013**

a) Dorsomedial nucleus

b) Posterior hypothalamus

c) Perifornical nucleus

d) Lateral hypothalamic area

Correct Answer - B

Ans. B i.e. Posterior hypothalamus

Shivering/Shuddering

- It is a bodily function in response to **early** hypothermia in warm-blooded animals.
- When the core body temperature drops, the shivering reflex is triggered to maintain homeostasis.
- Muscle groups around the vital organs begin to shake in small movements in an attempt to create warmth by expending energy.
- Shivering can also be a response to a fever, as a person may feel cold, though their core temperature is already elevated.
- Located in the posterior hypothalamus near the wall of the third ventricle is an area called the primary motor center for shivering.
- This area is normally inhibited by signals from the heat center in the anterior hypothalamic-preoptic area but is excited by cold signals from the skin and spinal cord.

49. Vomiting centre is situated in the:
September 2008

a) Hypothalamus

b) Midbarin

c) Pons

d) Medulla

Correct Answer - D
Ans. D: Medulla
Vomiting is believed to be controlled by two distinct brain centres—the vomiting centre and the chemoreceptor trigger zone—both located in the medulla oblongata.
The vomiting centre initiates and controls the act of emesis, which involves a series of contractions of the smooth muscles lining the digestive tract

50. Bohr effect is described as:
September 2009

a) Decrease in CO2 affinity of hemoglobin when the pH of blood rises

b) Decrease in CO2 affinity of hemoglobin when the pH of blood falls

c) Decrease in O2 affinity of hemoglobin when the pH of blood rises

d) Decrease in O2 affinity of hemoglobin when the pH of blood falls

Correct Answer - D
Ans. D: Decrease in O2 affinity of hemoglobin when the pH of blood falls
The decrease in $_{O2}$ affinity of hemoglobin when the pH of blood falls is called the Bohr effect and is closely related to the fact that deoxygenated hemoglobin (deoxyhemoglobin) binds H+ more actively than does oxyhemoglobin. The pH of blood falls as its CO, content increases, so that when the PCO_2 rises, the curve shifts to the right and the $P_{5„}$ rises.

51. FALSE for seminal vesicles:
***September* 2012**

a) Contains large amount of fructose

b) Stores sperms

c) Situated on either side near prostate

d) Secretion of seminal vesicle gives mucoid consistency to semen

Correct Answer - B
Ans. B i.e. Stores sperms
Sperms are stored in epididymis

52. Which of the following are inactive during normal respiration ?

a) Pre-Botzinger complex

b) Dorsal group of neurons

c) Ventral VRG group of neurons

d) Pneumotaxic center

Correct Answer - C
Ans. is **'c' i.e.,** Ventral group of neurons
Medullary respiratory centers

- The principal areas in the medulla oblongata concerned with regulation of respiration are : *?*

1) Dorsal respiratory group (DRG) : - The dorsal respiratory group of neurons are mainly *concerned with inspiration.* They descend and terminate on spinal motor neurons *innervating the primary muscles of inspiration, i.e., the diaphragm and the external intercostal muscles.*

2) *Ventral respiratory group (VRG) :* - The ventral respiratory group of neurons is *mainly concerned with forceful expiration* but also shows *some activity during inspiration.* Therefore, these neurons contribute to both expiration and inspiration. These neurons are divided into : *?*

i) The rostral VRG neurons : - These neurons show activity primarily synchronous with inspiration and therefore be called *inspiratory (I) neurons.* They terminate on spinal motor neurons *supplying the accessory muscles of inspiration, i.e., sternocleidomastoid, scalenes and anterior serrati.*

ii) The ventral VRG neurons : - These are mostly *expiratory (E) neurons.* But since the expiration is generally a passive process, E

neurons are silent most of the time. However, these neurons show activity when expiration is forceful, as during exercise. These neurons terminate on spinal motor neurons *supply the muscles of expiration, i.e., internal intercostal and abdominal muscles.*

3) *Pre-Botzinger complex :* - These neurons are responsible for generation of respiratory rhythm, i.e., the pacemaker cells which regulate the rate of respiration are located in Pre-Botzinger complex.

Pontine respiratory centers

- The important pontine areas concerned with respiration are : *?*

1) Pneumotoxic center (nucleus parabrachialis medialis) : - It is located in *upper part of pons* and transmits signals to the inspiratory area. The function of the pneumotaxic center is *primarily to limit inspiration, i.e.,* the primary effect of this center is to control the "switch-off" point of the inspiratory ramp thus controlling the depth of inspiration, i.e., the duration of the filling phase of the lung cycle. Pneumotaxic center also inhibits apneustic center further inhibiting inspiration. Therefore strong stimulation of this center results in an early termination of inspiratory ramp and hence, inspiration is shortened and the tidal volume decreases. Conversely, in the absence of inputs from this center, inspiratory ramp continues much longer and hence inspiration is prolonged and the tidal volume increases.

2) Apneustic center : - This center located in the *lower (caudal) part of pons.* The apneustic center excites inspiratory center (DRG) and produce a *prolonged inspiratory drive* which delays the onset of expiration. Thus, though the respiratory rhythm is established in the medulla, this rhythm is spoilt by a strong inspiratory drive orginating in the apneustic centers. However, two influences seems to keep the apneustic center in check : (i) *Pneumotaxic center of upper pons* and (ii) *Influence from stretch receptors in lung via vagus.* Both of these influence inhibit inspiratory activity.

53. Sleep centre is located in -

a) Basal ganglia

b) Medulla

c) Hypothalamus

d) Cerebellum

Correct Answer - C
Ans. is 'c' i.e., Hypothalamus

54. Aromatase produces estrogen from -

a) Progesterone

b) Cortisol

c) Aldosterone

d) Androgen

Correct Answer - D
Ans. is 'd' i.e., Androgen

55. Action of progesterone ?

a) Increased sensitivity of uterus to oxytocin

b) Inhibits LH secretion

c) Decrease in body temperature

d) Causes proliferative changes in uterus

Correct Answer - B
Ans. is 'b' i.e., Inhibits LH secretion

56. Corpus leuteum starts regressing after how many days of ovulation ?

a) 5 days

b) 10 days

c) 24 days

d) None

Correct Answer - B
Ans. is 'b' i.e., 10 days
If ovum is not fertilized, the corpus luteum starts degenerating *around day 24 of cycle (about 10 days after ovulation)* and is eventually is replaced by fibrous tissue, forming corpus albicans. Degeneration of corpus luteum is due to decline in level of LH (which is required for maintenance of corpus luteum) and increase in secretion of inhibin by luteal cell itself.

57. Weber Fechner law is related to ?

a) Phantom limb

b) Force of contraction in heart

c) Intensity of stimulus and sensation felt

d) Cortical plasticity

Correct Answer - C
Ans. is 'c' i.e., Intensity of stimulus and sensation felt

58. Maximum amount of K^+ ion is seen in which GI secretion ?

a) Saliva

b) Colonic

c) Gastric

d) Jejunal

Correct Answer - A
Ans. is 'a' i.e., Saliva

59. Blood supply of brain is ?

a) 1500 ml/min

b) 2000 ml/min

c) 750 ml/min

d) 250 ml/min

Correct Answer - C
Ans. is 'c' i.e., 750 ml/min
The cerebral blood flow (CBF) is about *750 ml/min (15% of total cardiac output), or 54 ml/100 gm brain tissue per minute.*

60. Fertilization takes place after how much time of ovulation ?

a) 1-2 days

b) 5-6 days

c) 8-12 days

d) > 12 days

Correct Answer - A
Ans. is 'a' i.e., 1-2 days

61. Major neurotransmitter in afferents in nucleus tractus solitarius to regulate cardiovascular system ?

a) Serotoxin

b) Glutamate

c) Glycine

d) Norepinephrine

Correct Answer - B
Ans. is 'b' i.e., Glutamate
Nucleus tractus solitarius (NTS) lies in medulla.
It receives following afferents :?
A) General visceral afferents
i) From tonsil, pharynx, posterior part of tongue, carotid body and sinus → *through glossopharyngeal nerve.*
ii) From pharynx, larynx, trachea, esophagus, and other thoracic and abdominal viscera → *through vagus nerve.*
B) Special visceral afferents
i) From anterior 2/3 of tongue (except circumvallate papillae) and palate → *through facial nerve*
ii) From posterior 1/3 of tongue (including circumvallate papillae) → *through glossopharyngeal nerve.*
iii) From posterior most part of tongue and epiglottis → *through vagus nerve.*

- NTS is involved in regulation of cardiovascular system through baroreceptors and chemoreceptors.
- *There is a general consensus that glutamate is the neurotransmitter released at the therminals of baroreceptor and chemoreceptor*

afferents in NTS. — www.springer.com

- However, cholinergic, GABAergic, and opioidergic mechanisms are also present in NTS.

62. Most diffusible ion across membrane -

a) Na^+

b) K^+

c) Cl^-

d) None

Correct Answer - C

Ans. is 'c' i.e., $Cl^?$

Among the given options, Cl- has lowest permeability coefficient and maximum permeability.

Permeability of membrane

- As the major middle portion of membrane (core of the membrane) is formed by hydrophobic region of phospholipids, this portion is impermeable to the usual water-soluble substances, such as ions, glucose and urea. Conversely, fat-soluble substances, such as oxygen, carbon dioxide, and alcohol, can penetrate this portion of the membrane with ease.
- The permeability coefficients of small molecules in the lipid bilayer *correlate with their solubilities in nonpolar (hydrophobic) region and thus their permeability.*

63. Cells most sensitive to hypoxia are ?

a) Myocardial cells

b) Neurons

c) Hepatocytes

d) Renal tubular epithelial cells

Correct Answer - B
Ans. is 'b' i.e., Neurons
The susceptibility of a tissue to hypoxia influences the likelihood of infarction.
Neurons are most sensitive to hypoxia (irreversible changes develop in 3-4 minutes) followed by myocardial cells (irrversible changes develop in 20-40 minutes).
Fibroblasts are amongst the most resistent cells to hypoxia.

64. Beta-2 transferrin is found in ?

a) Blood

b) Urine

c) Tear

d) CSF

Correct Answer - D

Ans. is 'd' i.e., CSF

- Beta-2 transferrin is an isoform of transferrin.
- It is found in cerebrospinal fluid (CSF).
- It is not found in other body fluids (blood, mucus, tear, saliva, urine).
- Therefore, it is a *specific marker for CSF* and is used for diagnostic of CSF leaks.

65. What will occur with increase in alveolar ventilation rate ?

a) Decreased partial pressure of O_2 in alveoli

b) Decreased partial pressure of CO_2 in alveoli

c) Decreased CO_2 diffusion from blood to alveoli

d) Decreased O_2 diffusion from alveoli to blood

Correct Answer - B
Ans. is 'b' i.e., Decreased partial pressure of CO_2 in alveoli
Alveolar ventilation is the amount of inspired air entering in gas-exchange areas (alveoli) per minute during quite breathing. It excludes the air which remains in dead space.

66. Tone of lower esophageal sphincter is increased by?

a) NO

b) VIP

c) Acetylcholine

d) Epinephrine

Correct Answer - C
Ans. is 'c' i.e., Acetylcholine
Lower esophageal sphincter

- Unlike the rest of the esophagus, the musculature of the gastroesophageal junction (lower esophageal sphincter; LES) is tonically active but relaxes on swallowing.
- The tonic activity of the LES between meals prevents reflux of gastirc contents into the esophagus. o The LES is made up of three components.
- The esophageal smooth muscle is more prominent at the junction with the stomach (intrinsic sphincter).
- Fibers of the crural portion of the diaphragm, a skeletal, a skeletal muscles, surround the esophagus at this point (extrinsic sphincter) and exert a pinchcock-like action on the esophagus. In addition, the oblique or sling fibers of the stomach wall create a flap valve that helps close off the esophagogastric junction and prevent regurgitation when intragastric pressure rises.
- The tone of the LES is under neural control.
- *Release of acetylcholine from vagal endings causes the intrinsic sphincter to contact, and release of NO and VIP from interneurons innervated by other vagal fibers causes it to relax.*
- Contraction of the crural portion of the diaphragm, which is

innervated by the phrenic nerves, is coordinated with respiration and contractions of chest and abdominal muscles.

- Thus, the intrinsic and extrinsic sphincters operate together to permit orderly flow of food into the stomach and to prevent reflux of gastric contents into the esophagus.

67. While walking or standing, posture is maintain by ?

a) Basal ganglia

b) Hypothalamus

c) Cerebellum

d) Amygdala

Correct Answer - C
Ans. is 'c' i.e., Cerebellum
Cerebellum, through its connection with the red nucleus influences the activity of brainstem reticular formation and thereby gamma motor neuron activity.
Through its connections with the vestibular nucleus and vestibulospinal tract, cerebellum influnences the activity of alpha motor neurons.
Thus, *normal cerebellar function is essential for the maintenance of normal muscle tone and posture.*
The cerebellum seems to play crucial roles in walking as well as maintaing a standing posture.
Cerebellar vermis plays an important role in maintenance of standing postuk.
Basal ganglia is also involved in maintaining posture by acting as relay center for extrapyramidal pathways. But its role is not as important.

68. Pepsinogen is activated by ?

a) Enterokinase

b) Enteropeptidase

c) H^+

d) Trypsin

Correct Answer - C
Ans. is c i.e.,H^+
Pepsin is secreted by chief cells of stomach in an inactive (zymogen) form called pepsinogen.
Acid (IF) in lumen of stomach converts pepsinogen to active pepsin.
Pepsin once formed also attacks pepsinogen producing more pepsin molecules by autocatalysis.

69. Bile acid has a detergent action due to ?

a) Formation of soap

b) Formation of zwitter ion

c) Amphipathic nature of bile salts

d) Formation of medium chain triglycerides

Correct Answer - C
Ans. is c i.e., Amphipathic nature of bile acids
Bile-salts help in digestion of fat by emulsification of fat in small intestine by detergent action of bile salts.
The detergent action of bile salts is due to their amphipathic property.
Emulsification increases the surface to volume ratio of the lipid droplets facilitating the action of lipases.
Bile salts also help in formation of *micelles.*
Micellar formation solubilizes the digested fats and provides a mechanism of their absorption into the enterocytes.

70. Myelination in peripheral nervous system is done by

a) Astrocytes

b) Oligodendrocytes

c) Ependymal cells

d) Schwann cells

Correct Answer - D
Ans. is d i.e., Schwann cells
Myelination in central nervous system → Oligodendrocytes.
Myelination in peripheral nervous system → Schwann cell.

71. Digestion of disaccharides occurs at ?

a) Mouth

b) Stomach

c) Small intestine

d) Large intestine

Correct Answer - C

Ans. is 'c' i.e., Small intestine

- Digestion of disaccharides (maltose, sucrose and lactose) occurs by the enzymes present in brush border os small intestinal epithelial cells.
- Maltase (a-glucosidase) breaks 1: 4 linkages in maltose and maltotriose and releases glucose (two molecules of glucose from maltose and three molecules of glucose from maltotriose). Isomaltase (a-limit dextrinase) breaks 1 : 6 a linkages of alpha-limit dextrin and releases glucose. *Isomaltase dextrinase) is the only enzyme that attacks 1 : 6a linkage.*
- Sucrose is hydrolysed into fructose and glucose by sucrase (an enzyme present in brush border of intestinal epithelium). Lactose is hydrolysed into galactose and glucose by lactase ((3-glucosidase). Trehalase hydrolyzes trehelose (a 1:1 a - linked dimer of glucose) into two glucose molecules. Trehalose is found in mushrooms.

72. Dicrotic notch is caused by

a) Closure of mitral valve

b) Opening of mitral valve

c) Closure of aortic valve

d) Opening of aortic valve

Correct Answer - C
Ans. is 'c' i.e.. Closure of aortic valve
Aortic pressure curve

- With the onset of the rapid ejection phase of the ventricular systole, the aortic pressure rises steeply to reach a maximum of about 120 mm Hg. The ejection of blood into the aorta causes a stretch on the aortic walls and makes the blood in the entire arterial system to move at a faster rate. This sets up a pressure wave that travels along the arteries. The pressure wave expands the arterial wall as it travels, and expansion is palpable as the pulse. In the later part of the ventricular systole, the aortic pressure declines and continues to decline throughout the diastole, to reach a minimum of about 80 mm Hg during the isometric contraction of the next cardiac cycle. The elastic recoil of the aorta and the resistance of arterioles help to maintain relatively high aortic pressure during diastole.
- A notch (incisura or dicrotic notch) is recorded in the early part of the downstroke of the aortic pressure curve. It corresponds to the closure of the aortic valve. It is produced by the sudden backward flow of aortic blood followed by the immediate cessation of backflow due to closure of the aortic valves.

73. Which of the following is an example of active transport?

a) Movement of water across cell membrane

b) Movement of oxygen across cell membrane

c) Co-transport of amino acids with sodium

d) None of the above

Correct Answer - C

Ans. is 'C' i.e., Co-transport of amino acids with Na^+

- Active transport of Na + and K + is one of the major energy-using processes in the body.
- The active transport of Na + is coupled to the transport of other substances (secondary active transport).
- For example, the luminal membranes of mucosal cells in the small intestine contain a symport that transports glucose into the cell only if Na + binds to the protein and is transported into the cell at the same time.

74. Chloride shift is due to ?

a) Generation of HCO^-_3 in RBCs

b) Metabolism of glucose in RBCs

c) Formation of O_2-Hb complex in RBCs

d) None

Correct Answer - A

Ans. is 'a' i.e., Generation of HCO^-_3 in RBCs

- Carbon dioxide is transported in blood as plasma bicarbonate.
- *Red blood cells (RBCs) play a major role* in the mechanism because RBCs contain the enzyme carbonic anhydrase that catalyzes the reaction $CO_2 + H_2O = HCO_3 +$
- Hence when CO_2 diffuses into the RBC, it reacts chemically with water to generate HCO3-.
- The ft ions are mopped up by hemoglobin, which is an excellent buffer.
- This enables the reaction to proceed in the forward direction.
- The HCO_3- ions generated diffuse out into the plasma in exchange for Cl- ions that diffuse into RBCs simultaneously.
- The movement of chloride ions into RBC is called Chloride shift.
- The above events results in an increase in total number ions inside the RBC, which increases its osmolarity.
- As a result, water enters the RBC through osmosis.
- The RBCs carrying CO_2 in bicarbonate form will therefore be somewhat larger than normal.
- Hence the hematocrit of venous blood is normally 3% greater than that of arterial blood. o In the lungs, Cl^- moves out of the RBCs and they shrink.

75. Which of the following is passively absorbed in gut ?

a) Glucose

b) Lipids

c) Fructose

d) Amino-acids

Correct Answer - B
Ans. is 'b' i.e., Lipids

76. Pulmonary vasodilatation is caused by ?

a) Hypoxia

b) Thromboxane A_2

c) Histamine

d) Angiotensin-II

Correct Answer - C
Ans. is 'c' i.e., Histamine

77. Life span of neonatal RBC ?

a) 60-90 days

b) 90-120 days

c) 120-150 days

d) 150-200 days

Correct Answer - A
Ans. is 'a' i.e., 60-90 days

78. Skin blood flow is decreased by ?

a) Dopamine

b) Isoprenaline

c) Noradrenaline

d) Acetylcholine

Correct Answer - C
Ans. is 'c' i.e., Noradrenaline
Autophagy is the process by which cells sequester and degrade their own cytoplasmic organelles.
During the process, autophagic vacuole is formed, which is a bilayer vacule containing unnecessary or dysfunctional organelle.
Autophagic vacule fuses with lysosome to form autophagosome (autophagolysosome).
Then, hydrolytic enzymes of lysosome degrade the organelle of autophagic vacuole.

79. Autophagic vacuoles fuse with ?

a) Golgi complex

b) ER

c) Lysosome

d) Mitocondria

Correct Answer - C
Ans. is 'c' i.e., Lysosome

80. Feed forward inhibition synapse seen in

a) Medulla

b) Cerebellum

c) Basal ganglia

d) Hypothalamus

Correct Answer - B
Ans. is `b' i.e., Cerebellum
Feed forward control system is employed during the regulation of temperature.
In feed-forward inhibition, a neuron is connected through two pathways one excitatory and one inhibitory.
For example, in cerebellum the stimulation of Basket cells produces IPSPs (inhibitory postsynaptic potentials) in Purkinje cells.
However, the basket cells and the Purkinje cells are excited by the same parallel-fiber excitatory input.
This arrangement is called *feed-forward inhibition* and helps to prevent the duration of the excitation produced by any given afferent impulse.

81. Main enzyme involved in digestion of fatty food?

a) Lingual lipase

b) Gastric lipase

c) Pancreatic lipase

d) Phospholipase

Correct Answer - C
Ans. is 'c' i.e., Pancreatic lipase
Ebner's glands on the dorsum of the tongue secrete lingual lipase and the stomach also secretes a lipase (gastric lipase). However, they are of very little significance in fat digestion.
Fat digestion essentially begins in the duodenum with entry of pancreatic and biliary secretions. o Pancreatic juice contains lipase (pancreatic lipase), the most important enzyme for fat digestion.
The pancreatic lipase digests triglycerides (triacylglycerols) into free fatty acids and 2-monoglycerides (2? m on ocylg lycerols).
Pancreatic lipase hydrolyzes 1-and 3-bonds of triglycerides with relative sparing of 2-bonds, so the principal products of its action are free fatty acids and 2-monoglycerides.

82. Motor protein in organ of corti ?

a) Kinesin

b) Albumin

c) Dynein

d) Myosin

Correct Answer - D
Ans. is d i.e., Myosin

- The inner hair cells of organ of corti have 50-200 ciliated structure called stereocilia.
- The top of each stereocilium is linked to the side of next adjacent higher stereocilium by means of a thin filamentous strucuture called the tip-link.
- Mechanically gated ion channels are located at these attachment points on the sides of stereocilia. Each stereocilium comprises of several actin filaments encased by a plasma membrane.
- The opening and closing of the ion channels is accomplished through the binding and unbinding of proteins at terminal ends of the tip links with a group of channel motor proteins (myosin) which move up and down the actin filaments of stereocilia.

83. Vibrations are felt by ?

a) Meissner's corpuscle

b) Merkel's disc

c) Pacinian corpuscle

d) Ruffini's end organ

Correct Answer - C
Ans. is 'c' i.e., Pacinian corpuscle
Tactile (touch) receptors
These are *general exteroreceptors for epicritic senses.* These are divided into superficial and deep receptors.
Superficial receptors are present in the epidermis or *papillary layer of dermis.* In glabrous (nonhairy) skin these receptors are *Merkel's disc (slowly adapting)* and *Meissner 's corpuscle (rapidly adapting).* In hairy skin there are *hair follicle receptors.*
Deep receptors are present in deeper dermis or in the subcutaneous tissues. The deep receptors are same in both hair and nonhairy skin and include *Ruffini's end organ (slowly adapting)* and *Pacinian corpuscle (Rapidly adapting).*
Touch, pressure and vibration are different forms of same sensation. Pressure is felt when the force applied on the skin is sufficient to reach the deep receptors, whereas touch is felt when the force is insufficent to reach the deep receptors, therefore detected by superficial receptors (Merkel's disc, meissner's corpuscle).
Vibrations are rhythmic variations in pressure (i.e. rhymic variations of force that reaches the deep receptors). Whether a tactile receptor senses pressure or vibration depends on whether the receptor is slowly adapting or slowly adaping :?
i) Slowly adapting (Ruffini's end organ) :- Are meant to detect

sustained pressure; they are useless for vibrations.
ii) Rapidly adapting (Pacinian corpuscle) :- Stop discharge in response to sustained pressure; they are useful only when the pressure fluctuates rapidly, i.e. during vibrations. The higher the rate of adaptation of a receptor, the greater is the vibration frequency it can detect.
Thus, tactile (touch) sensation can be divided into :?
A) Superficial (generally considered as touch) :- Detected by *Meissner 's corpuscle (detect texture of surface, i.e. rough or smooth)* and *Merkel's disc (detect two point discrimination).*
B) Deep
i) Pressure (Deep touch) :- Detected by *Ruffini's end organ.*
ii) Vibrations :- Detected by Pacinian corpuscle

84. Herring Breuer reflex is an increase in ?

a) Duration of inspiration

b) Duration of expiration

c) Depth of inspiration

d) Depth of expiration

Correct Answer - B
Ans. is 'b' i.e., Duration of expiration
The Hering-Breuer inflation reflex is an increase in the duration of expiration produced by steady lung inflation, and the Hering-Breuer deflation reflex is a decrease in the duration of expiration produced by marked deflation of the lung.

85. Amount of gastric juice secreted per day ?

a) 500-1000 ml

b) 1000-1500 ml

c) 2000-2500 ml

d) 3000-3500 ml

Correct Answer - C
Ans. is 'c' i.e., 2000-2500 ml

86. True about gap junctions are all, except ?

a) Transmit electric signals

b) Allow ions to pass

c) Intercellular space 1000 nm

d) Seen in cardiac muscle

Correct Answer - C
Ans. is 'c' i.e., Intercellular space 1000 nm
Gap junctions are intercellular connections consist of a pair of hemichannels (connexons) inserted into the membrane of adjacent cells.
Each connexone is made of six identical protein subunits called connexins which enclose a central channel.
When the corresponding connexons of adjacent cell link up end-to-end, they form a continuous channel that permits substances to pass through from cell to cell.
At gap junctions, the intercellular space narrows down to 3nm, thereby helping in binding the cells together. o However, their real physiological significance lies in *allowing ions to flow through them, i.e. they conduct ionic current.*
This *enables electrical excitation to spread from cell to cell,* as in *smooth and cardiac muscles.*
The *pore size of gap junctions decreases when intracellular Ca' is high or pH is low,* both of which are commonly associated with cell damage. Closure of gap junctions in response to these stimuli isolates damaged cells so that the Ca^{+2} and *1-1*$^{+}$ do not spread from the damaged to normal cells.

87. In starvation, earliest to become depleted -

a) Carbohydrates

b) Proteins

c) Fats

d) None

Correct Answer - A
Ans. is 'a' i.e., Carbohydrates
Metabolic alteration during fasting-starvation
o he metabolic changes observed in fasting are generally *opposite to those described for absorptive (fed) state.* In the absence of food, plasma levels of glucose, amino acids, and TGs fall, triggering a decline in insulin secretion and an increase in glucagon release. This results in *decreased insulin: glucagon ratio.* Which is responsible for most of the metabolic changes.

88. Growth hormone secretion is stimulated by ?

a) Increased blood glucose

b) Decreased blood glucose

c) Cortisol

d) Somatostatin

Correct Answer - B
Ans. is 'b' i.e., Decreased blood glucose
Regulation of GH secretion
GH secretion is regulated by GHRH released from hypothalamus. GH is secreted in a pulsatile fashion throughout the life, with elevated rates of secretion immediately after birth and at puberty. Interestingly, large bursts of secretion occur at night during the onset of deep sleep.
Stimuli that increase secretion of GH are hypoglycemia, exercise, fasting, protein meals, aminoacids (like arginine), stress, glucagon, pyrogen, lysin vasopressin, apomorphins, L-dopa & a-adrenergics, estrogen, androgens and 2-deoxyglucose.
Stimuli that decrease secretion of GH are REM sleep, glucose, Somatostatin, cortisol, FFA, GH itself, IGF-1, and medroxyprogesteron.

89. Isocapnic exercise is ?

a) Breathing for short duration against resistance

b) Breathing of decreased volume of ventilation

c) Breathing of increased volume of ventilation for long period

d) Breathing of decreased volume for long period

Correct Answer - C
Ans. is 'c' i.e., Breathing of increased volume of ventilation for long period

90. Hormones required during puberty ?

a) LSH

b) Testesterone

c) Leptin

d) All of the above

Correct Answer - D

Ans. is 'd' i.e., All of the above

- Puberty is triggered by a release of gonadotropins (FSH and LH) from pituitary gland.
- These hormones act as signals to the gonads (testes/ovaries) that trigger the production of -
  i) Estrogen, progesterone and some testosterone in women.
  ii) *Testosterone in men.*
- In both males and females, testosterone is responsible for development of pubic hair, accelerated bone growth, body odor and acne during puberty. For boys, testosterone is responsible for the process of virilization, including the enlargement of the penis, increased libido and growth of facial and chest hair.
- Estrogen is the major hormone responsible for female puberal development. It causes development of breast and thickening of endometrium.
- Progesterone causes proliferation of acini in mammary glands and converts watery cervical secretion to viscid and scanty.
- Leptin facilitates release of gonadotropin releasing hormone (GnRH), thereby helping in pubertal onset.
- Other hormones which are involved in puberty are thyroxine and growth hormone.

91. Capacitance vessels have in their wall ?

a) More elastic tissue and less muscle

b) Less elastic tissue and more muscle

c) More elastic tissue and more muscle

d) Less elastic tissue and less muscle

Correct Answer - D

Ans. is 'd' i.e., Less elastic tissue and less muscle

Veins are capacitance vessels. They have less smooth muscle and less elastic tissue in their wall.

Structure of vessels

A) Structure of artery

It is made up three layers -

1.Tunica Intima

The inner most layer (towards lumen) of artery is intima.

It consists of endothelial cells which rest on basment membrane.

There is some subendothelial connective tissue.

Intima is separated from media by internal elastic lamina.

2.Tunica Media

It is mainly contains *smooth muscles* and laminae of elastic tissue

Media is separated from adventitia by external elastic lamina.

3.Tunica Adventitia

It is the *outer most layer.*

Contains collegen and elastic fibers.

B) Structure of capillaries

Capillaries are thin walled vessels made up of single layer of endothelial cells with its basement membrane. o Capillaries are of three types -

1.Continous capillaries -

These capillaries has continuous lining of endothelial cells with no

These capillaries has continuous lining of endothelial cells with no fenestration.
Basement membrane is also continuous.
2.Fenesterated capillaries
There are fenestration between the endothelial cells.
Basment membrane is continuous.
3.Sinusoidal capillaries
Both endothelial cells and basement membrane have fenestration.
In resting tissues, most of the capillaries are collapsed and blood flows through the throughfare vessels from the arterioles to the venules.
C) Structure of veins
Structure of vein is smiliar to artery except that -
1.Wall is thinner
2.Three tunicae are less well demarcated.
3.Elastic tissue is scanty and not clearly organized into distinct internal and external elastic lamina.
4.Have valves (except venae cavae and common iliac vein).

92. Effect of cholecystokinin on GIT ?

a) Increases gastric acid secretion

b) Increases small intestinal peristlasis

c) Increases gastric motility

d) Relaxes gall bladder

Correct Answer - B
Ans. is 'b' i.e., Increases small intestinal peristalsis

93. Pubarche is due to ?

a) GH

b) Progesterone

c) Testosterone

d) Estrogen

Correct Answer - C
Ans. is 'c' i.e., Testosterone

94. False about total body water (TBW) ?

a) ICF is 2/3rd of TBW

b) In newborn TBW is 60% of body weight

c) Premature newborns have more TBW

d) In adults, TBW is 60% of body weight

Correct Answer - B
Ans. is 'b' i.e., In newborn TBW is 60% of body weight
In a term newborn, TBW is 70-80% of body weight. It is more in premature newborn than in term newborn.
Other options are correct.

95. Which of following is a microfilament ?

a) Tubulin

b) Actin

c) Desmin

d) Vimentin

Correct Answer - B
Ans. is 'b' i.e., Actin

96. All belong to molecular motor family except ?

a) Kinesin

b) Dynein

c) Myosin

d) Actin

Correct Answer - D
Ans. is 'd' i.e., Actin
Molecular motors
Molecular motors are *protein with ATPase or GTPase activity* that move organelles, proteins, and other components of cell to all parts of the cells. These proteins produce force movement in wide variety of cellular processes including vesicular transport, cell division, nuclear migration, muscle contraction, mechanochemical transduction and others. *Molecular motors use energy to generate this force (molecular motors are ATPase/ GTPase). Important cytoskeletal molecular motors are :?*
i) Kinesin (an ATPase) :- Involved in *axoplasmic transport* and *uses hydrolysis of ATP* to move vesicles down the axon toward the positive (+) end of microtubule formation.
ii) *Dynein (an ATPase) :- It* also *uses ATP.* there are two types of dynein : ?
a) Cytosolic dynein :- Involved in *axoplasmic flow* to move vesicle in opposite direction, i.e., towards the negative end of microtubules.
b) Axonemal dynein :- Power ciliary and flagellar movement.
iii) *Dynamin (a GTPase) :- Uses GTP* and is involved in endocytosis.
iv) *Myosin (an ATPase) Uses ATP* and is involved in muscle contraction by binding with actin.

97. Cells which surround the oocyst in graafian follicle are called ?

a) Discus proligerus

b) Cumulus oophoricus

c) Luteal cells

d) Villus cells

Correct Answer - B
Ans. is 'b' i.e., Cumulus oophoricus
Oocyte lies eccentrically in the graafian (ovarian) follicle.
It is surrounded by some granulsa cells that are given the name cumulus oophoriacus (or cumulus ovaricus).
The cells that attach it to the wall of the follicle are given the name discus proligerus.

98. Following changes are seen during capacitation of a sperms except ?

a) Increased permeability to calcium

b) Decreased permeability to calcium

c) Removal of cholesterol from acrosome

d) Increased motility

Correct Answer - B

Ans. is 'b' i.e., Decreased permeability to calcium

Capacitation of sperm (spermatozoa)

- Spermatozoa leaving the testis (seminiferous ubules) are not fully mobile. They continue their maturation and acquire their mobility during their passage through epididymis. From epididymis they come to vas deference, distal end of which also receives the secretions of seminal vesicle, and continues as the ejeculatory duct. The ejeculatory duct joins the prostatic urethra.
- Once ejeculated into the the female, vaginal secretions improve the motility and fertilizing ability of sperms. Further exposure to secretions of female genital tract (in uterus and/or fallopian tube) further improves the mobility and fertilizing ability of the sperms. The beneficial effects of stay in the female genital tract are collectively called capacitation, from the isthmus, capacitated sperms move rapidly to the ampullas, where fertilization takes place.

Following changes occur during capacitation :-

- Uterine and fallopian tube fluids wash away the various inhibitory factors that suppress sperm activity in male genital tract.
- Removal of cholesterol vesicle from acrosome so that acrosomal membrane becomes weak and can release enzyme at the time of fertilization.

- Increase membrane permeability to calcium ion.

99. Mismatch of ventilation/perfusion ratio is seen in

a) Apex

b) Base

c) Both

d) None

Correct Answer - C
Ans. is 'C' i.e.,Both
Ventilation perfusion ratio (V/O)
o Considering that cardiac output is 5.0 L/min and alveolar ventilation is about 4.2 L/min, the overall ventilation: perfusion ratio is 0-8. Idealy, therefore, each alveolus should have a V/Q ratio of 0.8. However, that is not so even in normal lungs.
o Due to gravity, the apical alveoli are both underventilated and underperfused while the basal alveoli are both overventilated and overperfused. However, gravity affects perfusion much more than it affects ventilation. Hence, apical alveoli are more underperfused than underventilated while the basal alveoli are more overperfused than overventilated. Therefore, V/Q is maximun at apex (about 3-0) and least at base (about 0-6).
o Since ventilation is far in excess of perfusion at apex, comparatively little oxygen is transferred from the alveoli to the blood, and CO_2 transferred to the alveoli is also less. Hence the gas tension at the apices are quiet close to those of inspired air, i.e., High $Pa0_2$ and low $PaCO_2$. On the other hand, at the base of lung perfusion is better than ventilation; *Hence $Pa0_2$ and $PaCO_2$ of basal alveoli are quiet close to those of pulmonary artery, i.e., low PaO,*

and high $PaCO_2$. In simple words, ventilation-perfusion mismatch is responsible for high P02 with low PCO_2 at apex and Low PO_2 with high PCO_2 at base.

100. Carotid and aortic bodies are stimulated when ?

a) Oxygen saturation decreases below 90%

b) Oxygen saturation decreases below 80%

c) Oxygen saturation decreases below 70%

d) Oxygen saturation decreases below 60%

Correct Answer - A
Ans. is 'a' i.e., Oxygen saturation decreases below 90%
Peripheral chemoreceptors (carotid and aortic bodies) are stimulated if arterial PO_2 is below 60 mmHg.
At P_{O2} of 60 mmHg, O_2 saturation is about 90% (89%).

101. Sense organ which is having efferent supply

a) Golgi tendon organ

b) Organ of corti

c) Retina

d) Taste bud

Correct Answer - B
Ans. is 'b i.e., Organ of corti
Afferent (sensory) neurons carry information form sense organs to CNS (brain & spinal cord).
Hair cells (in organ of corti) are the sensory recepors which are also innervated by *efferent neurons.*

102. False regarding papillae of tongue ?

a) Fungiform papillae at tip

b) Circumvallate papillae at base

c) Foliate papillae at back edge

d) Filiform papillae have taste buds at tip

Correct Answer - D
Ans. is 'd' i.e., Filiform papillae have taste buds at tip
In tongue, taste buds are grouped in structures called papillae. Taste buds are located in the walls of papillae. There are three types of papillae :-
i) Fungiform papillae :- Are especially numerous near the *tip and the margins of the tongue.*
ii) Circumvallate (Vallate) papillae :- These are the *largest papillae* and are distributed to a *V-shaped region near the base of tongue.*
iii) Foliate papillae :- Confined to the *back edge of the tongue.*
Besides these three types of papillae, there is also a fourth type, the filiform papillae but these have no taste buds.

103. Electric potential of resting membrane for a given electrolyte is given by which equation ?

a) Nernst

b) Goldman

c) Donnan-Gibbs

d) None

Correct Answer - A
Ans. is 'a' i.e., Nernst

104. In circulatory biomechanics which of the following is true?

a) Blood viscosity is increased in anemia

b) Blood viscosity is decreased in polycythemia

c) Cardiac output is increased in anemia

d) Cardiac output is decreased in Beri-Beri

Correct Answer - C

Ans. is 'c' i.e., Cardiac output is increased in anemia

Cardiac output is increased in conditions which cause decrease in peripheral vascular resistance :-

Exercise

1. AV fistula or shunt
2. Severe anemia
3. Thyrotoxicosis
4. Wet beri-beri
5. About other options

Blood viscosity is low in anemia and high in polycythemia.

105. Hemoglobin binds/transports all except ?

a) CO

b) O_2

c) SO_2

d) CO_2

Correct Answer - C
Ans. is 'c' i.e., SO_2

106. Fever is produced by ?

a) PGF2α

b) PGE2

c) PGI2

d) PGD2

Correct Answer - B
Ans. is 'b' i.e., PGE2
Fever is elevated body temperature due to resetting of hypothalamic thermostat above the normal level.
IL-1 (most potent), TNF-α and IL-6 are pyrogens (fever producing cytokines).
But they do not act directly.
They stimulate the release of PGE2, which resets the hypothalamic thermostat at higher level.
Thus, PGE2 is the final effector in production of fever.

107. Normal capillar wedge pressure ?

a) 0-2 mm Hg

b) 5-10 mm Hg

c) 15-20 mm Hg

d) 20-30mm Hg

Correct Answer - B
Ans. is 'b' i.e., 5-10 mm Hg
Normal capillary Wedge pressure is 4-12mm Hg. It is a measure of left atrial pressure.

108. Insulin resistance down-regulates -

a) GLUT-1

b) GLUT-2

c) GLUT-3

d) GLUT-4

Correct Answer - D
Ans. is 'd' i.e., GLUT-4

109. Plateau of oxygen-hemoglobin dissociation curve signifies ?

a) No oxygen is available for binding to Hb

b) No Hb molecule is available to bind with O_2

c) All oxygen is released to tissues

d) None of the above

Correct Answer - B

Ans. is 'b' i.e., No Hb molecule is available to bind with O_2

- Each molecule of hemoglobin can combine with upto four molecules of oxygen.
- Combination with the first molecule alters the conformation of the hemoglobin molecule in such a way as to facilitate combination with the next oxygen molecule.
- In light of this, if we look at the curve, as the PO_2 starts rising from 0 mm Hg upwards, initially all hemoglobin molecules in blood starts combining with their first oxygen molecule.
- This is the most difficult molecule to combine with.
- Hence saturation rises only slowly with initial rise in PO_2. As PO_2 rises further, hemoglobin molecules combine with their second, third and fourth molecules, which are progressively easier to combine with.
- Hence saturation rises steeply between PO_2 of 15 mm Hg and 40 mm Hg.
- When PO_2 rises still further, oxygen finds most of the hemoglobin molecules carrying four molecules of oxygen each.
- Since no molecules of hemoglobin can carry more than four

molecules of oxygen, there is not much scope for more O_2 combining with hemoglobin.

- Hence the curve becomes almost flat again beyond the PO_2 of 60 mm Hg.

110. Which of the following increases appetite ?

a) CART

b) α - MSH

c) AGPP

d) Insulin

Correct Answer - C
Ans. is 'c' i.e., AGPP

111. True about iron absorption are all, except ?

a) Major site of absorption is duodenum

b) Stored as Ferritin

c) Absorbed in ferrous form

d) Pancreatic secretions improves the absorption

Correct Answer - D

Ans. is 'd' i.e., Pancreatic secretions improves the absorption

Iron absorption

- Iron is absorbed from upper small intestine mainly duodenum.
- In diet iron occurs in two forms, haeme iron and inorganic (non-haeme) iron.
- Haem iron is better absorbed than inorganic iron, but the major fraction of diet is inorganic iron.
- Inorganic iron is mostly in ferric form; needs to be reduced to ferrous form because iron is absorbed in ferrous form.
- After absorption ferrous form is once again oxidized to ferric form inside enterocytes.
- A fraction of absorbed iron is rapidly delivered to plasma transferrin.
- However, most of the iron is deposited in the enterocytes as ferritin, some to be transferred more slowly to plasma transferrin, and some to be lost when senescent mucosal cells (enterocytes) are sloughed into the intestine.
- Iron absorption is regulated according to the demand, e.g., when there is iron deficiency, absorption increases.
- This regulation is mediated by *"iron metabolism regulatory hormone", i.e., hepcidin* that inhibit iron absorption.
- When there is iron deficiency, concentration of hepacidin falls and

there is increase iron absorption.

- Hepacidin also decreases release of iron from storage sites.

Transport and storage of iron

- Iron is transported is blood in combination with a glycoprotein transferrin.
- Iron is transported into cells through attachment of transferrin to specific membrane bound receptors.
- Iron is stored as ferritin (major storage form) or haemosiderin.
- Ferritin is a complex of iron and apoferritin (iron + apoferritin ferritin).
- Iron is mainly stored in *reticulo-endothelial cells* monocytes/macrophages of *liver, spleen, bonemarrow.*
- It is also stored in hepatocytes (parenchymal cells of liver) and *myocytes* of skeletal muscles. Note :
- Iron is stored in ferritin in ferric form.

112. Cardiac output increases by ?

a) Standing from lying down position

b) Expiration

c) Increased cardiac contractility

d) Parasympathetic stimulation

Correct Answer - C
Ans. is 'c' i.e., Increased cardiac contractility
Cardiac output is the product of stroke volume and heart rate. Hence any factor which affects either the stroke volume or the heart rate or both affects the cardiac output.
A) Factors affecting stroke volume
Stroke volume, which is the amount of blood pumped by the heart during one stroke, depends mainly on three factors : ?
Preload (Degree of ventricular filling during diastole) : - Cardiac preload is represented by volume of venous blood that distends the ventricle, i.e., venous return determines the preload. An increase in preload, i.e., increase in venous return results in a higher end-diastolic volume (Preload). This results in stretching of myocardial fiber and this increase in length of myofibril increases the strength of cardiac contraction in accordance with the Frank-Starling law or Starling's law of the heart. According to Starling's law, greater the initial length of muscle fiber, greater is the force of contraction. The initial length of muscle fiber (length of fiber at the initiation of contraction/systole) refers to length of the fiber at the end of the diastole, i.e., end-diastolic fiber length. Thus, the factors which improve venous return increase the cardiac output by increasing end-diastolic ventricular volume and length, i.e., preload. Opposite is true for factors which decrease venous return.

113. Spermatogenesis takes place in ?

a) Epididymis

b) Seminiferous tubule

c) Ductus deferens

d) Prostate

Correct Answer - B
Ans. is 'b' i.e., Seminiferous tubule
Spermatogenesis occurs in seminiferous tubules.

- Spermatogenesis refers to the process of *formation of spermatozoa (sperm) from primitive germ cells (spermatogonia).*
- Steps in spermatogenesis involve :?

i) Spermatogonia (primitive germ cells) undergo mitosis to form primary *spermatocytes.* Both spermatogonia and primary spermatocytes have diploid chromosomes (46 chromosomes or diploid of 23 chromosomes).
ii) Primary spermatocytes undergo meiosis to form secondary spermatocytes. Secondary spermatocytes have haploid (23) chromosomes.
iii) Secondary spermatocytes undergo *mitosis* to form *spermatids.*
iv) Spermatids do not divide further but undergo morphological changes to form sperms (spermatozoa). This step of formation of spermatozoa from spermatids is called spermiogenesis. The spermiogenesis takes place in the deep folds of cytoplasm of sertoli cells.

114. Estrogen Beta receptors are found on

a) Uterus

b) Blood vessels

c) Ovary

d) Vagina

Correct Answer - C
Ans. is 'c' i.e., Ovary

115. Endogenous pyrogens act by ?

a) Increasing heat generation

b) Raising thermostat point of hypothalamus

c) Causing vasoconstriction

d) By Non-shivering thermogenesis

Correct Answer - B
Ans. is 'b' i.e., Raising thermostat point of hypothalamus
Bacterial toxins (exogenous pyrogens) stimulate inflammatory cells to secrete pyrogenic cytokines (endogenous pyrogens), e.g. *IL-I, TNF-a , and IL-6.*
These endogenous pyrogenes stimulate PGE2 release in hypothalamus, which raises temperature set point of hypothalamus to cause fever.

116. Extrinsic system of coagulation is activated by

a) Factor XI

b) Factor X

c) Factor XII

d) Factor III

Correct Answer - D
Ans. is d i.e., Factor III

117. Sharp pain is transmitted by which type of fibres?

a) Aα

b) Aβ

c) Aδ

d) C

Correct Answer - C
Ans. is 'c' i.e., Aδ
Sharp somatic pain (fast pain) is carried by AS fibres.
Pain is carried by two types of fibers : ?
i) Aδ → These are relatively fast. Therefore the pain carries by these is *fast pain* (epicritic pain or first pain).
ii) C → These are slow, therefore the pain carries by these is slow pain (protopathic pain or second pain).

118. Reward center is located in ?

a) Cerebellum

b) Amygdala

c) Hippocampus

d) Hypothalamus

Correct Answer - D
Ans. is 'd' i.e., Hypothalamus

119. Correct order of velocity ?

a) Vena cava > Aorta > Vein > Artery > Venule > Arteriole

b) Aorta > Vena cava > Artery > Vein > Arteriole > Venule

c) Aorta > Artery > Vena cava > Vein > Arteriole > Venule

d) Vena cava > Vein > Aorta > Artery > Venule > Arteriole

Correct Answer - B
Ans. is `b' i.e., Aorta > Vena cava > Artery > Vein > Arteriole > Venul

120. Maximum water reabsorption in the Gastrointestinal tract occurs in ?

a) Stomach

b) Jejunum

c) Ileum

d) Colon

Correct Answer - B
Ans. is 'b' i.e., Jejunum
Water absorption from GIT

- Water and electrolytes need no digestion and are absorbed as such.
- There is approximately 9 liters of water input : Ingested water : 2·0 litres, Saliva : 1·5 litres, gastric juice : 2.5 litres, bile 0·5 litre, pancreatic juice : 1·5 litres, and small intestine secretions 1-0 litre.
- Out of these 9 litres, 7·7 litres (85%) is absorbed in small intestine and 1·0 - 1·5 litres (5-10%) is absorbed in large intestine (colon).
- Total 8·8 litres of water is absorbed and 0·2 litre is excreted in feces.
- In small intestine, most of the water is reabsorbed in the jejunum.

121. Thyroid gland is stimulated by which hormone during pregnancy ?

a) Prolactin

b) HCG

c) Human placental lactogen

d) ACTH

Correct Answer - B

Ans. is 'b' i.e., HCG

- The endocrine system undergoes noteworthy changes during pregnancy.
- The pituitary, thyroid and parathyroid glands appear enlarged.
- *The enlargement of thyroid gland occurs under the influence of hCGs pituitary thyrotropin (TSH) and human chorionic thyrotropin from placenta.* This results in an increase in thyroxine which stimulates metabolic activity in mother and fetus.
- Increased parathyroid hormone stimulates liberation of calcium ion from maternal bones for fetal use.
- Increased output of ACTH from pituitary stimulates secretion of :-

i. *Glucocorticoids :* It mobilizes amino acids for protein synthesis in fetal tissues.

i. *Aldosterone :* Promotes fluid retention in pregnancy.

122. FSH and LH both are inhibited by ?

a) Cortisol

b) Aldosterone

c) Estrogen

d) Progesterone

Correct Answer - C
Ans. is 'c' i.e., Estrogen
Consistent with the phenomenon of negative feedback in which the secretion of the target hormone inhibits its trophic hormone, *pregesterone inhibits LH* and inhibin inhibits FSH.

- *Estrogen, whose secretion is stimulated by both LH and FSH, inhibits both LH and FSH.*
- Progesterone and estrogen act at both hypothalamic and pituitary levels while inhibin secreted by granulosa cells acts only on the pituitary.
- Under certain conditions, estrogen causes stimulation (positive feedback) rather than inhibition of LH, e.g., at ovulation.

123. Gamma glutamate carboxypeptidase is linked with absorption of ?

a) Riboflavin

b) Niacin

c) Folic acid

d) Pyridoxinel

Correct Answer - C
Ans. is 'c' i.e., Folic acid

- Folic acid or pteroylglutamic acid is a parent compound for a group of substances called folates.
- Naturally occurring folic acid typically occurs as pteroylpolyglutamate, which is simple folic acid that has been conjugated by gamma peptide linkage with six additional glutamyl units.
- These pteroylpolyglutamates are hydrolysed to pteroylmonglutamates in the process of intestinal absorption.
- The small intestinal mucosa contains gamma glutamate carboxypeptidase, a hydrolytic enzyme usually known as folate conjugase, with releases monglutamic folate, which is rapidly absorbed from the upper small intestine. Thus gamma glutamate carboxy peptidase is involved in the absorption of folic acid.

124. The oxygen dissociation curve of myoglobin & hemoglobin is different due to?

a) Hb can bind to 2 oxygen molecules

b) Cooperative binding in Hb

c) Myogloobin has little oxygen affinity

d) Hemoglobin follows a hyperbolic curve

Correct Answer - B

Ans. is `b' i.e., Cooperative binding in Hb

- *Cooperative binding is responsible for sigmoid shape of the oxygen-hemoglobin dissociation curve.*
- As myoglobin is monomeric (consists of one polypeptide chain only), it can bind only one molecule of oxygen and for the same reason myoglobin cannot show the phenomenon of cooperative binding. Hence, the oxygen?myoglobin dissociation curve is hyperbola as compared to sigmoid shape of Hb-O_2 curve.

Hemoglobin - O_2 binding

- Each molecule of hemoglobin can combine with upto four molecules of oxygen. Combination with the first molecule alters the conformation of the hemoglobin molecule in such a way as to facilitate combination with the next oxygen molecule. In light of this, if we look at the curve, as the PO_2 starts rising from 0 mm Hg upwards, initially all hemoglobin molecules in blood starts combining with their first oxygen molecule. This is the most difficult molecule to combine with. Hence saturation rises only slowly with initial rise in PO_2. As PO_2 rises further, hemoglobin molecules combine with their second, third and fourth molecules, which are progressively easier to

combine with. Hence saturation rises steeply between PO_2 of 15 mm Hg and 40 mm Hg. When PO_2 rises still further, oxygen finds most of the hemoglobin molecules carrying four molecules of oxygen each. Since no molecules of hemoglobin can carry more than four molecules of oxygen, there is not much scope for more O_2 combining with hemoglobin. Hence the curve becomes almost flat again beyond the PO_2 of 60 mm Hg.

- Thus, the primary reason for the sigmoid shape of the oxygen-hemoglobin dissociation curve is that out of the four molecules of oxygen that can combine with a hemoglobin molecules, the first combines with the greatest difficulty and binding of an oxygen molecules increases affinity to next O_2 molecule. This phenomenon is termed as cooperative binding or cooperativity, i.e., a molecule of O_2 binds to a hemoglobin tetramer more readily if other O_2 molecules are already bound.

Myoglobin O_2 binding

- Myoglobin is present in higher concentration in red (slow) muscle fibers. *Myoglobin has greater affinity for oxygen than hemoglobin* and its P_{50} is only 5 mm Hg (as compared to PO_2 of hemoglobin which is about 26 mm Hg). Therefore, myoglobin-oxygen dissociation curve is shifted far to the left than Hb-O_2 dissociation curve. It has shape of hyperbola as compared to sigmoid shape of Hb-O_2 curve because it binds 1 molecule of O_2 per mole (in comparison to Hb which binds 4 molecules of O_2 per mole). The role of myoglobin is to bind O_2 at very low PO_2 and release them at even lower PO_2, for example in *exercising muscles* where PO_2 close to zero.

125. Myosin and actin filaments are kept in place by

a) Tropomyosin

b) Troponin

c) Actinin

d) Titin

Correct Answer - D
Ans. is 'd' i.e., Titin

- The side-by-side relationship between the myosin and actin filaments is difficult to maintain.
- This is achieved by a large number of filamentous molecules of a protein called titin.
- *Titin molecules act as a framework that holds the myosin and actin filaments in place* so that the contractile machinery of the sarcomere will work.

Important muscle proteins

1. Myosin:- Myosin is the protein that constitutes the *thick filaments.* Myosin of skeletal muscle is *myosin-IL* Myosin participates in the contractile mechanism and also acts as an ATPase.
2. Actin:- Actin is the major protein of *thin filament.* It is the actin that slides over myosin during contraction.
3. Tropomyosin: - It is the other protein of *thin filament.* It covers the active sites (myosin-binding sites) on actin. When Ca^{+2} concentration of cytoplasm (sarcoplasm) is raised, it uncovers the active sites of actin and allows the contraction So, *the 'cross-bridge cycling' is switched off or on by the tropomyosin molecule which slides on the actin molecule to cover or uncover the active sites on*

it.

126. True about cerebellar neuronal connections ?

a) Climbing fibres from inferior olivary nucleus

b) Mossy fibres from inferior olivary nucleus

c) Climbing fibres are inhibitory to Purkinje cells

d) Mossy fibres are inhibitory to Purkinje cells

Correct Answer - A

Ans. is 'a' i.e., Climbing fibres from inferior olivary nucleus

Neuronal circuit in cerebellum

Afferent for cerebellum comes through two fibers : climbing fibers and Mossy fibers. *Climbing fibers* which brings information only from the inferior olivary nuclei and establish excitatory synapes with purkinje cells. All other afferent input to the cerebellum is brought by the other types of fibers, called Mossy fibers which establish *excitatory synapse with granule cells* in the granular cell layer. The axon of granule cells, called *parallel fibers, stimulate the purkinje cells.* Thus mossy fibers, like the climbing fibers, also end up in stimulating the purkinje cells.

Granule cells are the only stimulatory (excitatory) cells in cerebellar cortex.

The *parallel fibers (axons of granule cells)* also stimulate three types of *interneurons :- Stellate and basket cells in the molecular layer,* and *Golgi cells in the granular layer.* Stellate and basket cells inhibit purkinje cells. Golgi cells, also activated by collateral from mossy fibers (besides parallel fibers), inhibit transmission from mossy fibers to granule cells.

Overall, *climbing fiber inputs exert a strong excitatory effect on a single purkinje cell, Whereas mossy fiber inputs exert a weak*

excitatory effect on many purkinje cells via the granule cells.
After complex inhibiting and excitatory interactions of various fibers and cells in the cortex, the output of cerebellar cortex, is projected to deep cerebellar nuclei by axons of pyramidal cells (only output cells of cerebellar cortex). The output of the Purkinje cells is inhibitory to the deep cerebellar nuclei. However, the output of deep cerebellar nuclei to the brain stem and thalamus is always excitatory because, beside inhibitory inputs of purkinje cells, deep cerebellar nuclei also receive excitatory inputs from afferent mossy and climbing fibers which usually are more prominent.

127. Lifespan of fetal RBC is ?

a) Same as adult RBC

b) 1/4 of adult RBC

c) 1/2 of adult RBC

d) 2/3 of adult RBC

Correct Answer - D
Ans. is 'd' i.e., 2/3 of adult RBC
"Life span of fetal RBC is about 2/3' of the adult RBC, i.e. about 80 days."

128. Baroreceptor are ?

a) Carotid body

b) Carotid sinus

c) Aortic body

d) None

Correct Answer - B
Ans. is 'b' i.e., Carotid sinus

- Baroreceptors are *mechanoreceptors* that are located in the adventia of carotid artery and aorta, at specialized locations called sinuses.

1) Carotid sinus is a little bulge at the root of internal carotid artery, located just above the bifurcation of the common carotid artery. It is innervated by the sinus nerve, a branch of glossopharyngeal (IX cranial) nerve.
2) Aortic arch (aortic sinus) also contains mechenoreceptors (stretch receptors) which are similar to carotid sinus receptors. However, their afferent nerve fibers travel in the aortic nerve, a branch of Vagus (X cranial) nerve.
The sinus nerve (from carotid sinus) and aortic nerve/vagal fibers (from aortic sinus) are together called `Sinoaortic nerves'. They, together, are also refered to as 'Buffer nerves' because they are the afferents of cardiovascular reflexes that buffer abrupt changes in blood pressure.

129. Insulin secretion is normally stimulated by ?

a) GLP-1

b) GLP-2

c) VIP

d) α-adrenergic receptors

Correct Answer - A
Ans. is 'a' i.e., GLP-1

- Recently, attention has been focused on glucagon - like polypeptide 1 (7-36) (GLP-1 [7-36]) as an additional gut factor for insulin secretion and GLP-1 (7-36) is more potent insulinotropic hormone.

Regulation of insulin secretion

Factors affecting insulin secretion are : -

i) Simulating insulin secretion :- Glucose; Mannose; Amino acids (arginine, leucine); Intestinal hormones (GIP. Gastrin, Secretin, CCK, GLP -1); β-keto acids; Parasympethetic stimulation (acetylcholine); cAMP; β-adrenergic stimulation; theophylline; Sulfonylureas; and certain endocrine hormones like growth hormone, Glucagon and glucocorticoids.

ii) Inhibiting insulin secretion : - Somatostatin; 2-deoxyglucose; mannoheptulose; a-adrenergic stimulation, P-adrenergic inhibitors; galanin; Diazoxide; Thiazide diuretics; K^+ depletion; Phenytoin; Alloxan; microtubule inhibitors; and insulin itself.

130. Insulin mediated glucose transport is seen in ?

a) Adipose tissue

b) Brain

c) RBC

d) Kidney

Correct Answer - A
Ans. is 'a' i.e., Adipose tissue

- Insulin stimulates the uptake of glucose by myocytes (skeletal muscle, cardiac muscles), adipocytes (adipose tissue) and hepatocytes. Tissues that do not depend on insulin for glucose uptake include brain, erythrocytes (RBC), the epithelial cells of kidney & intestine, Liver, and Cornea & lens of eye.
- The mechanism through which insulin increases glucose uptake is different in different tissues. In the muscle and adipose tissues, insulin increase facilitated diffusion by increasing glucose transporter (GLUT4) on the cell membrane.
- In the liver, insulin stimulates glucose entry into hepatocytes indirectly by induction of glucokinase so that the glucose entering the liver cells is promptly converted to glucose - 6 - phosphate (glucose trapping). This keeps the intracellular glucose concentration low and favours entry of glucose into the liver. Thus, *though the liver do not depend on insulin for glucose uptake, insulin stimulates glucose entry into hepatocytes.* That means glucose entery can occur in liver without the action of insulin, but this is facilitated by insulin. On the other hand, myocytes (skeletal and cardiac muslces) and adipocytes (adipose tissue) are dependent on insulin for glucose uptake.

131. Increased BMR is associated with ?

a) Increased body fat store

b) Increased glycognenesis

c) Increased glycolysis

d) Increased lipogenesis

Correct Answer - C

Ans. is 'c' i.e., Increased glycolysis

- Increased BMR is associated with hypermetabolic state which is characterized by :?

A) *Carbohydrate metablism*

i) ↑ Glycolysis
ii) ↓ Gluconeogenesis
iii) ↓ Glycogenesis
iv) ↑ Glycogenolysis

B) *Lipid metablism*

i) ↓ Lipogenesis
ii) ↑ Lipolysis
iii) ↓ Cholesterol Synthesis
iv) ↓ Triacylglycerol Synthesis
v) ↓ Lipoprotein degradation
vi) ↑ Ketogenesis

C) *Protein metablism*

i) Increased protein degradation
ii) Decreased protein biosynthesis

132. Post-tetanic potentiation is due to -

a) Hyperpolarization of muscle fibres

b) Rapid K^+ efflux

c) Increased availability of Ca^{++}

d) Rapid Na^+ influx

Correct Answer - C

Ans. is 'c' i.e., Increased availability of Ca^{++}

"Repetitive stimulation enhances force development due to rise in intracellular Ca^{++}, a phenomenon called posttetanic potentiation. It is due to increased phosphorylation of myosine light chain with increased number of cross bridges."

133. Which of the following has small representation in somatosensory area of cerebral cortex ?

a) Lips

b) Thumb/fingers

c) Tongue

d) Trunk

Correct Answer - D
Ans. is 'd' i.e., Trunk
A distinct topographic represention of the body can be demonstrated in somatosensory area-I.

- Each side of the cortex receives sensory information from the opposite side of the body only *(contralateral representation).*
- The body *is* represented upside down (vertical) in the postcentral gyms, i.e. *the face is represented at the foot of the gyrus whereas the legs and feet are represented at the top extending on the medial surface.*
- Some parts of body like face (especially lips, tongue) and fingers have a proportionately large representation than the other areas like the trunk. The cortical representation of the part of the body is proportionate to its innervation density (number of sensory receptors) rather than its size.

134. Factor X is ?

a) Hageman factor

b) Stuart-Prower factor

c) Christmas factor

d) Tissue factor

Correct Answer - B
Ans. is 'B' i.e., Stuart-Prower factor

135. Resting membrane potential in cardiac muscle ?

a) -70 mV

b) +70 mV

c) -90 mV

d) +90 mV

Correct Answer - C
Ans. is 'c' i.e., -90 mV
Normal RMP in myocardial fibers is about -90 mV.

136. Effect of GLP-1 ?

a) Increased aldosterone secretion by adrenal

b) Increased PTH secretion

c) Increased insulin secretion from beta-cells of pancreas

d) Increased testosterone secretion from Leydig cells

Correct Answer - C
Ans. is 'c' i.e., Increased insulin secretion from beta-cells of pancreas

137. Noradrenaline is major neurotransmitter in ?

a) Postganglionic parasympathetic fibres

b) Postganglionic sympathetic fibres except in sweat glands

c) Autonomic ganglia

d) Preganglionic autonomic fibres

Correct Answer - B

Ans. is 'b' i.e., Postganglionic sympathetic fibres except in sweat glands

Neurotransmitter in all preganglionic autonomic nerves (both sympathetic and parasympathetic) is acetylcholine (A CH)

Neurotransmitter in all ganglia (both sympathetic and parasympathetic) is acetylcholine.

Neurotransmitter in postganglionic parasympathetic fibres is acetylcholine.

In posganglionic sympathetic fibres, the major neurotransmitter is noradrenaline (NA) except in renal and mesentric vasculature where it is dopamine, in sweat glands, some blood vessels where it is acetylcholine and in adrenal medulla where it is adrenaline.

Most of the visceral organs are supplied by both sympathetic and parasympathetic system except;

.. Blood vessels, spleen, sweat glands and hair follicles receive only sympathetic innervation.

2. Ciliary muscle gastric and pancreatic glands receive only parasympathetic innervation.

- In general sympathetic and parasympathetic systems are antagonistic except :

Refractory period of atrial fibres is decreased by both.

At almost all organs except heart, cholinergic system has excitatory activity and adrenergic system has relaxing properties Sympathetic system stimulates (Tachycardia, Positive inotropic) and parasympathetic system depresses (Bradycardia, Negative inotropic) the heart.

138. Gamma globulin are synthesized in ?

a) Liver

b) Spleen

c) Kidney

d) Plasma cells

Correct Answer - D
Ans. is 'd' i.e., Plasma cells
Liver synthesizes most of the proteins of body except immunoglobulins (gamma globulins), which are synthesized by plasma cells.

139. Normal cerebral blood flow in ml/min ?

a) 55

b) 150

c) 750

d) 1000

Correct Answer - C
Ans. is 'c' i.e., 750
The cerebral blood flow (CBF) is about *750 ml/min (15% of total cardiac output), or 54 m1/100 gm brain tissue per minute*

140. Role of growth hormone in spermatogenesis ?

a) Late division of spermatocytes

b) Early division of spermatogonia

c) Formation of Acrosomes

d) Stimulation of sertoli and Leydig cells

Correct Answer - B
Ans. is `b' i.e., Early division of spermatogonia
Growth hormone specifically promotes *early divisions of spermatogonia* themselves. In the absence of GH, spermatogenesis is severely deficient or absent.
Growth hormone is also essential for general metabolic process in testis.
Hormones involved in spermatogenesis
Spermatogenesis is influenced by many hormones. Hormones required for spermatogenesis are *FSH, LH, testosterone, estrogen, growth hormones inhibin and activin.*
FSH is responsible for *initiation of spermatogenesis.* It binds with sertoli cells and spermatogonia and induces the *proliferation of spermatogonia.* It stimulates certoli cells to secrete *endrogen binding protein, inhibin, mullerian inhibing substance and estrogen.*
LH stimulates leydig cells to secrete testosterone.
Testosterone is the *principles hormone which directly stimulates spermatogenesis.* It is responsible for the sequence of remaining stages of spermatogenesis (after initiatin by FSH). It is also responsible for *maintenance of spermatogenesis.*
Estrogen is formed from testosterone (by aromatase) in sertoli cells. It is essential for spermeogenesis (last step of spermatogenesis, i.e.

formation of spermatozoa from spermatids).
Growth hormone is essentialy promotes *early division of spermatogonia.*
Inhibin plays an important role in regulation of spermatogenesis by feedback inhibition of FSH secretion.
Activin stimulates FSH secretion and stimulates spermatogenesis.

141. Growth hormone has its effect on growth through?

a) Directly

b) IG1-1

c) Thyroxine

d) Intranuclear receptors

Correct Answer - B
Ans. is 'b' i.e., IGI-1
GH has two major functions :-
i) Growth of skeletal system :- The growth is mediated by somatomedins (IGF). Increased deposition of cartilage (including chondroitin sulfate) and bone with increased proliferation of chondrocytes and osteocytes.
ii) Metabolic effects :- Most of the metabolic effects are due to *direct action of GH.* These include *gluconeogenesis, decreased peripheral utilization of glucose (decreased uptake), lipolysis and anabolic effect on proteins.*

142. Growth hormone does not cause ?

a) Gigantism

b) Acromegaly

c) Diabetes mellitus

d) Hypothyroidism

Correct Answer - D
Ans. is 'd' i.e., Hypothyroidism
Physiological effects of Growth hormone

- Growth hormone has two major action, i.e., (1) Stimulation of skeletal growth, and (2) Regulation of metabolism. 3) Stimulation of skeletal growth

The effect of GH on skeletal growth is mediated by somatomedins (Insulin-like growth factors : IGF). They are synthesized mainly *in the liver.* The growth promoting action of somatomedins is helped by their insulin like actions. GH, through somatomedin (IGF-1), stimulates proliferation of chondrocytes and osteocytes resulting in increased deposition of chondroitin sulfate in catilage and increased ossification of the newly formed cartilage.
GH deficiency in early life causes dwarfism (small height). GH excess in early life leads to *gigantism,* whereas growth hormone excess in adulthood results in acromegaly.
2) Regulation of metabolism
Protein metabolism : - GH has predominantly *anabolic effects* on skeletal and cardiac muscle where it promotes amino acid transport into cells and increase protein synthesis.
Carbohydrate and fat metabolism : - The effects of GH on carbohydrate and fat metabolism are complicated by the fact that *GH has anti-insulin effects, whereas somatomedins it produces have*

insulin like effects:-
i) Anti-insulin effects due to direct effect of GH include **decreased peripheral utilization of glucose, increased gluconeogenesis, hyperglycemia,** and lipolysis. Due to its anti-insulin effects GH excess can cause **insulin resistant diabetes mellitus.**
ii) Insulin like effects due to somatomedins (IGF) include **antilipolytic activity,** and other insulin like effects.

143. Migrating motor complex is due to which GI hormone ?

a) Gastrin

b) Motilin

c) CCK

d) VIP

Correct Answer - B
Ans. is 'b' i.e., **Motilin**
Migratory motor complex (MMC)
The gastric antrum shows bursts of propulsive *(peristaltic)* muscular activity every 90 minutes. The activity is conducted along the entire length of the small intestine, from stomach to distal ileum, at a rate of about 5 cm per minute. As soon as the activity reaches the terminal ileum, a new wave begins in the stomach. The purpose of MMC is to clear the stomach and small intestine of luminal contents in preparation for the next meal. The MMCs are initiated by motilin.

144. Sensations which are appreciated in thalamus

a) Proprioception

b) Pain & temperature

c) Tactile sensations

d) Pressure

Correct Answer - B
Ans. is 'b' i.e., Pain & temperature
Pain and temperature are primarily appreciated by the thalamus.
For other forms of sensation, the thalamus is unable to analyze the details of sensations.
Fibers carrying tactile and proprioceptive information ascend through the thalamocortical pathway to area 3 of primary somatic sensory cortex through the thalamic radiation.
Therefore, if the somatosensory cortex is removed, tactile sensations and proprioceptions are lost, but pain and temperature sensations persist.

145. NO acts on platelets through ?

a) cAMP

b) Adenosine

c) cGMP

d) TX-A_2

Correct Answer - C
Ans. is 'c' i.e., cGMP

146. Mitral and periglomerular cells are seen in ?

a) Medulla

b) Olfactory bulb

c) Primary visual cortex

d) Geniculate body

Correct Answer - B
Ans. is 'b' i.e., Olfactory bulb
The sensory receptors for *olfaction (smell)* are located in the olfactory mucous membrane. In human, the olfactory mucous membrane (olfactory neuroepithelium) located in the roof of the nasal cavity near the septum. Because of its location high in the nasal cavity, the olfactory mucosa is not directly exposed to the flow of inspired air entering the nose.
The olfactory mucosa contains *olfactory receptors.* The olfactory receptors are unique in that the receptor cell itself is a neuron. The olfactory receptor cell has cilia projecting in the nasal mucosa which act as receptor for olfaction (These are dendrites of neuron/receptor cells). *The axons of olfactory neuron (olfactory receptor cells) form olfactory nerve* which passes through cribriform plate and terminates in the olfactory bulb. In olfactory bulb axons of olfactory nerve synapse with dendrides of mitral cells to form the olfactory glomeruli. *Mitral cells are the principal output neurons of olfactory bulb and their axons form the olfactory tract.*
The olfactory bulb also contains periglomerular cells, which are inhibitory neurons and granule cells which have no synapse and make reciprocal synapses with mital and tufted cells.
Like the taste fibers, olfactory tract also projects to the primitive parts

of the brain as well as the neocortex. The projections to the primitive parts are principally to the *pyriform area (olfactory cortex), amygdala and entorhinal cortex, which in turn projects to the hippocampus.* The pathway to the *neocortex* involves a relay in the olfactory tubercle, and then in the thalamus, the output of which projects to the *orbitofrontal cortex.*

147. Derivative of POMC

a) Norepinephrine

b) Dopamine

c) ACTH

d) Acetylcholine

Correct Answer - C

Pro-opiomelanocortin (POMC) comprises 285 amino acid residues (MW 31000) and serves as a precursor of many proteins/polypeptide.
Derivatives of POMC are:-
i) Pituitary hormones: ACTH, MSH
ii) β-lipotropic hormone (β-LPH)
iii) γ-lipotropic hormone (γ-LPH)
iv) β-endorphin
v) CLIP (corticotropin-like intermediate lobe peptide).

148. Preaccelerin is ?

a) Eater II

b) Facter V

c) Facter VII

d) Facter X

Correct Answer - C
Ans. is 'c' i.e., Facter VII

149. Which of the following is not an intermediate filament?

a) Keratin

b) Desmin

c) Tubulin

d) Lamin

Correct Answer - C
Ans. is `c' i.e., Tubulin

150. Antimullerian hormone is secreted by ?

a) Granulosa cells

b) Lyedig cells

c) Sertoli cells

d) None

Correct Answer - C
Ans. is 'c' i.e., Sertoli cells
Antimullerian hormone or Mullerian inhibiting substance is secreted by sertoli cells.

151. Hepcidin inhibits ?

a) Absorption of cobalamine

b) Transfer of iron into enterocytes

c) Folic acid synthesis

d) Respiratory oxidase

Correct Answer - B
Ans. is 'b' i.e., Transfer of iron into enterocytes

- Hepcidin is an iron metabolism regulatory hormone that inhibits iron absorption (transfer of iron into enterocytes).
- **Ascorbic acid (vitamin C)** forms soluble complexes with iron and **reduces iron from the ferric to the ferrous state**, thereby **enhancing iron absorption**.
- **Tannins**, present in tea, form insoluble complexes with iron and **lower its absorption.**

152. Stroke volume is increased by ?

a) Increased end-diastolic and end-systolic volumes

b) Decreased end-diastolic and end-systolic volumes

c) Increased end-diastolic volume and decreased end-systolic volume

d) Decrased end-diastolic volume and increased end-systolic volume

Correct Answer - C
Ans. is 'c' i.e., Increased end-diastolic volume and decreased end-systolic volume
The stroke volume is the amount of blood pumped out by left ventricle in each stroke.
Stroke volume is given by the difference between end-diastolic ventricular volume (the volume of blood in the left ventricle at the end of diastole; normal 120 inl) and end-systolic ventricular volume (the volume of blood at the end of systole; normal 50 ml).
Stroke volume (70 ml) = End-diastolic ventricular volume (120 ml) - End-systolic ventricular volume (50 ml)

153. Effect of infusion of hypotonic saline?

a) Increased ICF only

b) Increased ECF only

c) Increased in both ICF and ECF

d) Increased ICF and decreased ECF

Correct Answer - C
Ans. is 'c' i.e., Increased in both ICF and ECF
After infusion of hyptonic saline causes a decline in plasma osmolality and a shift of water into interstial space (as water moves from higher osmolarity to lower osmolarity), causing decrease in ICF osmolality.
This results in shift of water from ECF to ICF.
Finally, *both ECF and ICF compartments are increased (due to increases water) and osmolality of both compartment are decreased.*

154. Smooth muscle physiology different from skeletal muscle

a) K^+ requires for contraction

b) Ca^{2+} required for contraction

c) Troponin is absent

d) Myosin is required for contraction

Correct Answer - C
Ans. is 'c' i.e., Troponin is absent
* Troponin is absent in smooth muscle but required in skeletal muscles for contraction.
* Ca^+ and Myosin are required by both smooth muscles and skeletal muscles.
* K^+ has no direct role in the contraction of smooth muscle and skeletal muscle.
Smooth muscle contraction
* In smooth muscle, there is no troponin. Therefore calcium initiates contraction through a mechanism different from that employed by skeletal muscle. Smooth muscle contains a calcium-binding protein called calmodulin. An increase in cytoplasmic (sarcoplasmic) calcium leads to its binding to calmodulin. The calcium-calmodulin complex activates myosin kinase, also called myosin light chain kinase (MLCK). MLCK is a phosphorylase which phosphorylates a light chain belonging to myosin chain, often called *cross-bridge phosphorylation.* The phosphorylated myosin head interacts with actin, i.e., cross-bridging of myosin with actin. The cross-bridging leads to contraction.
***** The reversal of contractile response depends on a reduction in

sarcoplasmic calcium by calcium pumps in the sarcoplasmic reticulum membrane and sarcolemma which pump calcium into the sarcoplasmic reticulum and extracellular fluid respectively. Reduction in cytoplasmic (sarcoplasmic) calcium level activates an enzyme myosin phosphatase. Myosin phosphatase dephosphorylates the myosin head, thereby terminating the actin-myosin interaction and produces relaxation.

So, calcium influx has two functions in smooth muscles : -

* Generation of action potential
* Essential for contraction initiation (Excitation contraction coupling)

- It is interesting to know that although dephosphorylation of myosin head is necessary for relaxation, the dephosphorylation of myosin does not necessarily lead to the relaxation of the smooth muscle. This is due to the latching effect, i.e., myosin bridges hold on to the actin filament like a latch. Due to this smooth muscle contracts, and it can maintain its contraction for a prolonged period (sustained contraction) for a long period with minimal expenditure of energy → Characteristic feature of smooth muscle.
- As with skeletal, muscle ATP is required which is hydrolyzed by myosin head which has ATPase activity (In a similar way as in skeletal muscle).

155. Normal respiratory compliance is ?

a) 200 ml/cm water

b) 50 ml/cm water

c) 100 ml/cm water

d) 150 ml/cm water

Correct Answer - A
Ans. is 'a' i.e., 200 ml/cm water
The lungs and thoracic cage are both elastic structures. Hence they display a constant relationship between distending pressure and change in volume.
The change in volume per unit change in pressure is called "compliance".
The total compliance of both lungs together in the normal adult human being is about *0·2 L/cm water.*
That is, every time the transpulmonary pressure increases by 1 centimeter of water, the lung volume will expand 0·2 L (200 ml).
Compliance is a measure of distensibility.

156. Cushing reflex is associated with all except ?

a) Hypotension

b) Increased intracranial pressure

c) Bradycardia

d) Tachyponea

Correct Answer - A
Ans. is 'a' i.e., Hypotension
A rise in intracranial pressure causes impaired blood supply to VMC (RVLM) neurons and the local hypoxia and hypercapnia increase their discharge to the systemic resistance vessels, i.e., cushing reflex. The resultant rise in BP tends to restore cerebral blood flow and over a considerable range, the BP rise is proportional to the increase in intracranial pressure. The increase in BP causes reflex bradycardia through arterial baroreceptors. That is why bradycardia rather than tachycardia is characteristically seen in patients with increase (ICP).
Cushing reflex consists of *hypertension (increased BP), bradycardia and tachyponea.*

157. Which of the following technique is used to study current flow across a single ion channel?

a) Patch clamp

b) Voltage clamp

c) Iontophoresis

d) Galvanometry

Correct Answer - A

Ans. a. Patch-clamp

- Patch-clamp is a technique to record ion current flow through a single protein channel.
- The patch-clamp technique is a laboratory technique in electrophysiology, that allows the study of single or multiple ions channels in cells.
- The technique can be applied to a wide variety of cells but is especially useful in the study of excitable cells such as neurons, cardiomyocytes, muscle fibers, and pancreatic beta cells.
- It can also be applied to the study of bacterial ion channels especially prepared giant spheroplasts.
- In the patch-clamp experiment, a small pipette is carefully maneuvered to seal off a portion of a cell membrane. The pipette has an electrode bathed in an appropriate solution that allows for the recording of electrical changes through any pore in the membrane.

158. Poiseuille's equation states that

a) Blood flow is directly proportion to 2nd power of radius

b) Blood flow is directly proportion to 4th power of radius

c) Blood flow is inversely proportion to 2nd power of radius

d) Blood flow is inversely proportion to 4th power of radius

Correct Answer - B
Blood flow is directly proportioned to 4th power of radius.
POISEUILLE'S LAW:
* Also referred as **"Hagen-Poiseille's Law".**
*** Poiseuille's equation states,**
- Q = P1 - P2 * { (Π r4) / (8 η L)}
- Q - Flow rate
- (P1 - P2) - Pressure difference across vessel (provided P1 > P2).
- η - Blood viscosity.
- r - Radius.
- L - Tube length.

* If parameter values remains constant,
- Blood flow is directly proportional to 4th power of radius.
* Resistance of vessel to blood flow can be calculated by combining Ohm's law with Poiseuille's equation.
- By substituting values of Q from Poiseuille's law in Ohm's law.
* Implying, resistance is mainly affected by,
- Blood vessel radius,
- Vasodilatation/vasoconstriction.
* Thus ultimately, if parameter values remain constant,
_ Resistance to blood flow is inversely proportional to 4th power of radius.

159. True about calcium reabsorption in the kidney?

a) Most of the calcium reabsorption occurs in DCT

b) Major regulating factor is Parathormone

c) Parathormone decreases calcium reabsorption

d) Increased plasma phosphate decreases calcium reabsorption

Correct Answer - B
Major regulating factor is parathormone.

- The primary controller of renal tubular reabsorption is parathormone.
- It increases calcium reabsorption in Loop of Henle (thick ascending limb) and distal tubules.
- Most of the calcium (6590) is reabsorbed in PCT.
- Increased plasma phosphate increases calcium reabsorption.

160. Which carrier pump is transporting solutes in thick ascending limb of Henle loop?

a) Carrier pump Na-K-2Cl transporter.

b) NaCl- cotransporter

c) Na2+-H+ exchanger

d) Na2+-K+ exchanger

Correct Answer - A
Carrier pump Na-K-2Cl transporter.
REABSORPTION IN THICK ASCENDING LIMB:
Sodium, Potassium & Chloride reabsorption:

- By “Secondary active transport” -
  - Through Na2+-K+-2Cl-- carrier transporter.
  - Transports one Na2+, one K+, & two Cl-.
  - Active sodium absorption occurs.
- 30% filtered Na2+ reabsorbed.

161. What is the partial pressure for oxygen in the inspired air?

a) 116 mm Hg

b) 158 mm Hg

c) 100 mm Hg

d) 0.3 mm Hg

Correct Answer - B
Partial pressure of **O2 in inspired air** (Pi O2) - **158 mm Hg**
Gaseous concentration & its partial pressure in alveoli:
1. Oxygen:
Concentration & partial pressure controlled by,
* Rate of absorption of O2 into blood
* Rate of entry of new O2 into lungs by ventilatory process.
Values:
* Partial pressure of **O2 in inspired air** (Pi O2)
  - 158 **mm Hg**
* Partial pressure of O2 in alveolar air (PA O2)
  - 100 mm Hg
  - Calculated by "Alveolar gas equation".
* Partial pressure of O2 in expired air (PE O2)
  - 116 mm Hg
2. Carbon-di-oxide:
* Partial pressure of CO2 in inspired air (Pi CO2)
  - 0.3 mm Hg
* Partial pressure of CO2 in alveolar blood (PA CO2)
  - 40 mm Hg
* Partial pressure of CO2 in expired air (PE CO2)
  - 32 mm Hg

162. What are the cellular contents of cerebellar cortex?

a) Cortical cells

b) Glomus cells

c) Principle cells

d) Intercalated cells

Correct Answer - A
Ans.A Cortical cells.
CELLS IN CEREBRAL CORTEX:
Cortical cells:

- Majority are pyramidal cells
- Pyramidal cells - "Sine qua non" for cerebral cortex
- Axons of pyramidal cells leave the cortex
- Forms descending tract (e.g. Corticospinal, Corticobulbar etc).

163. Which cells are referred as "Pacemaker cells" with relation to 'BER'?

a) SA node

b) AV node

c) Interstitial cells of Cajal.

d) Pyramidal cells

Correct Answer - C
Interstitial cells of Cajal
Basic Electrical Rhythm (BER):

- Smooth muscle cells of the gastrointestinal tract have spontaneous rhythmic fluctuations in membrane potential between about -65 and -45 mV.
- BER initiated by Pacemaker cells called "Interstitial cells of Cajal".

Pacemaker cells -

- Interstitial cells of Cajal.
- Stellate mesenchymal cells with smooth muscle-like features.

Location:

- Are absent in esophagus & proximal stomach.
- In distal stomach & small intestine - Located in outer circular muscle layer near myenteric plexus.
- In colon - Located at the submucosal border of circular muscle layer.

Frequency:

- In Stomach & small intestine -
- Pacemaker frequency is in descending gradient.
- Pacemaker with the highest frequency usually dominates (Eg., In Heart).

164. Testosterone secreted by,

a) Leydig’s cells.

b) Somatotropic cells.

c) Acidophilic cells.

d) Gonadotropic cells

Correct Answer - A
Ans:A. Leydig’s cells.

- The hypothalamus sends a signal to pituitary gland to release gonadotrophic substances (follicle stimulating hormone and luteinizing hormone).
- Luteinizing hormone (LH) stimulates testosterone production.
- Testosterone is produced by gonads (by Leydig cells in testes in men & by ovaries in women).

165. Vasopressin acts through which channels in collecting duct?

a) Aquaporin 1

b) Aquaporin 2

c) GLUT –

d) GLUT – 4

Correct Answer - B
Ans:B. Aquaporin 2

- Principal cells of collecting duct contain a regulated system of water channels antidiuretic hormone (ADH, also called arginine vasopressin, AVP).
- ADH controls permeability of these cells to water by regulating insertion of pre-formed water channels (aquaporin-2, AQP2) into apical membrane.

166. True about decorticate rigidity?

a) Removal of cerebral cortex and basal ganglia

b) Flexion of lower limbs & extension of upper limbs

c) Rigidity is less pronounced than decerebrate rigidity

d) None of the above

Correct Answer - C

Ans:C. Rigidity is less pronounced than decerebrate rigidity.

Decorticate rigidity:

- Made by removing whole cerebral cortex but leaving basal ganglia intact.
- Characterized by flexion of upper extrimities at elbow & extension of lower extrimities.
- Flexion due to rubrospinal tract excitation of flexors in upper extremities & hyperextension of lower extermity.
- Decorticate animal does not have intense hypertonia as decerebrate animal.
- Due to intact basal ganglia in decorticate animal.

167. Bainbridge reflux causes?

a) Bradycardia

b) Increased cardiac output

c) Decreased venous return

d) Increased heart rate

Correct Answer - D
Ans:D. Increases heart rate.
Bainbridge Reflex:

- Positive feedback mechanism with compensatory increase in heart rate – Due to rise in right atrial pressure.
- Commonly referred to as “atrial reflex”.
- Resulting from increased blood pressure or increased distension of large systemic veins & right upper chamber of heart.

168. Golgi tendon organ responsible for?

a) Tension

b) Length

c) Pressure

d) Proprioception

Correct Answer - A
Ans: A. Tension.
Difference between functions of muscle spindle & golgi tendon organ:
Muscle spindle:

- Acts as “Muscle length detectors”.
- Also detects rate of change in muscle length.

Golgi tendon organ:

- Acts as “Muscle tension detectors”.
- Also detects rate of change in muscle tension.
- Because of location of muscle spindle & golgi tendon organ.
- Muscle spindle are parallel to muscle fibers (extrafusal fibers).
- Golgi tendon organ in series to muscle fibers (extrafusal fibers).
- Yet, Both are activated by muscle stretch.

169. Hormone predominately secreted after 14 day on endometrium is?

a) Progesterone

b) Estrogen

c) LH

d) FSH

Correct Answer - A

Ans: A. Progesterone.

Events of ovarian cycle:

- Bleeding continues for about 4 days.
- By 5th day, ovarian follicle is sufficiently developed.
- Secretes considerable quantities of estrogen.

During pre-ovulatory phase:

- Estrogen influencesendometrial proliferative changes.
- Hence, “Preovulatory phase of uterine cycle” also referred “Proliferative phase”.

During post-ovulatory phase:

- Endometrium enters secretory phase.
- Hence, “Postovulatory phase of uterinecycle” also referred “Secretory phase”.
- Due to combined action of estrogen & progesterone.

Progesterone:

- More important & responsible for secretory changes.
- Peaks on 21st day.

End of secretory phase:

- Estrogen-primed endometrium.
- Degeneration of corpus luteum declines estrogen & progesterone levels.

- Results in withdrawal bleeding – Menstruation.

170. Peripheral chemoreceptors respond to hypoxia using which channel?

a) Calcium channel

b) Sodium channel

c) Potassium channel

d) Chloride channel

Correct Answer - C

Ans: C. Potassium channel.

- Carotid bodies are composed of glomus cells (also called type I), which are of neuronal phenotype and contain a variety of neurotransmitters.
- Glomus cells are in functional contact with the afferent nerve endings.
  - Glomus cells are initial site(s) of sensory transduction.
- Hypoxia releases transmitter(s) from glomus cells, which in turn by depolarizing the sensory nerve ending leads to an increase in sensory discharge.
- One hypothesis assumes that a K+-channel protein is an O2 sensor and that hypoxia depolarizes glomus cells by inhibiting the K+ channel, leading to an increase in cytosolic Ca2+, resulting in transmitter(s) release.

171. With increase in age which of the following is true for lungs?

a) Pulmonary compliance increases

b) Residual volume decreases

c) Mucocillary clearance increases

d) Fibrous of interstitium dreaseses

Correct Answer - A

Ans: A. Pulmonary compliance increases

Anatomical and physiological changes of respiratory system with aging:

Anatomical:

- Air space size: Increased

Compliance:

- Chest wall compliance: Decreased
- Lung compliance: Increased to unchanged
- Total respiratory system compliance: Decreased

Muscle strength:

- Maximal inspiratory pressure (MIP): Decreased
- Trans diaphragmatic pressure (Pdi): Decreased
- Maximum voluntary ventilation (MVV): Decreased

Lung function:

- FEV1: Decreased
- FVC: Decreased
- TLC: Unchanged
- Vital capacity: Decreased
- Functional residual capacity: Increased
- Residual volume: Increased
- DLCO/VA: Decreased

Exercise capacity:

- VO2 max: Decreased
- Dead space ventilation: Increased

Immunology:

Bronchial fluid:

- Neutrophils %: Increased
- Ratio of CD4+/CD8+ cells: Increased
- Epithelial lining fluid antioxidants: Decreased.

172. Functional residual volume is?

a) After normal inspiration

b) After normal expiration

c) After forceful expiration

d) After forceful inspiration

Correct Answer - A
Ans:A. After normal inspiration

- Functional Residual Capacity (FRC) is the volume of air present in the lungs at the end of passive expiration.

173. Polyuria is -

a) 70ml/kg

b) 60ml/kg

c) 50ml/kg

d) 40ml/kg

Correct Answer - C
Ans: C. 50ml/kg

- Considered polyuric if urine production is greater than 50 ml/kg/day.

174. Tubuloglomerular feedback control is useful for which one of the following?

a) GFR

b) Plasma sodium

c) Plasma volume

d) Determining tubular secretion

Correct Answer - A
Ans: A. GFR.
Tubuloglomerular feedback – Two components:
* Afferent arteriole feedback mechanism
  - Usually referred as “Tubuloglomerular feedback”
* Efferent arteriole feedback mechanism.
Afferent arteriolar feedback mechanism:
* Transmitter involved – Adenosine causing Ca2+ channel opening.
Efferent arteriolar feedback mechanism:
* Activates renin-angiotensin system generating angiotensin II→ efferent arteriole constriction → ?ed GFR.
* Feedback depends on juxtaglomerular apparatus & its specialized cells.
  - Macula densa – Specialized epithelium of distal tubule in close contact with afferent arteriole

175. Calcitonin levels increased in

a) Hyperthyroidism

b) Hyperparathyroidism

c) Hypoparathyroidism

d) Cushing Syndrome

Correct Answer - B

Ans: B. Hyperparathyroidism

The serum calcitonin level is strongly increased in this type of cancer. After successful total thyroidectomy, calcitonin is no longer detectable. Increasing concentrations of calcitonin after therapy indicate relapse or metastasis. Hyperparathyroidism is present in 20-30% of patients with medullar thyroid carcinoma.

176. When the values of Fev1=1.3 & FCV=3.9. Which of the following does this signify?

a) Normal lung function

b) Obstructive lung disease

c) Restrictive lung disease

d) Both

Correct Answer - B

Ans: B. Obstructive lung disease

Measurement of the bronchodilator response of forced expiratory volume in 1 second (FEV1) is an important method in clinical respiratory medicine.

This measurement is used to predict the response to bronchodilator treatment and is part of the diagnosis of COPD and asthma.

The bronchodilator response of forced vital capacity (FVC) has less clinical use than the bronchodilator response of FEV1 but may add important clinical physiological information

Airway obstruction was defined as FEV1/FVC ratio below lower limit of normal (LLN) before bronchodilation, and COPD was defined as an FEV1/FVC ratio below LLN after bronchodilation.

177. Antegrade peristalsis due to?

a) Ach

b) Serotonin

c) Substance P

d) VIP

Correct Answer - D
Ans: D. VIP
Defined as a motor pattern of the gut organ musculature that can propel content into the anal (antegrade peristalsis) or oral (retrograde peristalsis) direction.
Impulses traveling orad activate ascending contraction:
- Neurotransmitters here are acetylcholine, substance P, and neurokinin A.

Impulses traveling caudad activate descending relaxation:
- Neurotransmitters here are VIP, NO, and PACAP (pituitary adenylyl cyclase activating polypeptide).

178. C-peptide seen in?

a) In Pre-proinsulin

b) In Proinsulin

c) As a combined entity with insulin after secretion

d) A gastrointestinal proactive molecul

Correct Answer - B

Ans: B. In proinsulin

Synthesis of insulin:

- Synthesized as larger preprohormone (Pre-proinsulin) entering ER.
- Removal of 23 amino-acid signal peptide takes place.
- Converted to “Prohormone -Proinsulin”.

Proinsulin structure:

- Made up A & B chain, connected by C-peptide/chain.

C-peptide –

- Detached from granules before secretion.
- 90% – 97% insulin from B cells.
- Along with equimolar amounts of C-peptide.

179. In forceful expiration, which of the following neurons gets fired?

a) VRG

b) DRG

c) Pneumotaxic centre

d) Chemoreceptors

Correct Answer - A

Ans: A. VRG

Medullary respiratory group:

- Principal areas in medulla oblongata concerned with respiratory regulation.

Includes,

- Dorsal respiratory group (DRG).
- Ventral respiratory group (VRG).
- Pre-Botzinger complex.
- Peripheral inputs.

Dorsal respiratory group (DRG):

DRG neurons –

- Mainly concerned with inspiration.
- Descend & terminate on spinal motor neurons innervating primary inspiratory muscles.
- I.e., Diaphragm & External intercostal muscles.

Ventral respiratory group (VRG):

VRG neurons –

- Mainly concerned with forceful expiration.
- Minimal activities w.r.t inspiration.
- Contributes to both expiration & inspiration.

180. Slow conduction velocity is seen with which of the following nerve fibers?

a) Preganglionic autonomic nerve fibers

b) Postganglionic autonomic nerve fibers

c) Motor nerves

d) Sympathetic nerve fibers

Correct Answer - B

Ans: B. Postganglionic autonomic nerve fibers

Erlanger & Gasser classification:

C fiber – Characteristics:

- Diameter – 0.2-1.0
- Myelination – Unmyelinated
- Conduction – 0.2-2 (minimum)

Functions:

- Pain – Slow pain (“Protopathic /Second pain)
- Temperature
- Pressure
- Postganglionic autonomic fibers.
- High susceptibility to: Local anesthetics

181. Calculate the ejection fraction from the given volume pressure curve:

a) 40%

b) 50%

c) 55%

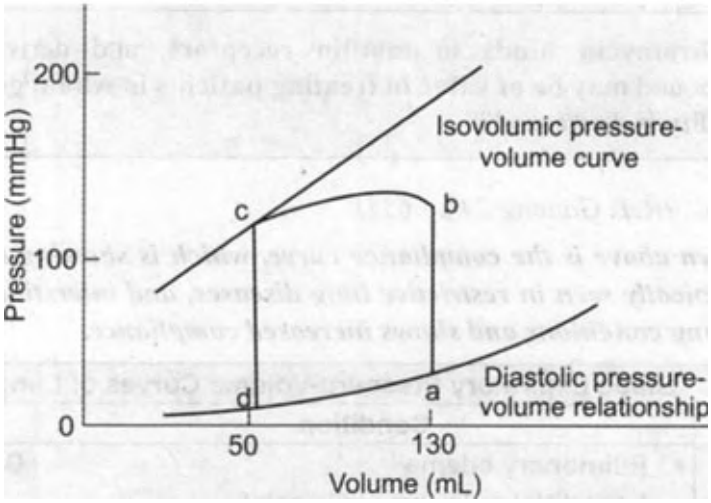
d) 60%

Correct Answer - D

Ans: D. 60%

(Ref Gunong 25/e p540 24/e p542)

- Ejection fraction calculated from the given volume pressure curve is 60%.



Pressure Volume Loop:

- ab: isovolumetric contraction
- bc: Ventricular contraction during systole
- cd: Isovolumetric relaxation.

Calculation:

- End-Diastolic Volume (EDV) (Point a) = 130 mL

- End Systolic Volume (ESV) (Point d) = 50 mL
- Stroke Volume (SV) = EDV–ESV = 80 mL
- Ejection Fraction = SV/EDV = 80/130 = 0.6 i.e. % EF = 60%.

182. Chemoreceptors are located in which area?

a) Medulla

b) Arch of aorta

c) Bifurcation of carotid artery

d) All of the above

Correct Answer - D
Ans. is'd'i.e., All of the above

- Central chemoreceptors - Ventral Surface Of Medulla.
- Peripheral chemoreceptors - At bifurcation of common carotid artery (carotid body) and arch of aorta (aortic bodies)

183. Hormone responsible for BP regulation after a fall due to blood loss.

a) ADH

b) ANP

c) Epinephrine

d) Aldosterone

Correct Answer - A

Ans. is 'a' i.e., ADH

(principles of medical physiology p. 573)

- Blood pressure is regulated by following mechanisms.

Short term regulation

- These mechanisms act immediately and correct the blood pressure quickly.

These are :-

1. Baroreceptor reflex: Works during Bp range 70-150 mmHg
2. Chemoreceptor reflex - Works when Bp below 80 mmHg.
3. CNS ischemic response : This the only hope of survival when BP is below 40 mmHg.

Hormonal release : These are -

1. Antidiuretic hormone (ADH) : Increases water reabsorption in kidney.
2. Angiotensin II: Causes vasoconstriction.

184.

Sodium channels are maximum in which part of neuron ?

a) Soma

b) Axon hillock

c) Dendrites

d) Axon

Correct Answer - B

Ans. is'b'i.e., Axon hillock

- In a motor neuron, the axon hillock and the initial segment of axon have the lowest threshold for excitation.
- This is because they have a much higher intensity of voltage gated sodium channel.

185. Blood supply of liver [m1/100g/min]

a) 1500-2000

b) 1000-1500

c) 50-60

d) 250-300

Correct Answer - C
Ans. is'c'i.e., 50-60
[Ref: Ganong 23'd/e p. 570]

- Blood flow through various organs are as follow:-
- Total Blood Flow (blood flow to whole organ in ml/min) r Liver (1500) > kidney (1260) > skeletal muscle (540) > Brain (750) > Skin (,162) > Heart (250).

186. Conversion of prekallikrein to kallikrein requires which clotting factor -

a) XIII

b) XII

c) XI

d) X

Correct Answer - B
Ans. is'b'i.e., XII
[Rel Essential of medical physiology p. 612]

- Initiation of intrinsic coagulation pathway occurs when factor XII is exposed to negatively charged surface.
- This leads to activation offactor XII to XIIa.
- Factor XIIa can then hydrolyze prekallikrein to kallikrein, which in turn activates more XII to XIIa.

187. The only excitatory neurons in cerebellar cortex are?

a) Purkinje

b) Basket

c) Golgi

d) Granule cells

Correct Answer - D

Ans. is'd'i.e., Granule cells [Ref BDC Vol. 3 p 92)

- Purkinje cells are the only output cells from cerebellar cortex.
- Purkinje cells send inhibitory efferents to deep cerebellar nuclei.
- Basket cells inhibit body of purkinje cells while stellate cells inhibit dendrites of purkinje cells.
- Granule cells send facilitatory efferents to basket, stellate and purkinje cells through parallel fibers.
- Climbing fibers and parallel fibers stimulate purkinje cells.

188. Temperature centre is ?

a) Supraoptic nucleus of hypothalamus

b) Paraventricular nucleus of hypothalamus

c) Preoptic nucleus of hypothalamus

d) Suprachiasmatic nucleus of hypothalamus

Correct Answer - C
Ans. is'c'i.e., Preoptic nucleus of hypothalamus [Ry' Ganong 23'd/e p. 275)

189. Righting reflex is a ?

a) Cochlear reflex

b) Spinal reflex

c) Vestibular reflex

d) None of the above

Correct Answer - C
Ans. is 'c' i.e., Vestibular reflex
[Ref Understanding of medical physiology p. 662]
Vestibular reflexes

- The information collected by vestibular apparatus leads mainly to reflex adjustment in posture and eye movements.

Vestibular reflexes are -

- Tonic labyrinthine reflex
- Righting reflex (labyrinthine righting reflex)
- Visual reflex vestibulo-ocular reFlex)

190. Biphasic action potential of mixed nerve except?

a) All or none phenomenon

b) Two or more positive peaks

c) Refractory period

d) Recorded on surface

Correct Answer - B
Ans. is'b'i.e., Two or more positive peaks
Action potential when recorded by putting two electrodes on the surface of a neuron (instead of putting on surface and one intracellularly), shows a biphasic response, i.e. Biphasic action potential.
As the wave of depolarization reached the first electrode, this electrode becomes negative and an upward deflection (Peak) is recorded.
Vagus, Glossopharyngeal, Facial are mixed nerve.

191. Which of the following is/are effect of increased 2,3-DPG on oxygen-hemoglobin dissociation curve?

a) ↑ ed affinity of heamoglobin to oxygen

b) ↓ ed affinity of haemoglobin to oxygen

c) Left shift of oxygen-hemoglobin dissociation curve

d) Right shift of oxygen-hemoglobin dissociation curve

e) No change in oxygen-hemoglobin dissociation curve

Correct Answer - B:D

Ans. (B) ↓ ed affinity of haemoglobin to oxygen (D) Right shift of oxygen-hemoglobin dissociation curve

[Ref: Ganong 25th/e p. 610-41; Guyton's 12'h/e p.j56-57; A K lain 6'h/e p. 430]

* Oxygen-hemoglobin dissociation curve is 2,3 DPG in RBC.
* DPG is an optional by-product of the glycolytic pathway.
* DPG binds with deoxygenated hemoglobin but not with oxygenated hemoglobin.
* Raised DPG concentration releases oxygen from oxyhemoglobin by shifting the following reversible reaction to the right.

Mechanism:

* One molecule of DPG binds with one mole of deoxyhemoglobin.
* Hence an increase in DPG concentration shifts the oxygen-hemoglobin dissociation curve to the right.
* Thus 2,3 DPG causes delivery (unloading) of O, to the tissues.
* Fetal hemoglobin has considerably less affinity for 2,3 - DPG than does adult hemoglobin therefore fetal hemoglobin has a greater

affinity for oxygen than adult hemoglobin.
In human blood, the affinity of fetal hemoglobin for 2,3-DPG is only about 4O% that of adult hemoglobin.
This makes fetal hemoglobin behave as if 2,3-DPG levels are low.

192. True statement relating to compliance of lung:

a) Increased by surfactant

b) Decreased in emphysema

c) At height of inspiration compliance is less

d) It can be measured by measuring intrapleural pressure at different lung volume

e) None

Correct Answer - A:C:D

Ans. (A) Increased by surfactant (C) At height of inspiration compliance is less (D) It can be measured by measuring intrapleural pressure at different lung volume

[Ref: Ganong 25th/629-32,24th/629-33; Guyton llth /473-75; A. K. Jain 5th/437]

Lung compliance:

- Measured by measuring intrapleural pressure at different lung volume.
- An important factor affecting the compliance of the lungs is the surface tension of the film of fluid that lines the alveoli.
- Deficiency of surfactant-less compliance; more surfactant-more compliance.
- Compliance decreases with the inflation of the lungs as more pressure is required to distend the already distended lung.
- The curve is shifted downward and to the right (compliance is decreased) by pulmonary congestion and interstitial pulmonary fibrosis; pulmonary fibrosis is a progressive disease of unknown

cause in which there is stiffening and scarring of the lung.

- The curve is shifted upward and to the left (compliance is increased) in emphysema.

193. Lipid rafts are seen in?

a) Ribosomes

b) Mitochondria

c) Plasma membrane

d) ER

Correct Answer - C
Ans. C. Plasma membrane.
* Lipid rafts are regions in plasma membrane that accumulate Cholesterol and glycolipids (glycosphingolipids).
- So there regions are slightly thicker than other areas of plasma membrane.
- Because f distinct molecular composition of lipid rafts, they can act us microcompartment within cells, giving the cell an additional way to organize pathways.
- Involved in the regulation of signal transduction.

Types of lipid rafts:
* Planar lipid rafts (noncaveolar or glycolipid rafts)
- Continuous with plane of cell membrane (they are not invaginate).

Caveolae:
* Specialized types of lipid rafts which are flask like invaginations of plasma membrane.
* Produced where caveolin protein is present in lipid bilayer membrane.

194. Marker of endoplasmic reticulum?

a) Acid phosphatase

b) Glucose-6-phosphatase

c) Catalase

d) LDH

Correct Answer - B

Ans. B. Glucose-6-phosphatase.

Organelle or fraction Markers

- Plasma membrane - Adenyl cyclase, Na+IC ATPase
- Lysosome - Acid phosphatase
- Golgi apparatus - Galactosyl transferase, Golgi mannosidase II, Sialyl transferase, G1cNAc transferase.

Endoplasmic reticulum - Glucose-6-phosphatase

- Peroxisome - Catalase, Urate (uric acid) oxidase
- Cytosol - Lactate dehydrogenase
- Nucleus - DNA
- Ribosome - High content of RNA

195. Following is a feature of simple diffusion?

a) Against a concentration gradient

b) Easy for non-polar substance

c) More in thick membrane

d) Requires carrier protein

Correct Answer - B

Ans. B. Easy for non-polar substance

Simple diffusion:

- Refers to diffusion of molecule across the membrane following a concentration gradient or chemical gradient, but without the help of any carrier protein.

Factors influencing:

A) Rate of diffusion is directly proportionate :-

- Concentration (chemical) gradient
- Cross-sectional area of the membrane through which diffusion takes place
- Lipid solubility of the substance

B) Rate of diffusion is inversely proportionate:-

- Thickness of diffusion membrane
- Size of the particle
- Charge or polarity of substance
- So, simple diffusion is favored by small size, lipid solubility and absence of polarity (non-polar substance) and charge (neutral molecule) through a thin, large membrane where the concentration gradient is more.

196. Most common mechanism for transport into the cell?

a) Diffusion

b) Primary active transport

c) Antiport

d) Cotransport

Correct Answer - A
Ans. A. Diffusion.
(Ref Principles of medical physiology p.3.)
Most important and most common mechanism of transport is passive diffusion.

197. True about Nernst equation?

a) Used to calculate equilibrium potential

b) Calculated for non-ionic solution

c) Nernst potential for Cl is -90 my

d) All are correct

Correct Answer - A

Ans. A. Used to calculate equilibrium potential.

[Ref: Ganong 24th le p.9; Principles of medical physiology p.8]

- RMP value is calculated on basis of Nernst equation.
- Also referred "Nernst potential/Equilibrium potential/Diffusion potential of K+.

198. Actin is which type of protein?

a) Fibrous

b) Globular

c) Both

d) None

Correct Answer - C
Ans. C. Both
[Ref Principles of medical physiology p.731]
There are two types of actin filaments:

- F-actin → Fibrous protein
- G-actin → Globular protein

199. Somatic efferent of which arise from medulla?

a) Oculomotor

b) Trochlear

c) Abducent

d) Hypoglossal

Correct Answer - D
Ans. D. Hypoglossal
General somatic efferent (motor) nuclei of Hypoglossal nucleus:

- It lies in medulla and through hypoglossal nerve supplies muscles of tongue, except palatoglossus.

200. Third order neurons of sensations from face arise in?

a) Medulla

b) Spinal nucleus of trigeminal

c) Thalamus

d) Brainstem

Correct Answer - C
Ans. C. Thalamus
General sensations from the face are carried by trigeminal nerve. From VPM nucleus of thalamus, third order neurons project to postcentral gyrus (primary sensory cortex).

201. ECF concentration of 1C· is 150 meq/L and ICF concentration of le is 5 meq/L. What is the equilibrium potential for K^+ is?

a) +60 mV

b) -60 mV

c) -90 mV

d) +90 mV

Correct Answer - C
Ans. 'c' i.e., -90 mV
Nernst Equation –

- Can be used to find the cell potential at any moment in during a reaction or at conditions other than standard-state.

$$E = E^\circ - \frac{RT}{nF} \ln Q_c$$

- E = cell potential (V) under specific conditions
- E= cell potential at standard-state conditions\
- R = ideal gas constant = 8.314 J/mol-K
- T = temperature (kelvin), which is generally 25C (298 K)
- n = number of moles of electrons transferred in the balanced equation
- F = Faraday's constant, the charge on a mole of electrons = 95,484.56 C/mol
- lnQc = the natural log of the reaction quotient at the moment in time.

- 61 150

EK = log = 90 mV
+1 5

202. True about heterophilic receptors?

a) Involved in binding of GH to cell membrane

b) Bind to same ligand/hormone

c) Involved in cell adhesion

d) All are correct

Correct Answer - C
Ans. C. Involved in cell adhesion
[Ref Textbook of clinical pathology p.1132]
Cell-cell and cell-tissue-interactions occur through following types of receptors:

- Homophilic & heterophilic receptors.

Heterophilic receptors:

- These receptors recognize distinct ligands (called adhesion epitopes) of opposing cell membranes or tissue (called "lock and key bonds" or "links").

203. Nernnst equation related to equilibrium potential does not depend upon?

a) Concentration gradient

b) Electric gradient

c) Non-ionic solution

d) Concentration of ions in two solution

Correct Answer - C
Ans. C. Non-ionic solution
[Ref Guyton 12th/e p.50; Principles of medical physiology p. 8]
Nernst equation is for ionic solution.

204. Due to Donnan-Gibbs effect?

a) Concentration of $K^{\cdot}$ is greater in ECF

b) Concentration of cl is greater in ECF

c) Total ions are more in ICF

d) All are true

Correct Answer - C

Ans. C. Total ions are more in ICF

[Ref Principles of medical physiology p.7]

Gibbs-Donnan equilibrium:

- The mammalian cells (intracellular fluid) contains non-diffusible anion like proteins and organic phosphate where as K' and Cl- are diffusible cation and anion, respectively.
- The ECF contains 1K+ and Cl- as diffusible cation and anion respectively.

Due to Gibbs-Donnan equilibrium :-

- Concentraion of Cl- is greater in ICF than ECF (concentration of diffusible cation is greater in compartment with non-diffusible anion).
- Concentration of Cl is greater in ECF than ICF.
- Total number of ions is greater in ICF than ECF.
- All these effects help to maintain the shape and volume of cells by distributing diffusible ions across the membrane according to physiological demand.

205. ATPase is which type of pump?

a) Secondary active

b) Electrogenic

c) Symport

d) All of the above

Correct Answer - B
Ans. B. Electrogenic
[Ref Ganong 24th/e p.51, 10; Guyton 12th/e p.53]
Sodium-potassium pump:
* Most important pump for primary active transport in body.
* An Electrogenic pump.
* Responsible for maintaining Na+ & K+ conc. difference across cell membrane.
Mechanism:
* ICF - High K+ concentration.
* ECF - High Na+ concentration.
* Both Na+ & K+ transported against concentration gradient.
* Uses energy by hydrolyzing ATP;
Functions:
* Pump contains ATPase activity.
* Na+-K+ pump extrudes -
  - 3 Na+ out from cell.
  - Pumps 2 K+ into cell.
  - Coupling ratio of Na+-K+pump - 3:2.

206. Diffusion related to 0_2 transport across respiratory membrane is an example of?

a) Simple diffusion

b) Facilitated diffusion

c) Active diffusion

d) Osmotic diffusion

Correct Answer - A
Ans. A. Simple diffusion.
[Ref. Ganong 25thle p. 51 & 24thle p. 53]

- Simple diffusion - Movement of fats, oxygen, CO, through lipid portion of membrane.
- Facilitated diffusion - Movement of glucose and some amino-acids.
- Primary active transport - Ions K+, Na*,
- Secondary active transport - Glucose or or amino-acid into the cell along Na` (Sympoft or cotransport) 1-1+ out of the cell against Na+ (Antiport or countertransport).

207. Apnea-hypopnea index is used for?

a) Emphysema

b) Asthma

c) Hyaline membrane disease

d) Obstructive sleep apnea [OSAI

Correct Answer - D

Ans. D. Obstructive sleep apnea [OSAI

[Ref Harvard ed] Apnea Hypopnea Index (AHI)

- The AHI is the number of apneas or hypopneas recorded during the study per hour of sleep.
- It is generally expressed as the number of events per hour.

Based on the AHI, the severity of OSA is classified as follows:

- None/Minimal: AHI < 5 per hour
- Mild : AHI 5, but < 15 per hour
- Moderate : AHI 15, but < 30 per hour
- Severe : AHI 30 per hour.

208. Measurement of intracellular fluid in a 50 years old male is done by?

a) Dilution method

b) Evans blue

c) D_20

d) Indirectly

Correct Answer - D
Ans. D. Indirectly.
[Ref Ganong 23th/e p. 3-6; Guyton 12th/e p. 286-288]

- Most of the fluid is calculated directly by dilution method, except for intracellular fluid (ICF) and interstitial fluid.
- Both these are calculated indirectly by calculating other body fluids.
- ICF = Total body water volume - ECF volume Interstitial fluid = ECF volume - Plasma volume.

209. Calculation of interstitial fluid in a 50 years old is done by?

a) TBW minus ECF

b) ECF minus plasma volume

c) ICF minus ECF

d) TBW minus ICF

Correct Answer - B

Ans. B. ECF minus plasma volume.

[Ref Ganong 23th/e p. 3-6; Guyton 12th/e p. 286-288]

- Most of the fluid is calculated directly by dilution method, except for intracellular fluid (ICF) and interstitial fluid.
- Both these are calculated indirectly by calculating other body fluids.
- ICF = Total body water volume - ECF volume Interstitial fluid = ECF volume - Plasma volume.

210. Hypercoagulable factor is?

a) Protein C

b) Protein S

c) Factor V Leiden

d) Antithrombin III

Correct Answer - C
Ans. C. Factor V Leiden
[Ref Textbook of clinical hematology p. 786]
Factor V Leiden is the most common inherited hypercoagulable state.
Occurs when a specific mutation in a protein that is more resistant to be turned off, leading to an increased risk of thrombosis.

211. Excitability of cells is maximally affected by change in concentration of which ion?

a) IC^{+}

b) Na*

c) a-

d) Ca+2

Correct Answer - D
Ans. D. Ca+2
[Ref Principles of medical physiology p.801]
Effects of ion concentration change on membrane potential:
* Hypercalcemia
- An increase in extracellular Ca2+ concentration can stabilize the membrane by decreasing excitability.
* Hypocalcemia
- Calcium ion is membrane stabilizers.
- A decrease in extracellular Ca2+ concentration increases the excitability of nerve by decreasing the amount of depolarization necessary to produce the action potential.
- Hyperexcitability is seen.

212. Inhibition of Na* ATPase leads to?

a) Decreased Na* in the cell

b) Increased Ca' in the cell

c) Increased K* in the cell

d) Increased Cl- in the cell

Correct Answer - B
Ans. B. Increased Ca' in the cell
[Ref Principles of medical physiology 3rdle p. 786]
3Na+/1Ca+ exchanger (Sodium/Calcium exchange pump):

- It moves 3Na+ into the cell in exchange one Ca+ going out

213. Non-specific pain pathway is for?

a) Nociceptive pain

b) Neuropathic pain

c) Idiopathic pain

d) Inflammatory pain

Correct Answer - C
Ans. C. Idiopathic pain
[Ref Textbook of psychotherapy p.6]
Pain may be divided into: -
Nociceptive pain:

- It is musculoskeletal pain that results from injury or inflammatory or degenerative disorders, e.g. bone fracture or arthritis or burn.

Neuropathic pain:

- It is due to dysfunction/damage of nerves, e.g. prolapse intervertebral disc.

Mixed pain:

- It has components of both nociceptive and neuropathic pains.

Idiopathic or unspecified pain:

- It is purely psychological in nature and is therefore called psychogenic pain.

214. Shortest phase of sexual cycle?

a) Excitement phase

b) Plateu phase

c) Orgasmic phase

d) Resolution

Correct Answer - C
Ans. C. Orgasmic phase
[Ref Oxford textbook of psychiatry p.227]
Orgasm phase:

- Premature ejaculation occurs in this phase
- Reflexive muscle contraction occurs in pelvis
- It is the shortest phase and lasts only a few seconds

215. Dull visceral pain is carried by which type of neurons?

a) A gamma

b) Aa

c) C fibres

d) B

Correct Answer - C
Ans. C. "C" fibers.
[Ref Ganong 24th\e p. 92 & 23rdle p. 89]

- A viscus does not have any other sensation (e.g. touch, temperature etc) except pain.
- Due to sparse distribution of pain receptors, visceral pain is poorly localized.
- Visceral pain sensation is carried by type - C afferents in the sympathetic system (from thoracic and abdominal viscera) and parasympathetic system (from pelvic viscera).

216. Erection of penis occurs in which phase of sexual *cycle?*

a) Excitement phase

b) Plateu phase

c) Orgasmic phase

d) Resolution

Correct Answer - A
Ans. A. Excitement phase
Ref Oxford textbook of psychiatry p.227]
Excitement phase

- There is increased physiological excitement such as high BP and heart rate.
- There is erection of penis (in males) and swelling of clitoris & labia minora (in females).
- Testes swell, scrotum tightens
- There is vaginal lubrication

217. 'C' fibers carry sensations through which pathway?

a) Posterior column

b) Anterior spinothalamic tract

c) Lateral spinothalamic tract

d) All of the above

Correct Answer - C
Ans. C. Lateral spinothalamic tract.
[Ref Ganong 23rdie p.648; Goyton 12th le p.573].
C fibers carry Pain (slow pain) and temperature sensation.
These are carried by lateral spinothalamic tract.

218. Premature ejaculation occurs in which phase of sexual cycle?

a) Excitement phase

b) Plateu phase

c) Orgasmic phase

d) Resolution

Correct Answer - C
Ans. C. Orgasmic phase
[Ref Oxford textbook of psychiatry p.227]
Orgasm phase:

- Premature ejaculation occurs in this phase
- Reflexive muscle contraction occurs in pelvis
- It is the shortest phase and lasts only a few seconds

219. Types C nerve fibers are?

a) Sensory

b) Motor

c) Mixed

d) Any of the above

Correct Answer - A
Ans. A. sensory.
Type C fibers:

- Postganglionic autonomic fibers.
- Sensory function afferent to temperature & pressure.
- No motor function.

220. Exercise mediated increase in muscular blood flow is mediated by which sympathetic fibers

a) Adrenergic

b) Noradrenergic

c) Dopaminergic

d) Cholinergic

Correct Answer - D

Ans. D. Cholinergic

- An exercise is a form of stress, and like most stresses, is accompanied by sympathetic overactivity.
- Skeletal muscles have both sympathetic noradrenergic vasoconstrictor fibers and sympathetic cholinergic vasodilator fibers.
- Vasoconstrictor nerve fibers act mainly on veins.
- Venoconstriction improves venous return and helps in improving cardiac output.
- On the other hand, sympathetic cholinergic fibers, which are unique to skeletal muscles, bring about arteriolar dilatation and thereby increase muscle blood flow.

221.

Phosphate/phosphorus is present in which part of cell?

a) Cell membrane

b) DNA

c) RNA

d) All of the above

Correct Answer - D
Ans. D. All of the above
[Ref Principles of medical physiology /e p.116]
Phosphorus is a component of DNA, RNA, ATP and also the phospholipids that form all cell membranes.
Nearly every cellular process that uses energy obtains it in the form of ATP.
Thus, it is an essential element for all living cells and important for energy utilization in the body.

222. Warmth sensation is carried by?

a) A a fibers

b) A (3 fibers

c) A y fibers

d) A S fibers

Correct Answer - A
Ans. a. A a fibers
[Ref Ganong 25"Ye p. 94 & 24"le p. 92; Principles of physiology p. 512]
Temperature (warmth/cold) sensation is carried by Aδ & C fibers.

223. True about myosin?

a) Thin filament

b) Covers active site of action

c) Has ATPase activity

d) Ca' binding protein

Correct Answer - C

Ans. C. Has ATPase activity

[Ref Ganong 241th le p.100, 102]

- The shortening of muscle fiber occurs due to sliding of actin filaments on myosin filament.
- However, there are four muscle proteins involved in the process: - Actin, Myosin, Tropomyosin, and troponin.

Myosin:

- Myosin is the protein that constitutes the thick filaments. Myosin of skeletal muscle is myosin-II.
- Myosin participates in the contractile mechanism and also acts as an ATPase.

224.

Maximum storage of magnesium occurs in which part of body?

a) Adipose tissue

b) Skeletal muscles

c) Blood

d) Bone

Correct Answer - D

Ans. D. Bone

[Ref Principles of medical physiology p.114]

- An adult contains approximately 25 grams of magnesium.
- About 60% of the magnesium is present in bone, of which 30% is exchangeable and functions as a reservoir to stabilize the serum concentration.
- About 20% is present is skeletal muscles, 19% in other soft tissues and less than 1% in ECF.

225. In cardiac muscles, T-tubules are present at?

a) Z lines

b) A lines

c) I lines

d) A-I junction

Correct Answer - A
Ans. A. "Z" lines.
[Ref Principles of medical physiology p.794]

- The cardiac muscle cell contains actin, myosin the sarcotubular system and other organelles seen in skeletal muscles.
- However, the T system of cardiac muscle is located at Z lines rather than at A-I junction, where it is located in skeletal muscles.

226. Tisse factor activates?

a) Preaccelerin

b) Hageman facter

c) Labile facter

d) Prothrombin

Correct Answer - A
Ans. A. Preaccelerin
[Ref Ganong 23rd le p.531-535]
Preaccelerin (factor VII) is activated to factor Vila by tissue factor.
Tissue factor is the cofactor for both factor VII and Vila.

227. Tissue factor activates?

a) Intrinsic pathway

b) Contact pathway

c) In vitro pathway

d) In vivo pathway

Correct Answer - D
Ans. D. In vivo pathway
[Ref Ganong 23thie p.5.31-53.5]
Blood coagulation pathways are divided into:-
Intrinsic pathway (contact pathway):

- It is largely an 'in vitro' pathway and is activated when factor XII (Hageman factor or contact factor) comes in contact with negatively charged surface, e.g. glass, kaolin etc.

Extrinsic pathway:

- It is largely an in vivo pathway is activated by tissue factor (thromboplastin) at the site of tissue injury.

228. In a muscle fiber at rest, the length of the I band is 1 mm and A band is 1.5 mm. What is the length of the sarcomere

a) 0.5 mm

b) 2.5 mm

c) 3.5 mm

d) 5 mm

Correct Answer - B

Ans. B. 2.5 mm.

- Sarcomere is the portion of myofibril between two Z lines.
- Thus, length of sarcomere in given question = 0.5 mm (1/2 I band) + 1.5 mm (A band) + 0.5 mm (1/2 I band) = 2.5 mm.

229. Hormone which affects IC* ion concentration?

a) GH

b) Thyroxine

c) Insulin

d) Estrogen

Correct Answer - C
Ans. C. Insulin
[Ref Guyton Ilth/e p.710]

- Insulin lowers serum IC' concentration i.e., causes hypokalemia. The hypokalemic action of insulin is due to stimulation of K+ intake by the cells mainly in muscle and adipose tissue. Insulin increases the activity of Na+ - K. ATPase in cell membrane, so that more K+ is pumped into cells.

230. White fibers are present in which muscle?

a) Calf muscles

b) Back muscles

c) Gluteal muscles

d) Hand muscles

Correct Answer - D

Ans. D. Hand muscles.

[Ref Principles of medical physiology p.118]

Type of muscle fibers:

- Type 1 (red) or type 2 (white).
- Most of the muscle in human body contains both types of fibers, i.e. most muscles in the body have both types of motor units.
- But, some muscles have more type 1 fibers (type 1 motor units) than type 2, and vice-versa.

Accordingly, skeletal muscles can be divided into :

Red muscles

- These muscles contain more type 1 (red) fibers, therefore are slow twitch muscles and contain more myoglobin content.
- These are muscles which require prolonged contraction, for example, muscles which help in maintaining posture, i.e. Back muscles gluteus muscles (at back of hip) and calf muscles.

White (pale) muscles

- These muscles contain more type 2 (white) fibers and are fast twitch muscles.
- These are muscles which help rapid contractions and finer movements.
- Examples are Hand muscles and extra ocular muscles.

231. Function of muscle spindle is?

a) Movement of a limb

b) Muscle tone maintenance

c) Goal oriented muscle contraction

d) All of the above

Correct Answer - B

Ans. B. Muscle tone maintenance

[Ref Understanding of medical physiology p.138]

- If a skeletal muscle is stretched, it respond by contracting.
- In other words, if a muscle is stretched, it tends to become shorter and more stiff, thereby resisting stretch.
- This is because of receptor sensitive to stretch within the muscle.
- Stretch receptor within a muscle is called "muscle spindles".

Stretch reflex has two principal functions:

1) To maintain muscle tone

- Tone is a tendency of a muscle to resist being stretched.
- Muscle tone is not only important for maintaining posture but also facilitates locomotion and makes all voluntary movement smooth.

2) To make muscles respond to stretch and release.

232. Afferents for stretch reflexes are carried by which fibers?

a) Aa

b) Ay

c) Type B

d) Type C

Correct Answer - A
Ans. A. Aa
[Ref Ganong 24th/e p. 229]
Sensory innervation (afferent) of muscle spindle:

- Two types of sensory nerve fibers (afferent) originate from the intrafusal fibers :
- Annulospiral (Primary) ending are wound around the central region of both nuclear bag fiber and nuclear chain fiber.
- These are Aα (or Iα) fibers.
- Flower-spray (Secondary) endings innervate the peripheral parts (ends) of nuclear chain fiber.
- These are Aβ or (or II) fibers.

233. All are true regarding intracellular receptors, except?

a) Act by regulating gene expression

b) Fastest acting receptors

c) Glucocorticoid receptors

d) DNA contains hormone responsive elements

Correct Answer - B
Ans. B. Fastest acting receptors
[Ref Ganong 24th le p.406; Harper 28th/e p.4281]
This is slowest acting tranduction mechanism because protein synthesis takes some time.

234. Spinal cord has how many synapses in golgi tendon reflex?

a) 1

b) 2

c) 3

d) 4

Correct Answer - B
Ans. B. 2
[Ref: Principles of medical physiology p. 786]

- Strech reflex through muscle spindle → Monosynaptic
- Golgi tendon reflex → Bisynaptic.

235. Secretion of cortisol is highest at?

a) Mid-night

b) Early morning

c) Afternoon

d) Evening

Correct Answer - B
Ans. B. Early morning
[Ref Textbook of clinical endocrinology p. 78]

- The secretion of ACTH and consequently that of cortisol follows a circadian rhythm due to hypothalamic (Suprachiasmatic nucleus) control.
- ACTH secretion is minimum during night and maximum early in the morning (6-8 am).

236. Inverse stretch reflex is a?

a) Monosynaptic reflex

b) Bisynaptic reflex

c) Polysynaptic reflex

d) Nonsynaptic reflex

Correct Answer - B
Ans. B. Bisynaptic reflex
[Ref Principles of medical physiology 3rd/e p.786]
Golgi tendon reflex (inverse stretch reflex) is bisynaptic reflex.

237. True about ACTH and cortisol [corticosteroid] secretion?

a) Maximum secretion in the evening

b) ACTH has negative feed-back control

c) ACTH has major effect on mineralocorticoid secretion

d) ACTH is derived from POMC

Correct Answer - B:D

Ans. B & D. ACTH has negative feed-back control (D) ACTH is derived from POMC

[Ref Understandings of medical physiology p.539]

- ACTH is derived from precursor molecule pro-opiomelanocortin (POMC).
- ACTH stimulates the adrenal cortex to increase the synthesis and release of glucocorticoids. At normal physiological concentration, the effect of ACTH on secretion of mineralocorticoid (aldosterone) and androgen is minimal. However, at higher concentration synthesis and release of these hormone can also increase.
- The secretion of ACTH is subjected to negative feedback (inhibition) by glucocorticoids.
- ACTH secretion shows diurnal (circadian) rhythm with minimum secretion at evening and maximum secretion at early morning.

238. Facilitatory presynaptic neurotransmitter is?

a) GABA

b) Glycine

c) Glutamate

d) Aspartate

Correct Answer - C:D
Ans. is 'c > d' i.e., Glutamate > Aspartate
[Ref Understanding of medical physiology 1"/e p.412]

- Glutamate is the chief excitatory neurotransmitter in the brain and spinal cord.
- Aspartate seems to be the chief excitatory neurotransmitter of cortical pyramidal cells.

239. Gene for insulin responsive glucose transporter is located on chromosome?

a) 7

b) 21

c) 17

d) 13

Correct Answer - C
Ans. C. 17
[Ref Principles of medical physiology p.790]

- GLUT-4 is responsible for facilitating the transport of glucose into the cells in response to insulin.
- For this reason, mutation in GLUT-4 have been associated with type 2 diabetes.
- The GLUT-4 gene is located on short arm of chromosome 17 (17p13).

240. Glucose transporter affected in diabetes mellitus?

a) GLUT-2

b) GLUT-5

c) GLUT-4

d) SGLT-2

Correct Answer - C

Ans. C. GLUT-4

[Ref Principles of medical physiology p.790]

- GLUT-4 is responsible for facilitating the transport of glucose into the cells in response to insulin.
- For this reason, mutation in GLUT-4 have been associated with type 2 diabetes.
- The GLUT-4 gene is located on short arm of chromosome 17 (17p13).

241.

Nissl's granules are found in which part of nerve cell -

a) Axon hillock

b) Axons

c) Node of Ranvier

d) Body

Correct Answer - D

Ans. D. Body

[Ref Chaudhri 7h/e Principles of medical physiology-7]

Nissl Bodies (Nissl granule or tigroid body):

- Nissl bodies are large granular body found in neuron.
- Present all over the soma (body), excepting axon hillock and they extend to some extent in the dendrites, but not within the axon.
- These granules are rough endoplasmic reticulum with free ribosomes and are the site of protein synthesis.
- They are thought to be involved in the synthesis of neurotransmitter such as acetylcholine.
- Nissl bodies are basophilic granules.
- Chromatolysis (disappearance of Nissl bodies) is an important histological sign of neuronal injury.
- When the demand of the protein synthesis is great the nissl granules overwork and many altogether disappear (chromatolysis).

242. Stereocilia are found in?

a) Eye

b) Nose

c) Tongue

d) Epididymis

Correct Answer - D
Ans.D. Epididymis
* Stereocilia are found in three places
- Hair cells of inner ear
- Epididymis
- Ductus deferens.

243. Mechanism of action of 5-a reductase?

a) Breakage of C_4C_5 double bond

b) Breakage of C-N bond

c) Breakage of amide bond

d) Breakage of N-N bond

Correct Answer - A

Ans. A. Breakage of C_4C_5 double bond

5-alpha reductase causes reduction (breakge) of C4-05 double bond (A4.5) with the help of NADH as a cofactor.

It converts (reduces) testosterone to dihdrotestosterone.

244. Stereocilia are present in?

a) Taste buds

b) Hair cells

c) Retina

d) Nose

Correct Answer - B
Ans. B. Hair cells.
[Ref Ganong 25th/e p.202]

- Hair cells have a common structure.
- The tallest hair cell is called as Kinocilium and the progressively shorter hair cells are called as Stereocilia.
- These hair cells are connected together by tip links which has mechanically sensitive cation channels.

245. CSF pressure is increased in all except -

a) Forced inspiration

b) Coughing

c) Valsalva manoeuvre

d) Crying

Correct Answer - A
Ans. A. Forced inspiration.
[Ref Essential of medical physiology p. 950]

- Events like coughing, valsalva manoeuvre, and crying increase the pressure by decreasing absorption.
- Compression of IJV (internal jugular vein) also raises the CSF pressure.

246. cAMP activates?

a) Protein kinase 'A'

b) Protein kinase 'C'

c) Nuclear transcription

d) Phospholipare

Correct Answer - A

Ans. A. Protein kinase 'A'

Hormones acting through adenylyl cyclase (AC):

- Corticotropin releasing hormone (CRH), FSH, LH, TSH, ACTH (corticotropin), ADH, Vasopressin (V2 receptors), Parathormone, Catecholamine) e.g., adrenaline (most actions), Glucagon, hCG, Calcitonin, Somatostatin, acetylcholine (M2), Dopamine (1), Angiotensin II (epithelial cells), GABA-B, Histamine (H2).

247. CSF is present in which space?

a) Central canal of spinal cord

b) Ventricles of brain

c) Subarachnoid space

d) All of the above

Correct Answer - D
Ans. D. All of the above.
[Ref Ganong 24th/e p.603; Principles of medical physiology p. 293]
* Cerebrospinal fluid (CSF) is a clear, colorless, almost protein free filtrate (transduate) of blood.
* It is present,
  - Around the brain (in subarachnoid space) and inside the brain (in its ventricles).
  - Around the spinal cord (in subarachnoid space) and inside the spinal cord (in its central canal).

248. Maximum daily degradation of hemoglobin in normal adults?

a) 2 gm

b) 4 gm

c) 6 gm

d) 8 gm

Correct Answer - D
Ans. D. 8 gm
A total daily excretion of 140 mg of urobilinogen would represent the catabolism of 3.99 grams of hemoglobin.
Normal maximum urobilinogen in feces is 280 mg, i.e. 8 grams of hemoglobin catabolism.

249. Daily fecal urobilinogen excretion in healthy adults?

a) 20-40 gm

b) 40-280 gm

c) 20-40 mg

d) 40-280 mg

Correct Answer - D
Ans. D. 40-280 mg
[Ref: Principles of medical physiology p.212]
The normal daily excretion of urobilinogen in the feces ranges from 40 to 280 mg, averaging 150 mg.
A total daily excretion of 140 mg of urobilinogen would represent the catabolism of 3.99 grams of hemoglobin.

250. Function of Ghrelin?

a) Stimulate water absorption

b) Increase appatite

c) Regulation of temperature

d) Stimulate lipogenesis

Correct Answer - B
Ans. B. Increase appatite
[Ref Clinical endocrinology p.48; Ganong 24th/e p.487]
* Ghrelin is a peptide secreted by oxyntic cells in gastric fundus that are characterized by round, compact, electron-dense secretory granules.
* Ghrelin promotes food intake, i.e, stimulate appetite (orexigenic).
* Increases with anorexia.
* In human, ghrelin induces lipolysis.
* Ghrelin is released from the stomach in fasting state.
- Increases hunger by inhibiting the ventromedial hypothalamus (satiety center).
- Stimulates GH secretions.

251. Location of visual cortex?

a) Precentral gyrus

b) Postcentral gyrus

c) Sylvian fissure

d) Calcarine sulcus

Correct Answer - D
Ans. D. Calcarine sulcus
[Ref Principles of medical physiology p.531]

- The occipital lobe is the visual processing center of brain containing most of the anatomical region of visual cortex.
- Primary visual area is brodmann area 17 (also called VI) on medial side of occipital lobe in calcarine sulcus.
- It is also called as striate area or striate cortex because it can be identified by a large stripe of myelin, the stria of gennari.

252. Parvocellular pathway for vision is concerned with?

a) Fine details of object

b) Movements of object

c) Flickering features

d) Depth of vision

Correct Answer - A
Ans. A. Fine details of object
[Ref Ganong 24th/e p.190]

- Parvocellular pathway (arises from layer 3, 4, 5, 6 of LGB).
- Axons from parvocellular terminate in layer 4 of the visual cortex.
- Parvocellular pathway carries signals for color vision, texture, shape and finer details.

253. Sweat glands are supplied by all except?

a) Cholinergic neurons

b) Sympathetic neurons

c) Adrenergic neurons

d) C-fibers

Correct Answer - C
Ans. C. Adrenergic neurons
[Ref Understanding of medical physiology p. 786]

- Nerve supply of sweat gland is unique in that it is sympathetic but cholinergic (most other sympathetic sites are noradrenergic).
- Post-ganglionic sympathetic fibers are Type-C fibers.

254. Gustatory pathway involves which nerve?

a) Facial

b) Glossopharyngeal

c) Vagus

d) All of the above

Correct Answer - D

Ans. D. All of the above

[Ref Principles of medical physiology p.87]

- Fibers innervating taste buds are branches of cranial nerves, i.e., branches of facial, glassopharyngeal, and vagus nerves.
- The taste buds in the anterior two-thirds of the tongue are innervated by lingual branches of the facial nerve.
- The taste buds in the posterior third of the tongue are innervated by glossopharyngeal nerve.
- Taste receptors in the pharyngeal part of tongue and on the hard palate, soft palate, and epiglottis are innervated by fibers of the vagus nerve.

255. True about basic rhythm of GIT?

a) Fluctuate between -65 and -40 mV

b) Initiated by zymogen cells

c) Pacemaker cells are present in proximal stomach

d) All of the above

Correct Answer - A

Ans. A. Fluctuate between -65 and -40 mV

[Ref Principles of medical physiology p.915]

- The smooth muscle cells of gastrointestinal tract has spontaneous rhythmic fluctuations in membrane potential between about -65 and -45 mV.
- This is called basic electrical rhythm (BER).
- This BER is initiated by pacemaker cells called intersititial cells of Cajal.

256. Function of cerebellum?

a) Regulation of tone

b) Coordination of eye movement

c) Planning & initiation of movement

d) All of the above

Correct Answer - D

Ans. D. All of the above

Functions of the cerebellum:

- Regulation of tone, posture and equilibrium.
- Smoothening and coordination of voluntary movements. The most important function and the best known function of cerebellum is coordination of movements.
- Coordination of eye movements
- Planning and initiation of movements
- Learning of frequently performed voluntary movements.

Timing and comparison:

- The cerebellum is believed to be a timing device that times the duration of agonistic muscle activity and latency of antagonistic activity, So that any movement is halted at the correct point.

257. Which of the following is not a metabotropic receptor for serotonin?

a) 5HT,A

b) 5HT,13

c) $5HT_2A$

d) 5HT3

Correct Answer - D
Ans. D. 5HT3
[Ref: Ganong32 p. 139; Principles of medical physiology p.786]
Metabotropic receptors:

- Are G-protein coupled receptors which act through second messenger.

Serotonin included:

- With the exception of the 5-HT3 receptor, a ligand gated ion channel, all other 5-HT receptors.

258. Two point discrimination is mainly a function of which touch receptors?

a) Merkel's disc

b) Ruffini's end organ

c) Paccinian corpuscle

d) Meissner's corpuscle

Correct Answer - A
Ans. A. Merkel's disc
[Ref Principles of medical physiology p. 647] Tactile (touch) receptors
F**or touch (superfical touch):-**

- Meissner's corpuscle (detect texture of surface, i.e. rough or smooth), Merkel's disc (detect two point discrimination).

259. Which of the following defines vital capacity?

a) Air in lung after normal expiration

b) Maximum air that can be expirated after normal inspiration

c) Maximum air that can be expirated after maximum inspiration

d) Maximum air in lung after end of maximal inspiration

Correct Answer - C

Ans. C. Maximum air that can be expirated after maximum inspiration

Vital capacity (VC):

- 4700 ml.
- Amount of air that can be exhaled with maximum effort after maximum inspiration (ERV+TV+IRV).
- Used to assess strength of thoracic muscles as well as pulmonary function.

260. Which of the following acts as "Gatekeeper" in the GIT?

a) Na^+-amino acid cotransporter

b) Na^+ K^+ ATPass

c) Calcium channel

d) Ne-glucose cotransporter

Correct Answer - C

Ans. C. Calcium channel

[Ref www.ncbi.nlm.nih.gov]

- Epithelial calcium channels (E CaCs) act as 'gatekeeper' for transepithelial Ca" transport.
- Prime target for hormonal control of active Ca(2+) flux from the urine space or intestinal lumen to the blood compartment.
- This review covers the distinctive properties of these highly Ca(2+)-selective channels and highlights the implications for our understanding of the process of transepithelial Ca(2+) transport.

261. Functional residual capacity in normal adult is?

a) 500 ml

b) 1200 ml

c) 2400 ml

d) 3200 ml

Correct Answer - C
Ans. C. 2400 ml
[Ref: Ganong 24th/e p.629-631]

- Volume of air in the lungs at the end of a normal expiration.
- In other words, FRC = ERV + RV.
- About 2400 ml.

262. What is maximum voluntary ventilation?

a) Amount of air expired in one munute at rest

b) Maximum amount of air that can be inspired and expired in one minute

c) Maximum amount of air that can be inspired per breath

d) Maximum amount of air remaining in lung after forced expiration

Correct Answer - B

Ans. B. Maximum amount of air that can be inspired and expired in one minute

[Ref Guyton 12th/e p. 472, 473; Ganong 24th/e p. 633]

Maximum voluntary ventilation (MVV):

- It is the maximum amount of air that can be moved into and out of the lungs in 1 minute by voluntary effort.
- About 125-170 L/min.

263. If the ileum is excised, what will increase in stool?

a) Bile salts

b) Bile acids

c) Iron

d) Calcium

Correct Answer - A
Ans. A. Bile salts
Bile (Major constituent bile salts) is absorbed in terminal ileum.
Iron and calcium are absorbed in duodenum.

264. True about Carboxyhemoglobin?

a) Take up 0_2 very quickly

b) Causes histotoxic hypoxia

c) Causes left shift of Hb-0_2 dissociation curve

d) All are true

Correct Answer - C

Ans. C. Causes left shift of Hb-0_2 dissociation curve

[Ref Understanding of medical physiology p.173].

- COHb cannot take up 02; liberates CO very slowly and shifts dissociation curve of remaining HbO, to left, decreasing the amount of 02 released.
- CO poisoning causes anemic hypoxia because the amount of Hb that can carry O2, is reduced but the total Hb amount of blood is unaffected by CO.

265. Maximum fat absorption in GI tract occurs in?

a) Duodenum

b) Jejunum

c) Ileum

d) Calcium

Correct Answer - B
Ans. B. Jejunum
After fat digestion, fatty acids and monoglycerides are absorbed in small intestine especially in the jejunum and some amount also in ileum.
In side the enterocyte, fatty acids and monoglycerides again form triglycerides.
These triglycerides are incorporated into chylomicrons and transported to lymphatics and from there to blood vessels.

266. What is the difference between Hb-0 dissociation curve and Hb-CO curve?

a) CO shifts the curve to left

b) CO has more affinity to Hb

c) Co-Hb curve is similar to 0_2-Hb curve

d) All are true

Correct Answer - D

Ans. D. All are true

[Ref Understandings of medical physiology p. 786]

- COHb cannot take up 02; liberates CO very slowly and shifts dissociation curve of remaining Hb02 to left, decreasing the amount of O2, released.
- The affinity of Hb for CO is 200-250 times its affinity for 02.
- So CO-Hb dissociation curve is almost identical to 02 Hb dissociation curve except that partial pressure are at a level of 1/250.

267. Not true about Bohr effect?

a) Decrease affinity of 0_2 by increase PCO,

b) Left shift of Hb-0_2 dissociation curve

c) It is due to H*

d) All are true

Correct Answer - B

Ans. B. Left shift of Hb-0_2 dissociation curve

[Ref Ganong 24th/e p.644, Understanding of medical physiology p.789]

Bohr effect:

- Increase in PCO2 decreases the 02 affinity to hemoglobin and shifts the oxygen dissociation curve to right; it is called Bohr effect.
- The effect of raised PCO2 is mediated by increase in hydrogen ion concentration.
- Hydrogen ions shift the curve by binding with hemoglobin.
- Deoxygenated hemoglobin (Deoxyhemoglobin) binds II' more actively than does oxygentated hemoglobin (oxyhemoglobin).
- Ions bind to deoxyhemoglobin and reduce the accessibility of oxygen to haem groups.
- That is why in the presence of more hydrogen ions, less oxygen can combines with hemoglobin at a given P02 and the oxygen dissociation curve shifts rightward.

268. True about aquaporins are all except ?

a) Protein

b) Aquaporin-1 in PCT

c) Aquaporin-2 in loop of Henle

d) Aquaporin-2 in CD

Correct Answer - C

Ans. C. Aquaporin-2 in loop of Henle

[Ref Ganong 24thie p.683-690]

- Aquaporins are protein channels which help in rapid diffusion of water
- Proximal tubles and thin descending limb of loop of Henle → aquaporin - 1, which is independent of ADH.
- Late distal tubule and collecting duct → aquaporin - 2, dependent on ADH.

269. Which of the following explains uptake of 0, in fetal circulation ?

a) Bohr's effect

b) Halden's effect

c) Higher affinity of HbF for 0,

d) None of the above

Correct Answer - C
Ans. C. Higher affinity of HbF for 0,
[Ref Smith's anaesthesia 3rdle p. 77]

- Fetal hemoglobin's greater affinity for oxygen improves oxygen uptake at the placenta.
- A greater affinity for oxygen is an advantage for uptake at the placenta.

270. Plasma inulin of a person is 4 mg/ml and urine flow rate is 20 ml/min. What will be GFR if urine inulin is 50 mg/ml?

a) 125 ml/min

b) 250 ml/min

c) 500 ml/min

d) 1000 ml/min

Correct Answer - B
Ans. B. 250 ml/min
[Ref Ganong 23rd le p.678, 679]
GFR – Urine inulin x Urine flow
GFR =– 250 ml/min.

271. Which of the following explains delivery of 0_2 in fetal circulation?

a) Bohr's effect

b) Halden's effect

c) Higher affinity of HbF for 02

d) None of the above

Correct Answer - A
Ans. A. Bohr's effect
Uptake of 0, at placenta → Due to high affinity of HbF for 02
Delivery of 02 at tissue level → Due to Bohr effect.

272. True of 02-Hb dissociation curve?

a) Straight line curve

b) 100% saturated at $P0_2$ of 100 mmHg

c) Cooperative binding

d) Hb molecule can carry 6 molecules of 0,

Correct Answer - C

Ans. C. Cooperative binding

Molecular basis:

- "Due to phenomenon "Cooperative binding of Oxygen to hemoglobin".

Steps involved:

- Hemoglobin, a tetramer
- Four O2 molecules binds 1 Hb molecule.
- 1st O2 molecule bonds with greatest difficulty.
- Increases affinity to next O2 molecule.

273. Which increases affinity of hemoglobin for 0,-

a) Acidosis

b) Hyperthermia

c) High pH

d) High PCO2

Correct Answer - C

Ans. C. High pH

Conditions associated with increased affinity of hemoglobin for oxygen:

- High pH.
- Decreased H+ ion concentration (alkalosis).
- Reduced PCO2
- Reduced body temperature.
- Reduced 2,3-bisphosphoglycerate (2,3 -BPG)/2,3-diphosphoglycerate (DPG)
- Fetal hemoglobin.
- CO poisoning.

274. In comparison to hemoglobin, effect of myoglobin on Bohr effect?

a) Increased

b) Decreased

c) Same

d) No Bohr effect

Correct Answer - D
Ans. D. No Bohr effect
[Ref Principles of medical physiology p. 711]
Myoglobin:

- Single polypeptide chain.
- Human myoglobin contains 152 amino acids with a molecular weight of 17,500.
- Heme is attached to 92"d histidin residue.
- One molecule of myoglobin can combine with one molecule of oxygen.
- Myoglobin has higher affinity to oxygen than that of Hb.
- Myoglobin has high oxygen affinity while Bohr effect, cooperative effect and 2, 3-diphosphoglycerate effect can absent.

275. Function of chloride shift in RBCs?

a) Right shift of Hb-O, curve

b) Left shift of Hb-0_2 curve

c) Transport of CO2

d) Diffusion of 0_2 in alveoli

Correct Answer - C

Ans. C. Transport of CO2

[Ref Ganong 24th/e p.644; Principles of medical physiology p. 819]

Transport of CO2:

* Carbon dioxide is transported in blood as plasma bicarbonate.
* Red blood cells (RBCs) play a major role in the mechanism because RBCs contain the enzyme carbonic anhydrase that catalyzes the reaction CO2 + H20 = HCO3 + H.
* Hence when CO2 diffuses into the RBC, it reacts chemically with water to generate HCO3.
* The H+ ions are mopped up by hemoglobin, which is an excellent buffer.
* This enables the reaction to proceed in the forward direction.
* The HCO3- ions generated diffuse out into the plasma in exchange for Cl ions that diffuse into RBCs simultaneously.
* The movement of chloride ions into RBC is called Chloride shift.
  - The above events results in an increase in total number ions inside the RBC, which increases its osmolarity.
  - As a result, water enters the RBC through osmosis.

276. Function of Lacis cells in nephron?

a) H^+secretion

b) Na^+reabsorption

c) Renin secretion

d) Regulation of vasoconstriction / vasodilatation of arterioles

Correct Answer - D

Ans. D. Regulation of vasoconstriction / vasodilatation of arterioles

[Ref Principles of medical physiology p.412]

- Juxtaglomerular/Extraglomerular mesangial cells (Lacis cells) forming connection via actin and microtubules which allow for selective vasoconstriction/vasodilation of the renal afferent and efferent arterioles with mesangial cell contraction.
- Note: Lacis cells also contain some renin.
- But Renin is mainly secreted by juxtaglomerular cells.

277. Closing volume is related to which of the following?

a) Tidal volume

b) Residual volume

c) Vital capacity

d) None

Correct Answer - B

Ans. B. Residual volume

[Ref Principles of medical physiology p. 240, 241]

- The closing volume is the point at which dynamic compression of the airways begins, especially during forced expiration.
- Lower (dependent) parts of the lungs has lesser transmural pressure, therefore they begin to close early.
- Therefore, closing volume is the lung volume above residual volume at which airway in the lower, dependent parts of the lungs begin to close off.
- Closing capacity is the lung volume (including residual volume) at which airways in the lower, dependent parts of the lungs begin to close off, i.e., Closing capacity = closing volume + residual volume.
- Closing capacity and volume are tested for small airway function.
- Critical closing volume is the minimum volume and pressure of gas necessary to prevent small airway collapse. It is somewhat near residual volume.

278. True about function of distal convoluted tubule?

a) Reabsorbe Na* by Nal(+2c1- channel

b) Reabsorbe IC' by Nei(' channel

c) Water reabsorption by ADH

d) All are correct

Correct Answer - C

Ans. C. Water reabsorption by ADH

Over-all impact of reabsorption in early distal tubule is to dilute urine by removing solutes.

Late segment of distal tubule is functionally similar to cortical collecting duct.

Principal (P) cells reabsorb sodium & water from lumen (By ADH & secrete potassium into lumen.

Intercalated (I) cells reabsorb potassium & secrete hydrogen into lumen.

Cl- is reabsorbed into late distal tubule.

279. Renin secretion is decreased by?

a) Sympathetic stimulation

b) Prostacycline [PGI2]

c) Nacl in distal tubules

d) Hypotension

Correct Answer - C

Ans. C. Nacl in distal tubules

[Ref Ganong 241th le p.674, 670]

Principal regulators of renin secretion:

- The juxtaglomerular cells themselves are the sensors of the afferent arteriolar pressure. Lowered pressure stimulate renin release
- Increased NaC1 in distal tubules is sensed by macula densa and the signal is transmitted to JG cells.
- This results in decreased Renin release.
- Opposite occurs when decreased NaC1 is delivered in distal tubule, i.e., increased renin release.
- Adenosine is probably the mediator of signal.
- The JG cells are innervated by sympathetic fibers. They release renin in response to sympathetic discharge, and by circulating catecholamines.
- Prostacycline (PGI2) stimulates renin secretion through a direct action.

280. Most important cerebral vasodilator?

a) H^+

b) Na^+

c) Cal^+

d) None

Correct Answer - A

Ans. A. H^+

[Ref R.K. Marya 3rdie p. 156]

The main metabolic factor responsible for the vasodilatation associated with cerebral activity is the CO2 produced by the activated neurons.

Increase in blood PCO2 also produces cerebral vasodilatation.

The vasodilatory effect of CO2 is indirect and is mediated by formation of local H^+ which has a direct vasodilatory effect on cerebral blood vessels.

A fall in blood PO ,produces cerebral vasodilatation and an increase in blood PO ,produces cerebral vasoconstriction.

281. Action potential in cardiac muscles is due to which ions?

a) K*

b) Na*

c) Ca'

d) CI?

Correct Answer - A:B:C

Ans. b > a & c

- Na+, K+ and Ca+, all are involved in full cycle of action potential in cardiac muscle.
- But, the main phase (phase 0 or depolarization) is due to Na+ ions.
- Phase 0 (phase of rapid depolarization) → opening of fast sodium channels with Na* influx.
- Phase 1 (initial phase of rapid repolarization) -4 closure of fast sodium channels.
- Phase 2 (plateu phase) → opening of voltage gated slow Ca** channels with calcium influx.
- Phase 3 (final repolarization) → opening of K* channels with efflux.
- Phase 4 -4 Resting membrane potential.

282. Which of the following cause increase in pulmonary arterial pressure?

a) Histamine

b) Hypoxia

c) ANP

d) PGI2

Correct Answer - B

Ans. B. Hypoxia

[Ref Ganong 24th/e p.637]

- Hypoxia causes vasoconstriction in pulmonary blood vessels causing increase in pulmonary arterial pressure.

Effect of various stimulations on pulmonary vessels:

Vasoconstriction:

- alpha-adrenergic
- Thromboxane-A2
- Angiotensin II
- LTC4, LTD4
- Endothelins
- Hypoxia
- Hypercapnia

283. Heart sound occuring just before closure of AV?

a) S1

b) S2

c) S3

d) S4

Correct Answer - D
Ans. D. S4
[Ref CECIL p.212]

- S4 occurs just before 1st heart sound (1st heart sound is due to closure of AV valve, i.e. mitral & tricuspid valve).

284. Effect of positive G?

a) Increased cerebral arterial pressure

b) Increased venous return

c) Decreased cardiac output

d) Increased pressure in lower limb

Correct Answer - C
Ans. C. Decreased cardiac output
[Ref Ganong 25thie p.576, 24th le p.607-608, Principles of medical physiology p.632]
Effects of positive G:

- Throwing of blood in the lower part
- Increased lower limb venous pressure
- Decreased cerebral arterial pressure
- Decreased, venous return
- Decreased, cardiac output
- Gray-out and Black-out.

285. Central chemoreceptors are not stimulated by?

a) T PCO_2

b) T El' in CSF

c) Hypoxia

d) All stimulate

Correct Answer - C
Ans. C. Hypoxia
[Ref Ganong 25th/e p. 658]
Central chemoreceptors:

- Located in a chemosensitive area on the ventral surface of the medulla near the exit of the ninth and tenth cranial nerves.
- The primary stimulus for the central chemoreceptors is an increase in the hydrogen ion concentration.
- Stimulation of central chemoreceptors by increased hydrogen ion concentration leads to excitation of the respiratory neurons, thereby producing an increase in the rate and depth of respiration.
- Central chemoreceptors are directly stimulated by an increase in H* concentration in CSF and brain inerstitial tissue, which is brought about by change in arterial PCO2 (PaCO2).
- Not stimulated by hypoxia; rather like any other cells, they are depressed by hypoxia.

286. Chemical regulation of respiration is not affected by?

a) $P0_2$

b) PCO2

c) pH

d) Mean BP

Correct Answer - D
Ans. D. Mean BP
[Ref Principles of medical physiology; Ganong 24th/e p.662-663]
Chemical Regulation
Central chemoreceptors: TFP Concentration in CSF (1, pH of CSF); T PCO, of blood.
Peripheral chemoreceptors: LP02, TPACO2, acidosis (4 pH)

287. True about high altitude acclimatization?

a) Left shift 010_2- Hb curve

b) Decreased RBC count

c) Hypoventilation

d) Increased erythropoietin

Correct Answer - D

Ans. D. Increased erythropoietin

[Ref Ganong 24th/e p. 650, 651 & 23'/e p. 617-619; Guyton 12i p. 529, 530]

Acclimatization:

Imporal compensatory mechanisms at high altitude are :-

- Hyperventilation:- Causes CO2 washout, .1., PCO2 and respiratory alkalosis.
- Increased 2, 3 DPG:- Rightward shift of 02-Hb dissociation curve.
- Polycythemia and increased Hb:- Due to increased erythropoietin release which causes absolute polycythemia with increased red cell mass.
- Others:- Increased renal excretion of alkali (HCO3-), increased tissue vascularity, increased oxidative metabolism, Increased diffusion capacity of lung, increased myoglobin.

288. Respiratory exchange of gases is strated from?

a) Branchi

b) Alveoli

c) Bronchiole

d) Tissue level

Correct Answer - B
Ans. B. Alveoli
[Ref Ganong 25th/e p.639-640]
External respiration:

- It consists of exchange of gases (02 and CO2) in the alveoli.
- There is diffusion of 02 from alveolar air into pulmonary capillary blood and diffusion of CO2 into opposite direction.

289. Distending capacity of lung is maximum at?

a) Apex

b) Base

c) Mid region

d) Posterior lobe

Correct Answer - A
Ans. A. Apex
[Ref Understandings of medical physiology p.791]

- "The air spaces at the apices of the lungs tend to be relatively distended, due to weight of the lungs effectively dragging itself downwards, putting traction on the upper part of the lung and stretching the apical air spaces open."

290. Baroreceptors are related to which vessels?

a) Internal carotid artery

b) External carotid artery

c) Subclavian artery

d) Brachiocephalic trunk

Correct Answer - A
Ans. A. Internal carotid artery
[Ref Ganong 24thle p.590, 591; Principles of medical physiology p.791]

- Baroreceptors are mechanoreceptors that are located in the adventia of carotid artery and aorta, at specialized locations called sinuses.

291. S2 is associated with ?

a) Rapid ventricular filling

b) Atrial contraction

c) Closure of semilunar valves

d) Closure of AV valves

Correct Answer - C
Ans. C. Closure of semilunar valves
S2 is due to closure of semilunar valves (aortic and pulmonary valves).

292. 51 S2 is checked by which reflex ?

a) Knee jerk

b) Patellar reflex

c) Calcaneal reflex

d) None

Correct Answer - C

Ans. C. Calcaneal reflex

- S1 S2 is checked by ankle jerk (also called Calcaneal reflex or achilles reflex).

293. Prostaglandin was discovered from ?

a) Tear

b) Saliva

c) Seminal fluid

d) Blood

Correct Answer - C

Ans. C. Seminal fluid

- The name prostaglandin comes from the prostate gland. When prostaglandin was first isolated from seminal fluid, it was believed to have been added from the prostate."

294. Correct formula is ?

a) GFR = Kf x 10

b) Kf = GFR x10

c) Kf = GFR x 125

d) GFR =Kf x 125

Correct Answer - A

Ans. A. GFR = Kf x 10

- The GFR is determined by (l) the sum of the hydrostatic and colloid osmotic forces across the glomerular membrane, which gives net filtration pressure, and (2) the glomerular capillary filtration coefficient (Kr).
- Mathematically, the GFR equals the product of Kf and the net filtration pressure.

295. Which of the following equation is correct regarding equilibrium potential for diffusion ?

a) EMF = 25 CA/CB

b) EMF = 41 CA/CB

c) EMF = 61 CA/CB

d) EMF = 80 CA/CB

Correct Answer - C

Ans. C. EMF = 61 CA/CB

- When two ionic solution (ions) A and B of different concentration (Ca and Cb) of an ion separated by a permeable membrane, the ions tend to diffuse along their concentration gradient.
- Since ions are charged particles their diffusion can be stopped by an appropriate electrical potential (E) applied across the membrane.
- The magnitude and polarity of the potential (equilibrium potential) that must be applied to side A of the membrane for stopping the diffusion of ions (Ea) is given by nernst equation, i.e., the equilibrium potential for an ion is calculated by Nernst equation.

296. Most important factor in transport across a membrane?

a) Charge of particle

b) Membrane thickness

c) Size of particle

d) Concentration gradient

Correct Answer - D

Ans. D. Concentration gradient

[Ref Guyton 12h/e p. 48-501]

- Transport across a cell membrane is divided into passive or active, based on whether it is along the concentration gradient or against the concentration gradient.

1) Passive transport

- It is in the direction of concentration gradient i.e., “Downhill movement".

2) Active transport

- It is against the direction of concentration gradient, i.e., “Uphill movement”.

297. Tronsport process which is against concentration gradient and carrier mediated is ?

a) Facilitated diffusion

b) Osmosis

c) Active transport

d) Endocytosis

Correct Answer - C
Ans. C. Active transport
Active transport:

- It is against the direction of concentration gradient, i.e., *Uphill 6ovenento.
- Energy (e.g., ATP) is required
- Carrier proteinis required
- Examples are primary active transport and secondary active transport.

298. Similarity between active transport and facilitated diffusion ?

a) Energy requirment

b) Against concentration gradient

c) Carrier protein

d) All of the above

Correct Answer - C

Ans. C. Carrier protein

1) Passive transport

- Direction of concentration gradient i.e.,'Downhill movement"
- Does not require energy expenditure

Example are: -

.. Without carriers: - Simple diffirsion, osmosis

2. Through carrier : - Facilitated diftrsion

2) Active transport

- It is against the direction of concentration gradient, i.e., *Uphill 6ovenento.
- Energy (e.g., ATP) is required
- Carrier protein required
- Examples are primary active transport and secondary active transport.

299. Transport through pores in cell members is ?

a) Active transpert

b) Transcytosis

c) Diffusion

d) Endocytosis

Correct Answer - C

Ans. C. Diffusion

[Ref: Guytonp.49]

- Substances can move by simple diffusion directly along the pores and channels from one side of the membrane to the other.

Thus, simple diffusion can occur by two pathways.

1. Through membrane lipid bilayer → for lipid soluble substances.
2. Through pores (water channel) -+ for ions/electrolytes.

300. Percentage of total body water to body weight at birth?

a) 90%

b) 80%

c) 60%

d) 50%

Correct Answer - B
Ans. B. 80%
[Ref Principles of medical physiology p.712]

- The major component of body mass is water.
- The contribution of water to body weight varies with age.
- Total body water (TBW) as a percentage of body weight declines form as high as 90% in early fetal life to 75-80% at birth.
- Thereafter it delines progressively to 60% by the end of one year. After that it remains constant.

301. Epithelial sodium channels has ?

a) 2a, 213

b) la, i(3

c) 2a, 213, 2y

d) 2a, 113, 2y

Correct Answer - D
Ans. D. 2a, 113, 2y
[Ref: Principles of medical physiology p. 241]
There are two different types of Sodium channels:-
Voltage-gated sodium channels:

- These are present in Excitable cells.
- These exist as heterodimer or heterotrimers of alpha and beta subunits, containing one alpha and one or two beta subunits.

Epithelial-sodium channels:

- These are present in epithelium of absorptive or secretory epithelium, e.g. colon, sweat gland duct, pancreatic duct, respiratory passage, and distal tubule of kidney.
- These exist as heterotetramers of alpha, beta and gamma subunits, containing mostly two alpha, one beta and one gamma subunits.

302. True about ENaC are all except ?

a) Epithelial channel

b) Composed of 2 homolous subunits

c) Present in kidney and GIT

d) Inhibited by amiloride

Correct Answer - B

Ans. B. Composed of 2 homolous subunits

- Epithelial Na+ channels (ENaC) is rate limiting step in Na+ reabsorption across several epithelial linings.
- It is present in kidney (distal part), GIT (colon), salivary & sweat glands, and respiratory tract.
- ENaC is made of three homologous subunits > alpha, beta, and gamma.
- In late distal tubules and collecting ducts, ENaC is inhibited by potassium sparing diuretics like amiloride and triameterene.

303. pH of intracellular fluid is ?

a) Slightly less than ECF

b) Slightly more than ECF

c) Same as ECF

d) Highly alkaline

Correct Answer - A
Ans. A. Slightly less than ECF
[Ref: Principles of medical physiology p.132]

- Extracellular fluid (ECF) has pH 7.4 (range 7 .35 - 7.45) and is slightly alkaline
- Intracellular fluid (ICF) has H* ion concentration slightly higher than ECF. Thus, pH of ICF is slightly low than ECF, but still it is slightly alkaline.

304. Increased in plasma viscosity is maximally caused by which plasma protein?

a) Fibrinogen

b) Albumin

c) Globulin

d) All have equal effect

Correct Answer - C

Ans. C. Globulin

[Ref: Clinical aspects of blood p.80]

- The effect of a protein on plasma viscosity depends on its molecular weight and structure.
- The viscosity is higher if a protein has

1. Less spheroid shape
2. Higher molecular weight
3. Higher aggregation capacity
4. Higher temperature or pH sensitivity

- The globulin causes maximum increase in plasma viscosity followed by fibrinogen (2d after globnlin) and albumin (3rd in number).

305. Oncotic pressure is contributed by?

a) Sodium

b) Chloride

c) Chloride

d) Albumin

Correct Answer - D
Ans. D. Albumin
[Ref: Clinical physiology 3'd/e p.336]

- Oncotic pressure, also called colloid osmotic pressure, is a form of osmotic pressure exerted by proteins in blood plasma that usually tends to pull the water into the circulatory system.
- The major contributing protein for plasma oncotic pressure is albumin.

306. Most recent taste sensation is?

a) Sweet

b) Sour

c) Bitter

d) Umami

Correct Answer - D

Ans. D. Umami

The umami taste is the fifth taste which is unique.

- The proposed mechanism of umami taste is through glutamate taste sensors (glutamate receptors) with release of neuronal glutamic acid.

In nature, there are three umami substances:

- Monosodium glutamate (MSG)
- Disodium 5-guanosine mosphosphate (GMP)
- Disodium 5-ionsine monophosphate (IMP)

307. Motor evoked potential assess ?

a) Peripheral motor pathways

b) Central motor pathways

c) Both of the above

d) Regeneration in muscles

Correct Answer - B

Ans. B. Central motor pathways

- Motor evoked potentials (MEPs) are electrical signals recorded from neural tissue or muscle following activation of central motor pathways.
- It is used for assessment of nervous system, especially during intraoperative neurophysiological monitoring (IONM).
- Most often, this is accomplished by using trans cranial electrical stimulation (TES) of brain and recording of evoked neural or myogenic activity distal (caudal) to area that is at risk during surgery.

308. First to occur after a sharp nerve cut ?

a) Chromatolysis

b) Polymorphic arrangement

c) Increased protein synthesis

d) Macrophage activation

Correct Answer - A

Ans. A. Chromatolysis

- Within 6 hours of injury, the nucleus migrates to the periphery of the cell where Nissl's granules and rough endoplasmic reticulum break up and disperse.
- This phenomenon is called chromatolysis.
- The part of nerve distal to the point injury undergoes 'secondary or Wallerian degeneration', the proximal part undergoes "primary or retrograde" degeneration up to a single node Ranvier.

309. Which of the following is false about peripheral nerve injury?

a) Neuropraxia is irreversible

b) Epineurium is intact in axonotmesis

c) Neurotmesis is the most severe form of injury

d) Wellerian generation starts in axonotmesis

Correct Answer - A

Ans. A. Neuropraxia is irreversible

Neuropraxia (Class I)

- This is the least severe form of nerve injury, with complete recovery. In this case, the axon remains intact, but there is myelin damage causing an interruption in conduction of the impulse down the nerve fiber.
- Most commonly, this involves compression of the nerve or disruption to the blood supply (ischemia).
- No Wallerian degeneration is seen.

310. Blood testis barrier in testis is formed by?

a) Sertoli cells

b) Leydig cells

c) Granulosa cells

d) None

Correct Answer - A
Ans. A. Sertoli cells
[Ref Ganong 23'd/e p. 402]

- Junction between adjacent sertoli cells form blood-testis barrier.

311. In electromyograply [EMG] transient response at the time of insertion of eloctrode indicates ?

a) Spontoneous muscle activity

b) Voluntary muscle activity

c) Induced muscle activity

d) Cell membrane damage

Correct Answer - D

Ans. D. Cell membrane damage

[Ref: Clinical physiology 24th/e p.222]

- Electromyography is a process of recording electrical activity of muscles.

It can be done by either of the two methods:

1. By putting a surface electrode and recording activity of underlying muscle.
2. By inserting a needle electrode into the muscle.

There are there types of signals (by needle electrode) : -

i) Insertional activity:

- It is the electrical activity at the time of insertion of electrode due to disruption of cell membrane.
- This should be ignored.

ii) Resting activity (spontaneous activity).

iii) Voluntary muscle recruitment.

312. Caisson's disease is associated with?

a) Rapid descend in aircraft

b) Rapid descend of deep sea divers

c) Underwater construction workers

d) All of the above

Correct Answer - C
Ans. C. Underwater construction workers
Caisson's disease, (also called decompression sickness, Bends, Diver's Paralysis, Dysbarism) is a particular form of gas embolism, which occurs when individuals are exposed to sudden lowering of atmospheric pressure like- rapid ascend of scuba and deep sea divers , individual in unpressurized aircraft in rapid ascent (e.g., in pilots), underwater construction workers and extra-vehicular activity from spacecraft.

313. True about visual cycle cascade ?

a) Associated with conformational change in opsin

b) Light causes isomerization of all-trans-retinol to 11 Cis-retinol

c) Retinol [alcohol] is involved

d) All are true

Correct Answer - A

Ans. A. Associated with conformational change in opsin

- There is conformational change in opsin.
- Light causes conversion of 11 cis-retinal to all trans retinal.
- Retinal (aldehyde) is involved (not retinal).
- When light fans on photoreceptors, 11- Cis retinal of rhodopsin is isomerized to all-trans retinal (Photo isomerization).
- The change in physical configuration is such that it cannot hold protein opsin and therefore two are separated, i.e. rhodopsin is hydrolyzed.

314. True about smooth muscle contraction ?

a) Troponin plays an important role

b) Calmodulin has no role

c) Phosphorylation of myosin

d) All of the above

Correct Answer - C

Ans. C. Phosphorylation of myosin

[Ref Guyton 12'h/e p.64-66]

- In smooth muscle there is no troponin.
- Therefore calcium initiates contraction through a mechanism different from that employed by skeletal muscle.
- Smooth muscle contains a calcium binding protein called calmodulin.
- Increase in cytoplasmic (sarcoplasmic) calcium leads to its binding to calmodulin.
- The calcium-calmodulin complex activates myosin kinase, also called myosin light chain kinase (MLCK).
- MLCK is a phosphorylase which phosphorylates a light chain belonging to myosin chain, often called cross-bridge phosphorylation.
- The phosphorylated myosin head interact with actin, i.e., cross-bridging of myosin with actin.
- The cross-bridging leads to contraction.

315. Increase in Duration of expiration is due to?

a) J-reflex

b) Head's paradoxical reflex

c) Hering-Breure reflex

d) Proprioceptors

Correct Answer - C
Ans. C. Hering-Breure reflex
[Ref Ganong 24h/e p. 664 6 23d/e p. 632]

- The Herring-Breuer inflation reflex is an increase in the duration of expiration produced by steady lung inflation, and the
- Herring-Breuer deflation reflex is a decrease in the duration of expiration produced by marked deflation of the lung.

316. If HbAl C is 8%, What will be the value of blood glucose [mg/d1] ?

a) 100

b) 150

c) 200

d) 300

Correct Answer - C
Ans. C. 200
Mean blood glucose (mg /dl) = (35.6 x HbA1C) - 77.3 = (35.6 x 8) - 77.3 = 207.5
Mean blood glucose (m moUL) = (1.98 x HbA1C) - 4.29

317. Respiratery quotient is the Ratio of -

a) CO_2 consumed to 0_2 released

b) 0_2 released to CO_2 consumed

c) Co, released to 0_2 consumed

d) 0_2 consumed to Co, released

Correct Answer - C

Ans. C. Co, released to 0_2 consumed

RQ is the ratio of the amount of CO2 released to the amount of O2 consumed.

RQ of Carbohydrate is 1.00, for fat is 0.70 and for proteins it is about 0.82.

318. Wallerian degeneration is for ?

a) Nerve degeneration

b) Muscle degeneration

c) Nerve regeneration

d) Muscle regeneration

Correct Answer - A
Ans. A. Nerve degeneration
[Ref: Samson Wright 13h/e p. 288]

- The part of nerve distal to the point injury undergoes 'secondary or Wallerian degeneration', the proximal part undergoes "primary or retrograde" degeneration up to a single node Ranvier.

319. Size of platelets is ?

a) 1 A°

b) 2 A°

c) 1µm

d) 2µm

Correct Answer - D
Ans. D. 2µm
Platelet = 2-3 micrometer.

320. Glucagon activates which enzyme ?

a) Pepsinogen

b) Trypsinogen

c) Adenylyl cyclase

d) None

Correct Answer - C
Ans. C. Adenylyl cyclase
Glucagon acts through cAMP by activating adenylyl cyclase.

321. Inhibition of heart by vagus by M_2 receptors is medicated by which mechanism?

a) cAMP

b) Cat'

c) DAG

d) None

Correct Answer - A
Ans. A. cAMP
Muscarinic receptors (cholinergic receptors) in heart are M2 type.
These are responsible for vagus mediated bradycardia.
M2 mediated actions are through cAMP

322. Inhibition of heart by vagus is mediated by which receptors -

a) M_1

b) M_2

c) N_N

d) NM_2

Correct Answer - B
Ans. B. M_2
Effect of parasympathetic system on heart are through M2 receptors.

323. Penile erection is mediated by?

a) Parasympathetic system via muscarinic receptors

b) Parasympathetic system via nicotinic receptors

c) Sympathetic system via a-receptors

d) Sympathetic system via (3-receptors

Correct Answer - A
Ans. A.Parasympathetic system via muscarinic receptors
[Ref Ganong 24'h/e p.339-342, Ganong 23d/e p.341]
Erection of penis → Muscarinic effect of parasympathetic system.
Ejaculation - alpha-receptor ofsympathetic system

324. Withdrawal reflex is also known as ?

a) Extension reflex

b) Stretch reflex

c) Golgitendon reflex

d) Flexor reflex

Correct Answer - D
Ans. D. Flexor reflex
[Ref Understanding of medical physiology p. 680]

- Withdrawal reflex is a typical protective reflex.
- A painful stimulus applied to the hand or foot results in withdrawal of the limb.
- Withdrawal involves flexion of the limb therefore it is also called as flexion reflex.
- Flexion results from contraction of flexor muscles and relaxation of extensor muscles.
- Simultaneous contraction of flexors and relaxation of extensors is brought about by reciprocal innervation.

325. Tetany in muscle occurs inspite of normal serum Ca" level. Which ion is responsible ?

a) Mg^{2+}

b) Ca^{2+}

c) K^{+}

d) Na^{+}

Correct Answer - B

Ans. B. Ca^{2+}

[Ref: Principles of medialphysiology p. 105, 1061]

- During a single twitch, the amount of Ca+2 released into sarcoplasm is not enough to produce tetanic tension.
- When the muscle is stimulated in rapid succession, Ca+2 comes out into the sarcoplasm with each stimulus and there is a progressive accumulation of Ca2+ in the sarcoplasm.
- Tetanic tension is reached when sarcoplasmic Ca2+ levels reach their maximum.

326. Unspecified pain pathway is for?

a) Neuropathic pain

b) Trauma

c) Visceral pain

d) Psychogenic pain

Correct Answer - D
Ans. D. Psychogenic pain
Textbook of psychotherapy p.6

- Idiopathic or unspecified pain: It is purely psychological in nature and is therefore called psychogenic pain.

327. Pain is carried by which nerve fibers?

a) Act, A13

b) Act, Ay

c) AS, C

d) Ay, C

Correct Answer - A:C
Ans. A. Act, A13 & C. AS, C
[Rd Ganong 24n/e p. 92 & 23'd/e p. 89; Principles of physiology p. 5121]

- Fast fibers carrying pain -+ Ad (fast pain)
- Slow fibers carrying pain -) C (slow pain)

328. Action potential generates at fastest rate in?

a) SA node

b) AV node

c) Bondle of His

d) Purkinje fibers

Correct Answer - A
Ans. A. SA node
[Ref: Essentials of medicalphysiolog p. 856]

- SA node discharges impulses at fastest rate, hence the rate at which SA node fires determines the heart rate, therefore,
- SA node is normal pacemaker of the heart, i.e., it determines the pace of the heart.

329. Vibration sense is detected by which type of receptor?

a) Merkel's disc

b) Ruffini's end organ

c) Paccinian corpuscle

d) Meissner's corpuscle

Correct Answer - C
Ans. C. Paccinian corpuscle
[Ref Principles of medical physiology p. 647]

- Tactile (touch) receptors
  - For touch (superficial touch):- Meissner's corpuscle (detect texture of surface, i.e. rough or smooth), Merkel's disc (detect two point discrimination).
  - For pressure (deep touch):- Rufini's end organ (slowly adapting).
  - Vibrations: Detected by Pacinian corpuscle (rapidly adapting).

330. Vibration sense is detected by ?

a) Nociceptors

b) Deep receptors

c) Superficial receptors

d) None of the above

Correct Answer - D
Ans. D. None of the above
[Ref principles of medical physiology p. 647]

- Vibrations are detected by Pacinian corpuscles which are deep tactile receptors.
- Tactile (touch) receptors
  - Superficial (in epidermis and papillary layer of dermis) > Merkel's disc, meissner's corpuscle.
  - Deep (in dermis and subcutaneous tissue) -+ Ruffini's end organ, Pacinian corpuscle.

331. Vibrations are detected by which types of receptors?

a) Slowly adapting

b) Rapidly adapting

c) Non-adapting

d) None of the above

Correct Answer - B

Ans. B. Rapidly adapting

- Rapidly adapting touch receptors - Pacinian corpwcle, Meissner's corpuscle.
- Slowly adapting touch receptors - Merkel's disc, Ruffini's end organ.
- No adaptation - Nociceptors (Pain receptors), vestibular receptors, muscle spindle.

332. Which of the following receptor is stimulated by sustained pressure?

a) Ruffini's end organ

b) Merkel's disc

c) Hair cells

d) Meissner Corpuscles

Correct Answer - A
Ans. A. Ruffini's end organ
[Ref; Ganong23r/e p. I50]

- Pressure (sustained pressure) stimulates Ruffini's end organ,

333. Most important intracellular buffer ?

a) Bicarbonate

b) Albumin

c) Phosphate

d) Ammonia

Correct Answer - C
Ans. C. Phosphate
Blood buffers: Hemoglobin, Plasma proteins, Bicarbonate.
Intracellular buffers: Phosphates (H2PO4), intracellular proteins.
Urinary buffers - Bicarbonate, Phosphate, ammonia.

334. Iron is conserved by?

a) Hemopexin

b) Hepicidin

c) Hemomedins

d) None

Correct Answer - A

Ans. A. Hemopexin

[Ref: Vasudevan 3n/e p. 196]

- Human body has mechanisms to conserve iron and prevent its loss from body-

i) When RBC is lysed, hemoglobin enters into circulation.

- Being small molecular weight substance hemoglobin will be lost through urine.
- To prevent this loss, Hb is immediately taken up by haptoglobin.

ii) When the globin part is removed from Hb, the heme is produced, and is released ito circulation.

- In order to prevent its excretion through urine, heme is bound with hemopexin.

335. Acrosome reaction is seen in?

a) Spermatogenesis

b) Oogenesis

c) Fertilization

d) Mensturation

Correct Answer - C

Ans. C. Fertilization

To fertilize the ovum the sperms undergo-

1. Capacitation
2. Acrosome reaction

Acrosome reaction:

- It follows the capacitation of the sperm.
- It occurs in ampulla.
- Sperm binds to zonapellucidaàZona protein -3 (ZP-3) of zonapellucida helps in attachment as well as in inducing acrosomal reaction.
- Acrosome releases lysomal enzymes, especially proacrosin which has high affinity for zonapellucida.
- Proacrosin has hydrolytic action that degrades zonapellucida in the very local region where the sperm cell is attached.
- This allows spermatozoa to swim their way to the vitelline membrane of the ovum.
- After this fertilization takes place.

336. Not a content of sperm ?

a) Golgi apparatus

b) Mitochondria

c) Lysosome

d) Endoplasmic reticulum

Correct Answer - D
Ans. D.Endoplasmic reticulum
Spermatozoan (sperm) has following parts :
1. Head
2. Middle piece
3. Principal piece
4. End piece (tail)

337. Broadman's area for motor speech?

a) Area 1,2,3

b) Area 4,6

c) Area 28,29

d) Area 44

Correct Answer - D
Ans. D. Area 44
[Ref Fuller's 4 le p. 10; Ganong 24n le p. 293]

- Motor speech is formed in Broca's area (area44).
- Striate area of cortex is primary visual area (Brodmann's area 17 or VI) and is located on the sides of calcarine fissure.

338. Insulin mediated transport of glucose is ?

a) Seen in adipose tissue

b) Via GLUT-2

c) Main Mechanism in RBCs

d) All are true

Correct Answer - A
Ans. A. Seen in adipose tissue
Insulin stimulates the uptake of glucose by myocytes (skeletal muscle, cardiac muscles), adipocytes (adipose tissue) and hepatocytes .
Tissues that do not depend on insulin for glucose uptake include brain, erythrocytes (RBC), the epithelial cells of kidney & intestine, Liver, and Cornea & lens of eye.
The mechanism through which insulin increases glucose uptake is different in different tissues. In the muscle and adipose tissues, insulin increase facilitated diffusion by increasing glucose transporter (GLUT-4) on the cell membrane.

339. Relationship between insulin and glucose concentration?

a) Linear

b) Hyperbola

c) Sigmoidal

d) Bell Shaped

Correct Answer - C
Ans. C. Sigmoidal
'The Relationship between glucose concentration and insulin secretion is sigmoidal.
The glucose-insulin response curve come from the discovery that insulin secretion did not respond as a linear function of glucose concentration.

340. Maximum density of muscle spindle is found in ?

a) Calf muscle

b) Lumbricals

c) Quadrieps muscle

d) Triceps

Correct Answer - B
Ans. B. Lumbricals
[Ref - Essentials of medical physiology p.786]

- The more refined the function, the greater the concentration of muscle spindles.
- The greatest concentration of spindles is found in the lumbrical muscles of the hand and then in the sub occipital muscles and in the extra ocular muscles.

341. 3 - subumit of insulin receptor binds to ?

a) Guanylyl cyclase

b) Adenylyl cyclase

c) IP3-DAG

d) Tyrosine kinase

Correct Answer - D
Ans. D. Tyrosine kinase
Insulin receptors
The insulin receptor is a combination of 4 subunits held together by disulfide linkages - Two Alpha subunits and two Beta subunits,
Alpha subunits lie entirely outside the cell membrane and function as insulin binding site.
Beta subunits Penetrate through cell membrane and protrude into the cytoplasm which has attached local tyrosine kinase.
Thus insulin receptor is an example of an enzyme - linked receptor (insulin k a group IID hormone).

342. Function of epinephirine and norepinephine in Fightor-Flight response is ?

a) Increased blood flow to skin

b) Increased blood flow to muscles

c) Bronchoconstriction

d) Bradycardia

Correct Answer - B

Ans. B. Increased blood flow to muscles

[Ref, Understanding medical physiology p.470, 471]

- Both epinephrine and norepinephrine, along with cortisol, are responsible for coordinating the "Fight - or - flight" response in situations of perceived danger or stress.

343. Ionotropic effect of thyroid hormone is by ?

a) Membrane receptors

b) cAMP

c) Potentiation of Catecholamines

d) cGMP

Correct Answer - C
Ans. C. Potentiation of Catecholamines
[RelGanong 24th/e p.j49l
The thyroid hormones increase the heart rate, cardiac contractility, stroke volume and cardiac output, and consequently also the systolic BP.
But the diastolic BP may fall due to vasodilatation in several vascular beds with decrease in peripheral vascular resistance.
The cardiovascular effects of thyroid hormones are partly mediated by potentiation of effects of catecholamines.

344. Hormone responsible for galactopoiesis ?

a) Growth hormone

b) Insulin

c) Oxytocin

d) Prolactin

Correct Answer - D
Ans. D.Prolactin
Galactokinesis

- Also called milk ejection or milk letdovn.
- It is brought about by oxytocin which stimulates contraction of the myoepithelial cells in the mammary alveoli and ducts ie.contraction of lactiferous ducts and sinuses.
- Oxytocin s released when the nipple is stimulated during suckling.

345. All are about adiponectin except ?

a) Secreted by adipose tissue

b) Lowers glucose

c) Increases FFA oxidation

d) Positive Correlation with BMI

Correct Answer - D
Ans. D. Positive Correlation with BMI
Adiponection is a hormone secreted by adipose tissue.
It lowers glucose and FFA levels.
Adiponectin has negative correlation with BMI, and more negatively with visceral fat than subcutaneous fat.
Adiponectin has inszlir sensitizing action and its levels correlate with insulin sensitivity. By insulin sensitizing action, adiponectin reduces tissue TG content, increase FFA oxidation, and increase glucose uptake by tissue.
Adiponectin also inhibits adhesion molecules (E-selectin, VEAM) and macrophages (decrease uptake of oxidized LDL).
Adiponectin receptors are found in liver and skeletal muscles.
Recently, receptors are also found in pancreas p -cells.
Adiponectin secretion is hormone regulated. Decreased levels with insulin and glucorticoids are seen.
Adiponection levels are low in obesity, type 2DM, ischemic heart disease (IHD) anit metabolic syndrome.
Adiponectin gene is located on chromosome 3.

346. Somatomedin - C deficiency causes?

a) Achondroplasia

b) Cretinism

c) Growth retardation

d) Juvenile DM

Correct Answer - C
An.s. C. Growth retardation
Effects of growth hormone on skeletal growth is mediated by somatomedins.
Deficiency of somatomedins causes growth retardation and dwarfism.

347. How is folic acid absorbed in proximal jejunum?

a) Facilitated diffusion

b) Active transport

c) Passive transport

d) Both active & passive transport

Correct Answer - D
Ans D. Both active & passive transport
Folates are Present in natural foods and tissues as polyglutamates because these forms serve to keep the folates within cell.
In plasma and urine, they are found as monoglutamates because this is the only form that can be transported across membranes.
Enzymes in the lumen of the small intestine convert the polyglutamate form to the monoglutamate form of the folate, which is absorbed in the proximal jejunum via both active and passive transport.

348. EPSP is due to ?

a) K' influx

b) Na* efflux

c) Na* influx

d) Ca** influx

Correct Answer - C

Ans. C. Na* influx

- EPSP - Opening of ligand gated Na+ channel resulting in Na+ influx.
- IPSP -
  - Opening of ligand gated Cl- channel resulting in Cl- influx.
- Opening of ligand gated K+ channel resulting in K+ influx

349. Vitamin D absorption is decreased by ?

a) Proteins

b) Acid

c) Lactose

d) Fat malabsorption

Correct Answer - D
Ans. D. Fat malabsorption
Absorption of all fat soluble vitamins is decreased in fat malabsorption.
These fat soluble vitamins are A,D,E and K.

350. Calcium absorption is hampered by

a) Protein

b) Lactose

c) Acid

d) Phytates

Correct Answer - D
Ans. D. Phytates
Calcium absorption is increased by i) Lactose, ii) Proteins, and iii) Acidic environment
Calcium absorption is decreased by i) Phytates, ii) Phosphates, iii) Oxalates; iv) Tetracycline; v) alkaline environment

351. Absorption of calcium ion is affected mostly by ?

a) Calcitriol

b) Parathormone

c) Glucocorticoids

d) ACTH

Correct Answer - A
Ans. A. Calcitriol
With an average intake of 1000 mg of calcium its net intestinal absorption is only 150-250 mg/day. Calcium is absorbed mainly in the duodenum and jejunum (proximal intestine) by an active transport mechanism regulated by calcitriol.
Parathormone indirectly promotes absorption of calcium by increasing the renal synthesis ofcalcitriol.

352. Secretion of bile out of hepactocytes occurs via?

a) Passive diffusion

b) Facilitated diffusion

c) Osmosis

d) Active transport

Correct Answer - D
Ans. D. Active transport
Bile contains substances that are actively secreted into it cross the canalicularmembrane, such as bile acids' phosphatidylcholine, conjugated bilirubin, cholesterol, and xenobiotics.
Each of these enters the bile by means ofa specific canaliculartransPorter.
It is the active secretion of bile acids, however, that is believed to be the primary driving force for the initial formation of canalicular bile.

353. Suppressor Strip on anterior edge of pre-central gyrus has following function ?

a) Increase extensor tone

b) Pain perception

c) Inhibition of stretch reflex

d) Voluntary movement

Correct Answer - C
Ans. C. Inhibition of stretch reflex
[Ref Ganong 25th/e p.242]

- "Stimulation of the anterior edge of precentral gyrus causes inhibition of stretch reflex.

354. Example of exopeptidase is ?

a) Trypsin

b) Chymotrypsin

c) Elastase

d) Carboxy peptidases

Correct Answer - D
Ans. D. Carboxy peptidases

355. Doll's eye reflex is used in?

a) Hemiplegic

b) Paraplegic

c) Unconscious patient

d) Cerebral palsy

Correct Answer - C

Ans. C. Unconscious patient

- Doll's eye reflex, also called Oculocephalic reflex, is used to assess brain function in unconscious/Comatose patients.
- It checks the vestibule-ocular reflex in unconscious patients.
- Head is rotated from side to side with eyes kept open.

i) Positive (normal) -

- Eyes move in the direction opposite to that of the head movement.
- It signifies intact brainstem.

ii) Negative (abnormal) -

- Eyes move in the direction of head movement.
- It signifies brainstem damage.

356. Function of myenteric plexus is to regulate ?

a) GI secretion

b) Local blood flow

c) Motility

d) All of the above

Correct Answer - C
Ans. C. Motility
Myenteric plexus (Aurbach's plexus) controls GI motility.
Meissner's (submucosal) plexus controls GI secretions and local blood flow.

357. Inner plexus in GIT is ?

a) Mucosal plexus

b) Submucosal plexus

c) Auerbach's plexus

d) Myenteric plexus

Correct Answer - B
Ans. B. Submucosal plexus
Myenteric plexus (Auerbach's plexus) - External plexus.
Meissner's plexus (submucosal plexus) - Inner plexus.

358. Receptive area of stomach?

a) Antrum

b) Pylorus

c) Body

d) Fundus

Correct Answer - D
Ans. D. Fundus
Anatomically the stomach is divided into fundus, body (corpus), antrum and pylorus.
However, functionally, the stomach is divided into a proximal and distal end.
'Proximal stomach' includes fundus and proximal l/3d of the body and 'distal stomach" includes distal 2/3d of the body and the antrum.
A vasovagal reflex triggered by swallowing a bolus of food causes the lower esophageal sphincter to open and the proximal stomach to dilate (receptive relaxation) to accommodate the swallowed food.
As a result, the internal pressure hardly rises in spite of the increased filling.
Thus, the proximal stomach serves primarily the function of storage.

359.

Part of sympathetic system which secrete chemical transmitter?

a) Cardiac ganglion

b) Cervical sympathetic chain

c) Adrenal medulla

d) Thoracic sympathetic chain

Correct Answer - C

Ans. C. Adrenal medulla

[Ref: Textbook of Human physiology by sherwood p.681.]

- The Adrenal medulla is actually a modified part of the sympathetic nervous system.
- The adrenal medulla consists of modified postganglionic sympathetic neurons called chromaffin cells.
- Unlike ordinary postganglionic sympathetic neurons, chromaffine cells, do not have axonal fibers that terminate on effector organs.
- Instead, on stimulation by preganglionic fibers, the chromaffine in cells release their chemical transmitter directly into the blood.

360. Increased aldosterone and ADH secretiom following major trauma results in all the following except ?

a) Decreased Na^+ excretion is urine

b) Increased K' excretion in urine

c) Increased osmolarity of urine

d) Increased water excretion

Correct Answer - D
Ans. D. Increased water excretion
After major trauma, secretion of ADH and aldosterone increases.
ADH - Causes increased water reabsorption from collecting duct.
Aldosterone - Causes increase Na+&Cl- reabsorption and increase K+ secretion/excretion.

361. Normal Uninary pH is ?

a) 5.0 - 6.0

b) 6.5 - 7.0

c) 8.5 - 9.0

d) None

Correct Answer - B
Ans. B. 6.5 - 7.0
Blood pH – 7.4
Interstitial fluid pH – 7.34
Urine pH – 6.5 – 7.0 (4.5 to 8.0)

362. Which of the following has direct innervation from sympathetic system but no parasymputhetic supply?

a) Heart

b) Intestine

c) Skin

d) None

Correct Answer - C

Ans. C. Skin

Skin has no parasympathetic supply but has : -

- Sympathetic cholinergic supply - sweat gland
- Sympathetic adrenergic supply - cutaneous blood vessels.

363. A Substance has clearance same as inulin clearance, the Substarce is mainly excreted in urine by ?

a) Tubular Secretion

b) Glomerular filtration

c) Both a & b

d) Vascular leakage

Correct Answer - B

Ans. B. Glomerular filtration

If there be a substance that passes freely across the glomerular membrane but is neither reabsorbed nor secreted by tubular activity, urinary excretion would represent the amount filtered and nothing but the amount filtered.

Hence, its clearance would indicate how much plasma gets filtered every minute.

All these features make it a very suitable substance for estimation of glomerular filtration rate.

Inulin clearance is equal to the GFR, i.e., 126 ml/min.

364. Neuropraxia is ?

a) Damage to axon

b) Damage to endoneurium

c) Damage to epineurium

d) No Structural damage

Correct Answer - D
Ans. D. No Structural damage
[Ref: Apley's 8'h/e p' 231.]

- Neuropraxia – No anatomical disruption; axon & myelin sheath remain intact.
- Axontemesis - Disruption of axon with myelin sheath; Endoneurium is intact.
- Nuerotoemesis - Complete section of nerve; Axon, myelin sheath, endometrium, perimeurium, epineurium all are disrupted.

365. Mechamism of secretion of ammonia in distal tubule is?

a) Primary active transport

b) Symport

c) Antiport

d) Passive diffusion

Correct Answer - D
Ans. D. Passive diffusion
Ammonia (NH3) transport involves passive diffusion from tubular cells into the tubular lumen.

366. RMP in smooth muscles?

a) -90 mV

b) -70 mV

c) -150 mV

d) - 40 mV

Correct Answer - D
Ans. D. - 40 mV
RMP FOR VARIOUS EXCITABLE TISSUES:

- Neuron: -70 mV
- Skeletal muscle & Ventricle (cardiac muscle): -90 mV
- SA node: -30 to -40mV
- Smooth muscle: -30 to -50 mV
- Inner ear hair cell: -150 mV
- RBC: -10 mV
- Thyroid gland: -50mV
- Hair cells baseline membrane potential: - 60mV

367. Mesangial cell contraction is done by?

a) cAMP

b) Dopamine

c) PAF

d) ANP

Correct Answer - C
Ans. C. PAF
Contraction of mesangial cells is produced by :-Endothelin, angiotensin II, vasopressin, norepinephrine, PAF, PDGF, thromboxane A2, PGF2, Leukotrienes C4 & D4, Histamine.
Relaxation of mesangial cells is produced by ANP, Dopamine, PGE2, cAMP.

368. Glomerulotubular feedback is for regulation of?

a) BP

b) Blood volume

c) Na^+ reabsorption

d) Renal blood flow

Correct Answer - C

Ans. C. Na^+ reabsorption

Tubulo-glomerular feedback - Regulation of GFR in relation to renal blood flow.

Glomerulo-tubular feedback - Regulation of tubular reabsorption (especially Na+2) in relation to GFR.

369. Halden Effect is ?

a) CO_2 delivery by increased 02

b) 0_2 delivery by increased CO2

c) CO_2 delivery by increased CO2

d) 0, delivery by increased CO

Correct Answer - A

Ans. A. CO_2 delivery by increased 02

[Ref: Ganong 24n/e p. 644 & 23'd/e p. 612]

Because deoxyhemoglobin binds more H+ than oxyhemoglobin does and forms carbamino compounds more readily, binding of O2, to hemoglobin reduces its affinity for CO2, (Haldane effect).

370. Tubuloglomerular feedback is for regulation of?

a) BP

b) Blood volume

c) Na^+ reabsorption

d) GFR

Correct Answer - D

Ans. D. GFR

- To perform the function of autoregulation, the kidneys have a feedback mechanism that links changes in sodium chloride concentration at the macula densa with the control of renal arteriolar resistance.
- This feedback helps to ensure relatively constant delivery of sodium chloride to the distal tubule and helps prevent spurious fluctuations in renal excretion that would otherwise occur.
- The tubuloglomerular feedback mechanism has two components that act together to control GFR.

371. GFR measurement help in determining ?

a) Heart rate

b) Recovery from shock

c) Stage of kidney disease

d) Blood volume

Correct Answer - C
Ans. C. Stage of kidney disease
GFR is a measure of proper functioning of kidney.
Its value determines the stage of kidney disease.

372. Glomerular filteration of a substance depends upon?

a) Lipid solubility of substance

b) Binding capacity to albumin

c) Both of the above

d) None of the above

Correct Answer - B
Ans. B. Binding capacity to albumin
Plasma protein binding of a substance decreases is glomerular filtration.
Only unbound substances are filtered.
Glomerular filtration does not depend on lipid solubility as filtration occurs through the pores in glomerular membrane
(Lipid solubility affects the transport of substance across cellular membrane)

373. Total surface area of respiratory membrane ?

a) 25 cm'

b) 50 cm'

c) 25 m^2

d) 100 m2

Correct Answer - D
Ans. D. 100 m2
[Rel Principles of medical physiology p.340]

- Thickness of respiratory membrane is about 0.5 pm and its total surface area in two the lungs equals about 100 m2.

374. True about Coronary circulation ?

a) 250 ml/min

b) Major flow during systole

c) Unifrom flow during full cardiac cycle

d) All of the about

Correct Answer - A
Ans, A. 250 ml/min
The heart receives its blood supply from two coronary arteries right and left which arise from the root of the aorta.
Coronary blood flow, at rest, is about 250 ml per minute (5% of total cardiac output).

375. Damage to pnemotaxic center along with vagus nerve causes which type of respiration?

a) Chyne stoke breathing

b) Deep and slow

c) Shallow and rapid

d) Inspiratory Spasm

Correct Answer - D
Ans. D. Inspiratory Spasm
[Ref Principles of medical physiology p. 981).

- Damage to pneumotaxic center or mid pontine transection (between upper and lower pons) produces -

1. With vagi intact:- Deep and slow breathing
2. With bilateral vagotomy: Apneustic breathing (apneusis), i.e. sustained inspiratory spasm which is interrupted by brief and inefficient expiration.

376. True about Bezold-Jarish reflex?

a) Hypertension

b) Tachycardia

c) Hyperpnea

d) Hypotension

Correct Answer - D
Ans. D. Hypotension
The ventricular baroreceptors are scattered throughout the left ventricle and interventricular septum.
Stimulation of these recePtors by injection of certain drugs (e.g., serotonine, veratibine, or niiotine) into the left coronary artery produces apnea, bradycardia and hypotension.
This is called Bezold-Jarisch reflex or coronary chemo reflex.

377. Normal transpulmonary pressure during quiet breathing?

a) + 8 to +5 cm H_20

b) - 8 to - 5 cm H20

c) 0 to + 1 cm **H_20**

d) 0 to -1 cm **H20**

Correct Answer - A

Ans. A. + 8 to +5 cm H_20

- During quiet breathing, transpulmonary pressure is between +8cm (at end of inspiration) and +5 cm (at end of expiration).

378. Position of stretch receptors in left atrium?

a) AV septum

b) Interatrial septum

c) Entrance of pulmonary vein

d) None of the above

Correct Answer - C
Ans. C. Entrance of pulmonary vein
[Ref principles of medical physiolog p.753]
Atrial stretch receptors are located at the various venoatrialjunction.
Atriocaval receptors are located in the right atrium just at the entrance of SVC and IVC,
Pulmonary venoatrial receptors are located in the left atrium just at the entrance of pulmonary vein.

379. Organ with dual blood supply?

a) Heart

b) Liver

c) Kidney

d) Lung

Correct Answer - B:D
Ans. (B) Liver (D) Lung
Liver has dual supply - Hepatic artery and portal vein
Lung has dual supply - Pulmonary artery and bronchial artery.

380. Blood pressure is dependant on?

a) Cardiac output

b) Heart rate

c) Stroke volume

d) All of the above

Correct Answer - D
Ans. D. All of the above
Arterial blood pressure is the product of the cardiac output and the total peripheral vascular resistance (TPR).
Mean blood pressure is the major determinant of adequate blood flow through the tissues.

381. Oxygen saturation of venous blood is ?

a) 30%

b) 50%

c) 70%

d) 90%

Correct Answer - C
Ans. C. 70%
Mixed venous oxygen saturation is the percentage of oxygen bound to hemoglobin in venous blood, i.e, blood returning to right side of heart.
Normal value is 60-80% (average 70 %)
Also know, Arterial oxygen saturation is 95-99 % (average 97 %).

382. Isocapenic buffering is ?

a) Increcased pCO_2 with increased CO2

b) Increcased pCO_2 with decreased CO,

c) Normal pCO, with increased CO2

d) None of the above

Correct Answer - C
Ans. C. Normal pCO, with increased CO2
* During exercise, initially CO2 production and increase in ventilation are proprotionate.
  - So, pCO2 remains the same.
  - This is called isocapnic buffering.
* But, in later stages, ventilation increases more than the rate of CO2 production.
* As a result, PCO2 decreases.

383. After load is decreased by ?

a) Exercise

b) Anemia

c) Thyrotoxicosis

d) All of the above

Correct Answer - D

Ans. D. All of the above

After load (resistance offered to ventricular pumping action) :

- Left ventricle has to pump out blood against aortic resistance. Increased aortic resistance (e.g., high BP) tends to decrease stroke volume.
- Decreased peripheral resistance increases cardiac output e.g., in exercises, AV fistula or shunt, severe anemia (due to vasodilation by anemic hypoxia), thyrotoxicosis (due to vasodilation caused by increased O2 consumption),andwetberi-beri.

384. Vital capacity is measured by ?

a) Plethysmography

b) Gas-dilution methed

c) Nitrogen washout technique

d) Spirometer

Correct Answer - D
Ans. D. Spirometer
Spirometry can measure:- Tidal volume (TV), inspiratory reserve volume (IRV), expiratory reserve volume (ERV), vital capacity (VC), forced vital capacity (FVC), FEV.
Spirometry cannot measure:- Residual volume (RV), functional residual capacity (FRC), total lung capacity (TLC).

385. Baroreeaptors are located in ?

a) Tunica media

b) Tunica intima

c) Tunica adventitia

d) None

Correct Answer - C
Ans. C. Tunica adventitia
Baroreceptors are mechano-receptors that are located in the adventitia of carotid artery and aorta, at specialized Locations called sinuses.

386. ST Segment of ECG Correspords to which phase of action potential ?

a) Rapid depolarixation

b) Rapid repolarizedtion

c) Find repolarizetion

d) Plateu Phase

Correct Answer - D
Ans. D. Plateu Phase
Phase-2 is plateau Phase.

387. In patients with emphysematous bullae, total lung volume is best determined by?

a) Spirometry

b) Helium dilution method

c) Plathysmography

d) Any of the above

Correct Answer - B

Ans. B. Helium dilution method

- Total lung capacity (TLC) is determined by helium dilution method which does not measure volume in bullae.
- TLC measured by plethysmography includes the volume of bullae also.
- Thus, gas volume in bullae can be determined by subtracting the TLC determined by helium dilution from the TLC determined by plethysmography.

388. ST Segment of ECG corresponds to which phase of action potential ?

a) Phase 0

b) Phase I

c) Phase II

d) Phase III

Correct Answer - C

Ans. C. Phase II

Relation of ECG with phases of action potential -

- Phase 0 & 1 = QRS comPlex
- Phase 2 = ST segment
- Phase 3 = T wave.

389. All are true about compliance of lung except ?

a) Change in Volume per unit change in pressure

b) Total Compliance is 0.2 L/cm

c) A measure of distensibility

d) Decreased in emphysema

Correct Answer - D

Ans. D. Decreased in emphysema

[Ref. Principles of medical physiology p.325,326 ; Ganong 24h/e p. 632]

- The change in volume per unit change in pressure is called 'compliance'. The total compliance of both lungs together in the normal adult human being is about 0.2 L/cm water.
- That is, every time the trans pulmonary pressure increases by 1 centimeter of water, the lung volume will expand 0.2 L (200 ml).
- Compliance is a measure of dispensability.
- Compliance is increased in emphysema.

390. ST Segment of ECG Corresponds to ?

a) Ventricular depolarization

b) Ventricular repolarization

c) Atrial depolarization

d) AV Conduction

Correct Answer - D
Ans. D. AV Conduction
Action potential in myocardial fibers has 5 phases :0,1,2,3 and 4.

391. In relaxation pressure curve, in chronic smokers at Zero relaxation pressure ?

a) Lung volume increases

b) Lung volume decreases

c) No change in lung volume

d) Any of the above

Correct Answer - A

Ans. A. Lung volume increases

Chronic smoking causes COPD with loss of elasticity of lung and there is hyperinflation of lung.

Combined recoil pressure of lungs and thoracic cage is inwardly directed in hyper inflated lungs.

As lung loses its elasticity, thoracic cage distends (expands) to a higher volume at zero relaxation pressure -+ Functional residual capacity is increased.

392. Cerebral blood flow is increased by ?

a) Increase in P02

b) Increase in PCO2

c) Decrease metabolic rate

d) All of the above

Correct Answer - A
Ans. A. Increase in P02
[Ref: www.ncbi.nlm.nih.govl]
One major function of ion channels in endothelial cells is the control of Ca2+ influx either by a direct modulation of Ca2+ influx pathway or by indirect modulation Na+ and Cl channels.

393. Which of the following parameter Indicates elimination of CO_2 from lung ?

a) Pa02

b) pH

c) PaCO2

d) HCO, level

Correct Answer - C
Ans. C. PaCO2
[Ref: Clinical physiology p.712]

- PaCO2 (Partial pressure of arterial CO2) → Reflects the adequacy of the lungs ventilation and CO, elimination (known as respiratory parameter).

394. In zero gravity V/Q ratio is ?

a) 0.8

b) 1

c) 2

d) 3

Correct Answer - B

Ans. B. 1

- Removal of gravity results in more uniform ventilation and perfusion this V/Q should be 1.
- But, in all recent studies it has been shown, that there are other (non-gravitational) factors which contributes to V/Q mismatch.
- Therefore even at zero gravity, Heterogeneity of perfusion and ventilation occurs.
- Thus, V/Q ratio cannot be 1 at zero gravity.
- But, in given scenario we accept simple gravitational model, in which V/Q ratio must be I' though theoretically.

395. Action Potential in cardiac muscles has how many phases?

a) 2

b) 3

c) 4

d) 5

Correct Answer - D
Ans. D. 5
Blood flow (Q) is the volume flow per unit time (cm3/s), whereas velocity of blood flow (V) is displacement of blood per unit time (cm/s).
Increasing the radius two times will decrease the velocity by 4 times.

396. Role of ion channels on vascular endothelium is ?

a) Ca^+ influx

b) K^+ efflux

c) Na^+ influx

d) Cl- effux

Correct Answer - D
Ans. D. Cl- effux
O2 therapy is useful in hypoxic hypoxia like hypoventilation (COPD, restrictive disease) and high altitude.
It is not useful in anemic hypoxia (anemia, CO poisoning), stagnant hypoxia (CHF) and histotoxic hypoxia (cyanide poisoning)

397.

Aortic valve closure occurs in which part of cardiac cycle?

a) Beginning of isovolumetric contraction

b) Beginning of ventricular ejection

c) Beginning of isovolumetric relaxation

d) During rapid ventricular filling

Correct Answer - B
Ans. B. Beginning of ventricular ejection
Lung capillary volume – 150ml.

398. Normal0_2 extraction ratio of tissues ?

a) 5%

b) 15%

c) 25%

d) 40%

Correct Answer - C
Ans. C. 25%
Normal O2 extraction ratio is 25-30 %

399. Poiseuille's equation states that?

a) Blood flow is directly proportion to 2nd power of radius

b) Blood flow is directly proportiom to 4th power of radius

c) Blood flow is inversely proportion to 2nd power of radius

d) Blood flow is inversely proportion to 4th power of radius

Correct Answer - D

Ans. D. Blood flow is inversely proportion to 4th power of radius

Minute volume:

- Amount of air breathed in (inspired) or out (expired) by the lungs in one minute. So, minute volume = Tidal volume x Respiratory rate.
- It is at about 6L

400. Guardian angel against obesity name given to?

a) Adiponectin

b) Fibronectin

c) HDL

d) Insulin

Correct Answer - A
Ans. A. Adiponectin
Adiponectin, which has been called a "fat burning molecule" and the guardian angel against obesity, directs fatty acids to muscle for their oxidation".

401. What is the minimum fluid urine output for neutral solute balance?

a) 300 ml

b) 400 ml

c) 500 ml

d) 750 ml

Correct Answer - C
Ans. C. 500 ml
Normally, 180 L of fluid is filtered through the glomeruli, while the average daily urine volume is about 1L with a urine concentration of 290 mOsm/L.
The same load of solute can be excreted per day in a urine volume of 500 ml when the urine is maximally concentrated i.e, 1400 mOsm/L; or in a volume of 23.3 L when the urine is maximally dilute, i.e,, 30-50 mOsm/L.

402. True about breathing are all except ?

a) Normal breathing occurs when transpulmonary pressure is 8-5 cm H,0

b) Compliance depends only on surfactant

c) Expiration during quite breathing is passive

d) Inspiration is an active process

Correct Answer - B

Ans. B. Compliance depends only on surfactant

Compliance of lungs depends on:-

1. Elastic forces of lung tissue (one-third).
2. Elastic forces caused by alveolar surface tension.

- There two forces oPPose distensibility of lung and therefore decrease lung compliance.
- Surfactant, by decreasing the alveolar surface tension increases lung compliance.

403. Normal vital capacity in an adult is -

a) 1200 ml

b) 2500 ml

c) 3000 ml

d) 4700 ml

Correct Answer - D
Ans. D. 4700 ml

404. Boyle's Law states that ?

a) P/T = constant

b) PV = constant

c) PV = nRT

d) V/T = constant

Correct Answer - B
Ans. B. PV = constant
Boyle's law

- At a constant temperature, the pressure (P) of a given mass is inversely proportionate to its volume (p directly proportional to 1/v), i.e., PV constant.

405. Air remaining in lung after normal expiration ?

a) TV

b) RV

c) FRC

d) VC

Correct Answer - C
Ans, C. FRC
Functional residual capacity (FRC) is the amount of air remaining in the lungs after a normal tidal expiration.

406. Maximum voluntary ventilation is -

a) 25 L/min

b) 50 L/min

c) 100 L/min

d) 150 L/min

Correct Answer - D
Ans. D. 150 L/min

407. Physiological dead space is calculated by ?

a) Boyle's law

b) Dalton's law

c) Bohr equation

d) Charle's law

Correct Answer - C
Ans. C. Bohr equation
Anatomical dead space-> measured by single-breath N, method.
Physiological (total) dead space > measured by Bohr equation.

408. BP is less than 40 mm Hg. Which mechanism of regulation is working ?

a) Chemoreceptor reflex

b) Baroreceptor reflex

c) CNS ischemic reflex

d) None of the above

Correct Answer - C
Ans, C, CNS ischemic reflex
Chemoreceptor reflex is useful in regulation of BP when it falls to level between 40-70 mm Hg.
But if BP is below 40 mm Hg, the last ray of hope for survival is the Central Nervous System (CNS) Ischemic response.
CNS ischemic response is evoked by ischemia of CNS.

409. Deoxygenated blood is not seen in ?

a) Pulmonary artery

b) Pulmonary vein

c) Right atrium

d) Umbilical artery

Correct Answer - C
Ans, C. Right atrium
Pulmonary veins carry oxygenated blood from the lungs to the left side of heart (left atrium).
Pulmonary artery carries deoxygenated blood from right side of heart (right ventricle) to the lung
Right side of heart (right atrium and right ventricle) contains deoxygenated blood.
Umbilical arteries supply deoxygenated blood from the fetus to placenta, in the umbilical cord.

410. Slowest blood flow is seen in ?

a) Arteriole

b) Veins

c) Capillaries

d) Venules

Correct Answer - C
Ans, C. Capillaries

411. In healthy person, arterial baroreceptor activity is seen at what stag of cardiac systole ?

a) Systole

b) Diastole

c) Both

d) None

Correct Answer - A
Ans. A. Systole
Baroreceptors respond not only to pressure magnitude but also to rate of change of pressure.
At rest, arterial baroreceptors are stimulated during the systolic upstroke of the pressure puke wove

412. SI unit of pressure is ?

a) mmHg

b) cmHg

c) Pascal

d) Torr

Correct Answer - C
Ans. C. Pascal
Blood pressure is the lateral pressure exerted by the column of blood on the walls of the arteries,
Most commonly used unit of BP is mm Hg.
But recently there is a trend towards adopting lhe system International 'd' units (SI units).
In SI units, the basic unit for pressure is newton per square meter, and is called pascal (Pa).

413. Healthy adult cardiac reserve is ?

a) 50 - 100 %

b) 100 - 200 %

c) 200 - 250 %

d) 300 - 400 %

Correct Answer - D
Ans, D. 300 - 400 %
Cardiac reserve

- The maximum percentage that the cardiac output can increase above normal is called is the cardiac reserve.
- Thus, in the healthy adult the cardiac reserve is 300-400 % percent.

414. Critical closing pressure is ?

a) Arterial pressure minus venous pressure

b) Capillary pressure minus venous pressure

c) Pressure below which capillaries close

d) None of the above

Correct Answer - C
Ans. C. Pressure below which capillaries close
The critical pressure below which the capillaries close is called the critical closing pressure.

415. All are true about baroreceptors, expect ?

a) Stimulated when BP decreases

b) Afferents are through sino-aortic nerves

c) Stimulation causes increased vagal discharge

d) Stimulate nucleus ambiguous

Correct Answer - A
Ans. A. Stimulated when BP decreases
Baroreceptors are highly sensitive to any change in mean Bp.
When BP rises, baroreceptors are stimulated and their aferent (through sinoaortic nerves) stimulate nucleus of tractus solitarus (MIS) which inhibits the pressor area of vasomoter center i.e. RVLM. This results in decreased sympathetic outflow and, as a result vasodilatation.
Bp comes down.

416. Normal velocity of blood is ?

a) 40-50 cm/sec

b) 100-150 cm/sec

c) 200-250 cm/sec

d) 250-300 cm/sec

Correct Answer - A
Ans. A. 40-50 cm/sec
Mean blood velocity in aorta is 40 cm/sec.

417. Duration of maximum contraction depends upon?

a) Absolute refractive period

b) Relative refractive period

c) Both

d) None of the two

Correct Answer - B

Ans. B. Relative refractive period

During this period, excitability gradually recovers and a new action potential can be elicited sooner with a stronger stimulus.

Action potentials generated very early in the relative refractive period do not rise as sharply as normal action potentials, and have a lower amplitude and shorter duration.

Thus duration of action potential (and thus contraction) depends upon relative refractive period.

If AP is generated early in relative refractive period, it has shorter duration.

And if AP is generated after completion of relative refractive period, it has longer (normal) duration of action potential.

418. Stretch impulse is carried by?

a) Ia

b) Ib

c) B

d) C

Correct Answer - A
Ans. A. Ia
A-alpha, (Type Ia) fibers are primary afferent for stretch reflex.

419. Less mitochondria are seen in -

a) Red fibers

b) Type I fibers

c) White fibers

d) Slow fibers

Correct Answer - C
Ans. C. White fibers
Type II fibers are white because they lack myoglobin and have a few mitochondria. Their metabolism is glycolytic.
Type II fibers are fast twitch fibers with short duration of twitch.

420. All are true about red muscle fibers except ?

a) More mitochondria

b) Glycolytic metabolism

c) More myoglobin

d) More oxidative capacity

Correct Answer - B
Ans. B. Glycolytic metabolism

421. Integration center of tonic labyrinthine reflex is?

a) Spinal cord

b) Medulla

c) Midbrain

d) Cerebral cortex

Correct Answer - B
Ans. B. Medulla

422. Higher center for righting reflex?

a) Pons

b) Spinal cord

c) Cortex

d) Midbrain

Correct Answer - D
Ans. D. Midbrain

423. Righting reflex is a ?

a) Strech reflex

b) Postural reflex

c) Spinal reflex

d) Ocular reflex

Correct Answer - B
Ans. B. Postural reflex
Posture refers to the static position of any part of the body.
Movements are the transition from one Posture to the another.

424. Joint position & vibration sense is carried by?

a) Act

b) A(3)

c) AY

d) B

Correct Answer - A
Ans, A. Act

425. Tonic neck reflex disappears at what age ?

a) 1 month

b) 2 months

c) 3 months

d) 6 months

Correct Answer - D
Ans. D. 6 months

426. Significance of absence of loss of assymmetric tonic neck reflex in 9 months ?

a) Decreased muscle tone

b) Increased muscle tone

c) Normal phenomenon

d) None of the above

Correct Answer - B

Ans.B. Increased muscle tone

Asymmetric tonic neck reflex is prominant between 2nd and 4th months.

Persistence of this reflex beyond the age of 5 - 9 months or a constant tonic neck posture are abnormal and usually indicate spastic cerebral palsy.

In spastic cerebral palsy, there is increased muscle tone with hyper-reflexia.

427. Cerebellar damage causes all except ?

a) Dysmetria

b) Hypertonia

c) Ataxia

d) Past-pointing

Correct Answer - B

Ans. B. Hypertonia

Damage to the cerebellum leads to several characteristic abnormalities, including :

- Ataxia
- Hypotonia
- Dysmetria
- Rebound phenomenon
- Decomposition of movement

428. Which receptor get stimulated in moderate cold?

a) CMR-1

b) VR1

c) VRL-1

d) VR2

Correct Answer - A
Ans. A. CMR-1
One is receptor for moderate cold -+ CMR - 1(cold and methanol sensitive receptor - l)
Two types of vanilloid receptors for noxious heat (painful heat) :- I4R-l and VRL-L.

429. Post-ganglionic parasympathetic fibers are -

a) A a

b) A (3

c) A 7

d) C

Correct Answer - D
Ans. D. C
Post-ganglionic autonomic fibers (both sympathetic and parasympathetic) are 'C' type of fibers.

430. Group B nerve fibers are ?

a) Sympathetic preganglionic

b) Sympathetic postganglionic

c) Parasympathetic preganglionic

d) Parasympathetic post ganglionic

Correct Answer - A
Ans. A. Sympathetic preganglionic
"In both the sympathetic and parasympathetic divisions, preganglionic fibers are myelinated type B fibers".

431. Pain receptors are ?

a) Meissners corpuscle

b) Pacinian corpuscle

c) Free nerve endings

d) Merkel disc

Correct Answer - C
Ans. C. Free nerve endings
Pain receptors are free nerve endings, i.e. they are not enclosed in a capsule.

432. Spinal pathway mainly regulating fine motor activity ?

a) Anterior corticospinal tract

b) Rubrospinal tract

c) Vestibulospinal tract

d) Reticulospinal tract

Correct Answer - B
Ans. B. Rubrospinal tract

433. What is seen in withdrawal reflex ?

a) Extension

b) Flexion

c) Extension followed by flexion

d) None of the above

Correct Answer - B
Ans. B. Flexion

434. Which of the following has same concentration in CSF and plasma ?

a) Ca"

b) HCO3

c) Glucose

d) Cl?

Correct Answer - B
Ans. B. HCO3

435. Sweating is mediated by ?

a) Norepinephrine

b) Epinephrine

c) Acetylcholine

d) Histamine

Correct Answer - C
Ans. C. Acetylcholine
Nerve supply of sweat gland is unique in that it k sympathetic but cholinergic (most other sympathetic sites are noradrenergic)

436. Which thalamic nuclei can produce basal ganglia symptoms ?

a) Lateral dorsal

b) Pulvinar

c) Ventral anterior

d) Intralaminar

Correct Answer - C
Ans. C. Ventral anterior
Motor nuclei (ventral anterior and ventral lateral) of thalamus relay and process messages from basal ganglia (especially globus pallidus) and cerebellum to motor and premotor cortex

437. Which of the following is a cerebellar nucleus ?

a) Caudate nucleus

b) Subthalamic nucleus

c) Fastigial nucleus

d) Pautamen

Correct Answer - C
Ans. C. Fastigial nucleus
Cerebellum is divided into -
1. Cerebellar Cortex (external):- Contains five cells purkinje cells, granule cells, basket cells, stellate cells and golgi cell.
2. Deep cerebellar nuclei (external):- There are four ntclei dmtate, fastigial, globose, and emboliform

438. Salivation of dog when food is given along with bell is?

a) Conditioned reflex

b) Reinforcement

c) Habituation

d) Innate reflex

Correct Answer - A
Ans, A. Conditioned reflex

439. Precentral gyrus & corticospinal tract are essential for?

a) Vision

b) Olfaction

c) Auditory

d) Voluntary movement

Correct Answer - D
Ans. D. Voluntary movement
Precentral gyrus is the primary motor cortex (Brodmann's Area 4) where the impulse for voluntary activity originates.

440. Number of cones in Retina ?

a) 3-5 millions

b) 10-20 millions

c) 25-50 millions

d) 50-100 millions

Correct Answer - A
Ans. A. 3-5 millions
Number of Cones in retina is 3-4.5 millions whereas number of Rods are 90-100 millions.

441. Cell bodies of orexigenic neurons are present in ?

a) Dorsal raphae

b) Locus coerulus

c) Lateral hypothalamic area

d) Hippocampus

Correct Answer - C
Ans. C. Lateral hypothalamic area
ARC neurons also project to other hypothalamic nuclei, including the orexigenic orexin containing neurons in lateral hypothalamic area, to stimulate apPetite.

442. Which of the following does not have sympathetic noradrenergic fibers ?

a) Blood vessels

b) Sweat gland

c) Heart

d) Eye

Correct Answer - B
Ans. B. Sweat gland

443. All should be features of a substance to measure GFR, except ?

a) Freely reabsorbed

b) Freely feltered across glomerulus membrane

c) Not secreted by kidney

d) None

Correct Answer - A

Ans. A. Freely reabsorbed

To measure GFR, the substance should have following features:-

1. Pass freely across the glomerular membrane.
2. Neither reabsorbed nor secreted by kidney.

444. Renal blood flow is ?

a) 1-1·5 L/min

b) 1·5-2 L/min

c) 2-2-5 L/min

d) 2·5-3 L/min

Correct Answer - A

Ans. A. 1 - 1.5 L/min

- The total renal blood flow (RBF) is approximately 1.1 - 1.3 Lt/min.
  - i.e.,22-25% of cardiac output.
- The kidneys have a high blood flow
  - In resting, healthy, young adult men, renal blood flow averages about 1.2 L/min.
  - This is about 25% of the cardiac output (5 to 6 L/min).
  - Both kidneys together weigh about **300 g**, so **blood flow per gram of tissue averages about 4mL/min**.
  - This rate of perfusion exceeds that of all other organs in the body, except the neurohypophysis and carotid bodies.
  - **The high blood flow** to the kidneys is necessary for a **high GFR** and is not due to excessive metabolic demands.

445. Best measure for GFR ?

a) Serum creatinine

b) Urine output

c) BUN

d) PAN

Correct Answer - A
Ans. A. Serum creatinine
Inulin is more accurate measure of GFR, but is inconvenient because it has to be injected intravascular.
Creatinine is not as accurate as inulin, but creatinine is already present in the blood in steady-state, so the endogenous creatinine clearance can be used without the necessity of having to infuse inulin.

446. Normal renal threshold for glucose is at plasma glucose level ?

a) 100 mg/dl

b) 200 mg/dl

c) 300 mg/dl

d) 400 mg/dl

Correct Answer - B

Ans. B. 200 mg/dl

- The transport maximum for glucose is 375 mg/min whereas the filtered load of glucose is only 125 mg/min.
- The overall transport maximum for the kidneys, which is normally about 375 mg/min, is reached when all nephrons have reached their maximal capacity to reabsorb glucose.
- Thus, Renal threshold for glucose

.. At plasma levels à 200 mg/dl

?. At filtered load → 25O mg/min

447. Hyperosmolarity of renal medulla is due to?

a) K

b) Na

c) glucose

d) Cl

Correct Answer - A:B:D
Ans. (B) Na (A) K (D) Cl
The thick ascending limb of loop of Henle is impermeable to water but it actively reabsorbs NaCl.
The thin descending limb of loop of Henle is relatively impermeable to solutes but highly permeable to water.
The most important cause of the high medullary osmolarity is active transport of sodium and co-transport of potassium, chloride and other ions out of the thick ascending limb of loop of Henle into the medullary interstitium.
Most important among all these is NaCl, for maintenance of high medullary interstitium.

448. Most important extracellular buffer ?

a) Phosphate

b) Plasma proteins

c) Ammonia

d) Bicarbonates

Correct Answer - D
Ans. D. Bicarbonates
Bicarbonates - Bicarbonates are the most important buffers in blood.
This is because the components of this buffer system can be adjusted by the body.
The HCO3- concentration is controlled by the kidney while the PCO, is controlled through pulmonary circulation.

449. "Delta cells" of stomach secrete ?

a) Cholecystokinin

b) Gastrin-releasing peptide

c) Somatostatin

d) Secretin

Correct Answer - C
Ans. C. Somatostatin

450. Sugars are primarily absorbed in ?

a) Duodenum

b) Jejunum

c) Ileus

d) Ascending colon

Correct Answer - B
Ans. B. Jejunum
Absorption of glucose, galactose and fructose occurs mainly in small intestine, especially in the proximal part of jejunum.

451. Trypsinogen is converted to trypsin by?

a) Combination of 2 molecules of trypsinogen

b) Phosphorylation

c) Removal of few amino acids from trypsinogen

d) Addition of alkyl group

Correct Answer - C

Ans. C. Removal of few amino acids from trypsinogen

- Several enzymes are synthesized in inactive forms, called proenzymes (zymogens).
- Activated when a small length of the protein is cleaved off from one end through the action of specific protease.
- This causes an irreversible rearrangement of the tertiary structure to yield the active form of the protein.
- Enterokinase cleaves trypsinogen to yield active trypsin. The enzyme cleaves proteins at sites of neutral amino acids, with a preference for aromatic or large aliphatic side chains.

452. Which of the following plant components is not fermented by gastrointestinal microorganisms ?

a) Lignin

b) Cellulose

c) Hemicellulose

d) Pectin

Correct Answer - A
Ans. A. Lignin
Lignin, a non-carbohydrate type of dietary fiber is neither digested (by endogenous human enzymes) nor fermented by gastrointestinal microorganisms.

453. Lowest pH is seen in which of the gastrointestinal secretion?

a) Gastric juice

b) Bile juice

c) Saliva

d) Pancreatic juice

Correct Answer - A
Ans. A. Gastric juice

454. Daily salivary secretion is

a) 250-500 ml

b) 1000-1500 ml

c) 2000-2500 ml

d) 3000 ml

Correct Answer - B
Ans.B. 1000-1500 ml

455. Inhibition of myenteric plexus results in

a) Hyperacidity

b) Diarrhea

c) Decreased gut motility

d) Increased secretions

Correct Answer - C
Ans. C. Decreased gut motility
Myenteric plexus or Auerbach's plexus : - It is an outer plexus lying between the longitudinal and circular muscle layer.
The myenteric plexus controls mainly gastrointestinal motility therefore, perisalsis requires an active myenteric plexus

456. Primary hormone for secretion of milk ?

a) Oxytocin

b) Prolactin

c) Glucocorticoids

d) Relaxin

Correct Answer - B
Ans. B. Prolactin
Lactogenesis is the synthesis and secretion of milk from breast alveoli.
This requires primarily prolactin

457. Which of the following is not stored in cell

a) Insulin

b) Cortisol

c) Thyroxin

d) Renin

Correct Answer - B
Ans. B. Cortisol
Peptides and amine hormones are stored in cells within secretory vesicles.
In contrast, steroid hormones are not stored in secretory vesicle before their secretion.

458. Blood tissue barrier in testis is formed by?

a) Basal lamina & interstitial cells

b) Adjacent sertoli cells with basal lamina

c) Basal lamina & spermatogonia

d) Basal lamina & leydig cells

Correct Answer - B
Ans. B. Adjacent sertoli cells with basal lamina
Junction between adjacent sertoli cells form blood-testis barrier.

459. LH surge is associated with?

a) Increased estrogen & decreased progesterone

b) Increased estrogen & increased progesterone

c) Decreased estrogen & increased progesterone

d) Decreased estrogen & increased progesterone

Correct Answer - A
Ans. A. Increased estrogen & decreased progesterone
At the time of ovulation (LH surge) estrogen level is high while progesterone level is low.

460. The interval between ovulation and LH surge is ?

a) 12-24 hours

b) 24-48 hours

c) 48-72 hours

d) 72-96 hours

Correct Answer - B
Ans. B. 24-48 hours
At 36 to 48 h before ovulation, the estrogen feedback effect becomes positive, and this initiates the burst of LH secretion (LH surge) that produces ovulation.

461. Which hormone increases with age ?

a) GH

b) Prolactin

c) Parathormone

d) Insulin

Correct Answer - C
Ans, C. Parathormone
Parathyroid hormone levels rise with age, which may contribute to osteoporosis,
Increasing age affects the hormonal secretion of body.

462. The following is the unit for prolactin level of 20 in blood?

a) mg/ml

b) ng/ml

c) mg/L

d) ng/L

Correct Answer - B
Ans. B. ng/ml
The normal prolactin level is <20 nglml.

463. Human sperm remains fertile for how many hours in a female genital tract ?

a) 6-8 hrs

b) 12-24 hrs

c) 24-48 hrs

d) 72-96 hrs

Correct Answer - C
Ans. C. 24-48 hrs
A human spermatozoon remains fertile for a total of 24-48 hrs. in the female genital tract" --Textbook of reproductive system
Ovum remains fertile for 72 hours.

464. Deficiency of enzyme aromatase leads to deficiency of which hormone ?

a) Cortisol

b) Estrogen

c) Testosteron

d) Mineral corticoids

Correct Answer - B
Ans. B. Estrogen
Aromatase is the enzyme that catalyzes the conversion of androgens into estrogens.

465. After first meiotic division, the primary oocyte remains arrested in ?

a) Diplotene stage

b) Pachytene stage

c) Metaphase

d) Telophase

Correct Answer - A
Ans. A. Diplotene stage

466. All are androgens except ?

a) Testosterone

b) Dihydrotestosterone

c) Androstenedione

d) 17a-hydroxprogesterone

Correct Answer - D
Ans. D. 17a-hydroxprogesterone
Androgens are substances which cause development of secondary sex characters in castrated malc.
Androgens in male are -
1. Testosterons
2. Dihydrotestosterone (most potent)
3. Dehydroepiandrosterone
4. Androstenedione

467. Chronic atrophy of adrenal gland will result in which hormone deficiency ?

a) CRH

b) ACTH

c) Cortisol

d) MSH

Correct Answer - C
Ans. C. Cortisol
Cortisol (the major glucocorticoid) is released by adrenal cortex. CRH is secreted by hypothalamus, and ACTH and MSH are secreted by pituitary.

468. True about thyroid hormone receptor is?

a) Directly binds to TSH

b) Directly binds to TRH

c) Are surface receptors

d) Causes nuclear transcription after binding with T4

Correct Answer - D
Ans. D. Causes nuclear transcription after binding with T4
TRH and TSH bind to cell membrane recePtors (surface receptors)' Thyroid hormone (thyroxine) receptors are intranuclear receptors which induce synthesis of specific Proteins (transcription of proteins) by increasing expression of specific gene.

469. After injecting testosterone in a hypoandrogenic male, which of the following occurs ?

a) Decreased FSH secretion

b) Decreased LH secretion

c) Increased spermatogenesis

d) None of the above

Correct Answer - B

Ans. B. Decreased LH secretion

Systemically administered testosterone does not raise the testosterone level in the testis to a great degree (as it is administered systemically), and it inhibits LH secretion (testosterone inhibits LH secretion by inhibition at both hypothalamus and pituitary levels).

So, endogenous testosterone secretion is decreased (LH is necessary for endogenous testosterone secretion).

Thus, testis does not have sufficient testosterone that is necessary for normal spermatogenesis.

Therefore, prolonged administration of systemic testosterone can cause oligospermia or azoospermia.

470. Conversion of chondrocyte into osteogenic cells is caused by ?

a) Insulin

b) IGF-1

c) Growth hormone

d) Thyroxine

Correct Answer - B:C

Ans. (C) Growth hormone (B) IGF-1

- A specific effect of Growth Hormone (GH) on skeletal growth is to convert chondrocytes into osteogenic cells, thus, causing specific deposition of new bone.
- This effect on bone growth is mediated by insulin like growth factor-l (IGF-l).

Thus, conversion of chondrocytes into osteogenic cells :-

- Caused by -+ growth hormone
- Which is mediated by - IGF-1

471. In breast lactiferous ducts are formed under the influence of which hormone?

a) Eestrogen

b) Progesterone

c) LH

d) FSH

Correct Answer - A
Ans. A. Eestrogen
Estrogen stimulates proliferation of the lactiferous ducts while progesterone is responsible for the development of mammary lobules.

472. Implantation occurs after how many days of fertilization?

a) 3-5 days

b) 5-7 days

c) 7-9 days

d) > 14 days

Correct Answer - B
Ans.B. 5-7 days
About 6-7 days after fertilization the blastocyst attaches to the endometrium, a process called as implantation or embedding. Normal site of implantation is posterior wall of uterus close to fundus.

473. Spermiogenesis refers to ?

a) Formation of spermatazoa from spermatogonia

b) Formation of spermatazoa from spermatids

c) Formation of spermatids from spermatocytes

d) Formation of secondary spermatocytes from primary spermatocytes

Correct Answer - B
Ans.B. Formation of spermatazoa from spermatids
Spermatogenesis → Formation of spermatozoa from spermatogonia,
Spermiogenesis - Formation of spermatozoa from spermatids.
Thus, spermiogenesis is the last step of spermatogenesis.

474. Spermatogenesis takes place in ?

a) Epididymis

b) Seminiferous tubule

c) Ductus deferens

d) Prostate

Correct Answer - B
Ans.B. Seminiferous tubule
Spermatogenesis refers to the process of formation of spermatozoa (sperm) from primitive germ cells (spetmatogonia).
SPermatogenesis begins at puberty and continues throughout adult life to decline in old age.
In humans, it takes an average of 74 days to form a mature spem from primitive germ cells.
Spermatogenesis occurs in seminiferous tubules.

475. Which of the following action of GH is mediated by IGF-1

a) Lipolysis

b) decreases insulin

c) Antilipolysis

d) Na* retention

Correct Answer - C
Ans. (C) Antilipolysis
The actions of growth hormone-mediated via IGF-1 (somatomedin-C) are the indirect effects of growth hormone.
These include
- antilipolytic activity
- insulin-like activity
- protein synthesis
- epiphyseal growth.

476. All of the following stimulate GH release, except-

a) Fasting

b) Exercise

c) Free fatty acids

d) Stress

Correct Answer - C
Ans. C. Free fatty acids
Stimuli that increase secretion of GH are hypoglycemia, exercise, fasting, protein meals, aminoacids (like arginine), stress, glucagon, Pyrogen, lysin vasopressin, apomorphins, L-dopa & alpha-adrenergics, estrogen, androgens and 2-deoryflucose.
Stimuli that decrease secretion of GH are R"EM sleep, glucose, Somatostatin, cortisol, FFA, GH itseif, IGF-1, and medroxyprogesteron.

477. Half life of T3 ?

a) 10 hours

b) 1 day

c) 6 days

d) 10 days

Correct Answer - B
Ans. B. 1 day

478. Not increased in stress ?

a) ADH

b) thyroxine

c) GH

d) None

Correct Answer - D
Ans. D. None.
All the given hormones are increased during stress.

479. Plasma volume is measured by ?

a) Inulin

b) Evans blue

c) Mannitol

d) D20

Correct Answer - B
Ans. B. Evans blue

480. Most common type of calcium channels of skeletal muscles are ?

a) T type

b) L type

c) R type

d) N type

Correct Answer - B
Ans.B. L type
In skeletal muscle, there is a very high concentration of L-type calcium channels, situated in T-tubules.

481. What is the effect of moderate exercise on cerebral blood flow

a) Does not change

b) Increases

c) Decreases

d) Initially decreases then increases

Correct Answer - A

Ans. A. Does not change

- Cerebral blood flow is maintained due to autoregulation (between 60-160 mm Hg) in response to moderate exercise.
- During exercise

.. Blood flow decreased in;- Inactive skeletal muscles, kidney' liver' GIT.

2. Blood flow is unaltered in the brain (due to autoregulation).

3. Blood flow is increased in exercising skeletal muscles, heart (coronary circulation), lung.

4. Initially, it decreased due to the redistribution of blood towards muscle but later increased due to an increase in temperature of Skin.

482. 'Patch-clamp' is used for ?

a) To record facilitated diffusion

b) To record flow in voltage gated channel

c) To record osmotic pressure around semipermeable membrane

d) To record RMP

Correct Answer - B
Ans.B. To record flow in voltage gated channel
Patch-clamp is used to record current flow through a single voltage-gated protein channel.

483. Gap junctions?

a) Are absent in cardiac muscles

b) Are absent in smooth muscles

c) Are present in cardiac muscles to transmit impulse from one to another myocyte

d) Are present in cardiac muscles but no role

Correct Answer - C

Ans. C. Are present in cardiac muscles to transmit impulse from one to another myocyte

Gap junctions

- They are intercellular connections calledhemichannels or connexons.
- They are made up of protein subunits "Connexins".
- These continuous channel (connexons) permits substances (ions and other) to pass from one cell to other without having to pass through the cell membrane.
- Gap junction is typically seen in cardiac and smooth muscles.
- Because of gap junctions cardiac muscle behaves as a functional syncytium as these gap junctions provide low-resistance Bridge for spread of excitation from one fiber to other-

484. Carbonic anhydrase activity found in all except?

a) Brain

b) Kidney

c) RBC

d) Plasma

Correct Answer - D
Ans.D . Plasma
Carbonic anhydrase (CAse) is an enzyme which catalyzes the reversible reaction of formation of bicarbonate ions,
The enzyme is present in renal tubular cells (especially PT), gastric mucosa, exocrine pancreas, ciliary body of eye, brain and RBC.

485. Half life of Prealbumin is ?

a) 2 days

b) 10 days

c) 20 days

d) 40 days

Correct Answer - A
Ans. A. 2 days

486. Calmodulin activates ?

a) Muscle phosphorylase

b) Protein kinase

c) 2, 3 DPG

d) Glucokinase

Correct Answer - A
Ans. A. Muscle phosphorylase
Calcium - calmodulin complex activates myosin light kinase (myosin kinase) which is a phosphorylase and phosphorylate myosin head.

487. During starvation, which level increases ?

a) Leptin

b) MSH

c) Grhelin

d) Insulin

Correct Answer - C
Ans. C. Grhelin

488. Mechanism of action of cholecystokinin ?

a) Activation of adenylyl cyclase

b) Opening of ion channels

c) Through IP3- DAG system

d) Transcription facters

Correct Answer - C
Ans. C. Through IP3- DAG system

489. Which hormone acts on JAK-STAT kinase receptor ?

a) TSH

b) Thyroxine

c) GH

d) FSH

Correct Answer - C
Ans.C. GH

490. Thyroid hormone binds to which receptor ?

a) Membrane

b) Cytoplasmic

c) Nuclear

d) None

Correct Answer - C
Ans. C. Nuclear

491. Normal range of serum osmolality is (mOsm/Kg) ?

a) 280 - 300

b) 250 - 270

c) 300 - 320

d) 210 - 230

Correct Answer - A
Ans. A . 280 - 300
Normal osmolal concentration (osmolality of plasma is 290 mOsm/Kg.

492. The following is the action of melatonin?

a) Facilitates ACTH secretion

b) Prevents sleep induction

c) Regulates the circadian day night rhythm

d) Release of TSH

Correct Answer - C

Ans. C. Regulates the circadian day night rhythm

- The principal secretory product of the pineal gland is melatonin.
- Melatonin secretion shows a circadian rhythm, the level being higher at night and lower at day.
- This diurnal variation is brought about by norepinephrine secreted by postganglionic sympathetic nerves that innervate the pineal gland.
- In the dark norepinephrine, secretion is increased which acts on β-receptors to increase intracellular cAMP and cAMP, in turn, produces a marked increase in N-Acetyl transferase activity, an enzyme involved in melatonin synthesis from serotonin.

493. Na+ -K+-C1- cotransporter contains ?

a) 5 transmembrane spanning domain

b) 7 transmembrane spanning domain

c) 9 transmembrane spanning domain

d) 12 transmembrane spanning domain

Correct Answer - D
Ans. D . 12 transmembrane spanning domain
Na+ -K+-Cl- cotransporter (cation-chloride cotransporter) has 12-transmembrane spanning domains with glycosylation sites on extracellular loop between membrane spans 7 and 8.

494. Von wilebrand factor is synthesized by all except?

a) Endothelial cells

b) Megakaryoctyes

c) Hepatocytes

d) None

Correct Answer - C
Ans C. Hepatocytes
Most clotting factors are synthesized in liver except a component of factor VIII. Factor VIII has two components: -
1. Factor VIIIc (coagulant factor VIII): - Synthesized in liver (main source) and kidney.
2. Von Willebrand factor (vWF) : - Synthesized in endothelium (main source) and megakaryocytes.

495. Females have low RBC count compared to males due to ?

a) Low erythropoietin

b) Menstural blood loss

c) High estrogen

d) Low stem cells

Correct Answer - B

Ans. B. Menstural blood loss

Differences in blood values between men and women result because of several factors :-

1. Men have higher androgens levels and androgens stimulate RBC production.
2. Women of reproductive age lose blood through menstruation, which lower blood cells.
3. Women typically have more fat than men, and the higher the body fat content, the lower the hematocrit level.

496. ATPase activity is present in

a) Actin

b) Myosin

c) Troponin

d) None

Correct Answer - B
Ans. B. Myosin
Myosin is the protein that constitutes the thick filament s.
Myosin of skeletal muscle is myosin-II
Myosin participates in the contractile mechanism and also functions as an ATPase.

497. Normal ferritin level in adult male ?

a) 5-10 ng/ml

b) 100-200 ng/ml

c) 500-700 ng/ml

d) 800-900 ng/ml

Correct Answer - B
Ans. B. 100-200 ng/ml
Normal serum ferritin

- Males - 30-400 ng/ml
- Females - 30-200 ng/ml

498. Daily water loss in sweat during normal activities ?

a) 50 - 100 ml

b) 200 - 400 ml

c) 500 - 700 ml

d) 1000 - 1200 ml

Correct Answer - A
Ans. A. 50 - 100 ml
Fluid loss in sweat: This is highly variable, and depends on physical activity and environmental temperature.
The volume of sweat normally is about 100 ml/day.

499. Ionic receptors are all except ?

a) NMDA

b) Kainate

c) mGluR

d) AMPA

Correct Answer - C

Ans. C . mGluR

Inotropic receptors

- Inotropic receptors are transmembrane ion channels which allow different kinds of ion to travel in and out of the cell.
- Binding of neurotransmitter (ligand) either open or close the ion channel.
- Therefore, inotropic receptors are "Ligand gated transmembrane ion channels,"

Examples of inotropic receptors are:-

1. For glutamate - AMPA, Kainate, NMDA
2. For GABA: GABA(a) recePtors
3. For acetylcholine: Nicotinic (Nm,Nn)
4. For serotonin - 5HT3

500. Difference in the amount of 0_2 inspired and CO2 expired ?

a) 20 ml/min

b) 50 ml/min

c) 75 ml/min

d) 100 ml/min

Correct Answer - B
Ans. B. 50 ml/min
250 ml of O2 enters the body per minute and 200 ml of CO2 is excreted.

501. Venous blood with high hematocrit is seen in ?

a) RBC high chloride

b) Plasma high Na

c) Plasma high HCO_3

d) RBC high K

Correct Answer - A
Ans. A. RBC high chloride
Hematocrit of venous blood is normally 3% greater than that of arterial blood.

502. Daily pancreatic secretion ?

a) 1.5 L

b) 2.5 L

c) 5.0 L

d) 10 L

Correct Answer - A
Ans. A. 1.5 L

503. Microcirculation consists of ?

a) Capillaries

b) Capillaries venules and arterioles

c) Aorta

d) Arteries and veins

Correct Answer - B
Ans., B. Capillaries venules and arterioles
The microcirculation consists of arterioles to venules, i.e. arterioles, capillaries and venules.

504. Gas exchange in tissues takes place at ?

a) Artery

b) Capillary

c) Vein

d) Venules

Correct Answer - B
Ans. B. Capillary
Site of gas exchange = Capillaries

505. Duration of 2" heart sound is ?

a) 0.15sec

b) 0.12 sec

c) 0.08 sec

d) 0.1 sec

Correct Answer - B
Ans.B. 0.12 sec

506. Einthovens law -

a) I + III = II

b) I - III = II

c) I + II + III = 0

d) I + **III =** avL

Correct Answer - A
Ans. A. I + III = II
Einthoven's Law states that if the electrical potentials of any two of the three bipolar limb electrocardiographic leads are known at any given instant, the third one can be determined mathematically by simply summing the first two (but note that the positive and negative signs of the different leads must be observed when making this summation).
Thus the sum of the voltages in leads I and III equals the voltage in lead II.

507. Vasoconstriction in skin ?

a) Sympathetic

b) Parasympathetic

c) Wheal and flare

d) Warm climate

Correct Answer - A
Ans. A. Sympathetic
Sympathetic stimulation acting via alpha 1 and 2 are vasoconstrictor to the skin arterioles.

508. Normal interstitial pressure is ?

a) 10 to 15 mmHg

b) -5 to 0 mmHg

c) 20 to 30 mmHg

d) -10 to -20 mmHg

Correct Answer - B
Ans. B. -5 to 0 mmHg
Normal interstitial fluid hydrostatic pressure (or simply interstitial pressure) is usually -1 mHg.
However it varies according to tissues and ranges from -5 mmHg to -1 mmHg.
It is slightly subatmospheric in most of the tissues.

509. Striatum damage affects primarily ?

a) Procedural memory

b) Short term memory

c) Long term memory

d) Explicit memory

Correct Answer - A
Ans. A. Procedural memory
Procedural memory is a type of implicit memory that enables us to carry out commonly leaned tasks without consciously thinking about them, e.g., riding a bike, tying a shoe or washing dishes.
Procedural memory likely uses a different part of brain than episodic memory - with brain injury you can lose one's ability without losing other.
That's why a person who has experienced amnesia and forget much about his or her personal life often retains procedural memory i.e., how to drive a car or use a fork etc.
Striatum (a part of basal ganglia) is responsible for procedure memory.

510. Somatosensory cortex lesion will cause ?

a) Pain

b) Temperature

c) Localization

d) Vibration

Correct Answer - C
Ans, C, Localization
Cortical lesions do not abolish all the somatic sensations. Cortical anesthesia mainly involve loss of proprioception and tactile sensations (fine touch, two point discrimination, astereognosis or stereo anesthesia.
Pain and temperature are least affected, but they are poorly localization.

511. Setting posture before planned movement ?

a) Premotor cortex

b) Motor cortex

c) Frontal

d) Supplementary motor cortex

Correct Answer - A
Ans. A. Premotor cortex
The premotor cortex function is still incompletely understood, but it may be concerned with setting posture at the start of a planned movement and with getting the Individual prepared to move.
It is most involved in control of proximal limb muscles needed to orient the body for movement.

512. Neurons in sympathetic ganglia are ?

a) Unipolar

b) Bipolar

c) Pseudounipolar

d) Multipolar

Correct Answer - D
Ans, d. Multipolar
Ventral, lateral and dorsal horns of spinal cord and sympathetic chain ganglia contun multigolar neuron, whereas dorsal root ganglia contains pseudounipolar neurons.

513. Pt. is able to recognise person by name but not by face. Lesion is in ?

a) Post parietal region

b) Occipital

c) Frontal lobe

d) Temporal lobe

Correct Answer - D

Ans. D. Temporal lobe

An important part of the visual input goes to the inferior temporal lobe, where representations of objects, particularly faces are stored. In humans, storage and recognition of faces is more strongly represented in the right inferior temporal lobe in right-handed individuals.

514. CSF/plasma glucose ratio is ?

a) 0.2 - 0.4

b) 0.6 - 0.8

c) 1.2 - 1.6

d) 1.6 - 2.2

Correct Answer - D
Ans. D. 1.6 - 2.2

515. Burning pain is carried by which type of fibres ?

a) A alpha

b) A delta

c) A beta

d) C

Correct Answer - D
Ans. D. C
Pain is transmitted via two fiber types:
* Thinly myelinated A delta fibers (2-5m in diameter) which conduct at rates of 12-30 m/s.
* Unmyelinated C fibers (0.4-1.2m in diameter) which conduct at low rates of 0.5-2 m/s.
- Thermo receptors also span these two flber types.
- Cold receptors are on dendritic endings of A delta fibers and C fibers, whereas warmth (heat) receptors lue on C fibers.

516. A man slept with head over forearm, next morning he complains of tingling, numbness over forearm. It is caused by ?

a) Sensitivity to hypoxia is A>B>C

b) Sensitivity to pressure is A>B>C

c) Sensitivity to hypoxia is C>B>A

d) Sensitivity to pressure is B>A>C

Correct Answer - C
Ans.C . Sensitivity to hypoxia is C>B>A
Type C fibers (Type IV Lloyd & Hunt) are least susceptible to hypoxia'

517. Lesion of preoptic nucleus of hypothalamus causes?

a) Hyperphagia

b) Hyperdypsia

c) Hyperthermia

d) Hyperglycemia

Correct Answer - C
Ans. C. Hyperthermia
Preoptic nucleus is concerned with regulation of body temperature. Therefore, its lesion will result in defectivetemperature

518. The distance by which two touch stimuli must be separated to be perceived as two separate stimuli is greatest at ?

a) The lips

b) The palm of the hand

c) The back of scapula

d) The dorsum of the hand

Correct Answer - C

Ans. C. The back of scapula

The magnitude of two point discrimination thresholds varies from place of place on the bodyis smallest where touch receptors are most abundant.

stimulation points on the back must be separated by at least 65 mm before they can be distinguished as separate, whereas on the fingertips two stimuli ass recognized if they are separated by as little as 2 mm.

519. Purkinje fibres are inhibitory for ?

a) Deep cerebellar nuclei

b) Climbing fibre

c) Basket cells

d) Spinocerebellar tracts

Correct Answer - A
Ans. A. Deep cerebellar nuclei
After complex inhibiting and excitatory interactions of various fibers and cells in the cortex, the output of cerebellar cortex, is projected to deep cerebellar nuclei by axons of pyramidal cells (only output cells of cerebellar cortex).
The output of the Purkinje cells is inhibitory in the deep cerebellar nuclei.
However, the output of deep cerebellar nuclei to the brain stem and thalamus is always excitatory because, beside inhibitory inputs of purkinje cells, deep cerebellar nuclei also receive excitatory inputs from afferent mossy and climbing fibers which usually are more prominent.

520. Neurotransmitter involved in nigrostriatial pathway is?

a) Serotonin

b) Dopamine

c) Cholinergic

d) Adrenergic

Correct Answer - B
Ans. B. Dopamine
Dopaminergic nigrostriatal projection from the substantia nigra pars compacta (sNpc) to the striatum Caudate nucleus and putrrnen) and corresponding GABAergic proiection from striatum to substantia nigra pars reticulate (SNPR).
Dopamine is the major neurotransmitter in substantia nigra.

521. Loss of proprioception & fine touch ?

a) Anterior spinothalamic tract

b) Lateral spinothalamic tract

c) Dorsal column

d) Corticospinal tract

Correct Answer - C
Ans. C. Dorsal column

522. True about spinocerebellar tract is?

a) Equilibrium

b) Smoothens and coordinates movement

c) Learning induced by change in vestibulo ocular reflex

d) Planning and programming

Correct Answer - B

Ans. B. Smoothens and coordinates movement

- Spinocerebellum is concerned with smoothening and coordination of movements.
- It achieves this by getting a moment to moment report by spinocerebellar tract.

523. Salty tase is due to?

a) Ca^{+2}channels

b) Na^{+} channels

c) G-protein

d) H^{+} channels

Correct Answer - B
Ans, B. Na^{+} channels
Salty-tastingsubstances depolarize taste cells by activating amiloride-sensitive Na^{+} channels.

524. Epinephrine reduces insulin by ?

a) Alpha action predominantly

b) Beta action predominantly

c) Alpha and beta

d) Muscarinic receptors

Correct Answer - A
Ans. A. Alpha action predominantly
Epinephrine decreases insulin release via alpha-2 action as pancreatic beta-cells has alpha-2 receptors.

525. Adrenaline effects insulin by?

a) Stimulation of alpha cells

b) Stimulation of beta cells

c) Stimulation of delta cells

d) Stimulation of g cells

Correct Answer - B
Ans. B. Stimulation of beta cells
Adrenaline decreases insulin secretion by acting on alpha-2 receptors on beta-cells ofpancreas.

526. Motor march is seen in ?

a) Axontemesis

b) Neurotemesis

c) Neuropraxia

d) Nerve regeneration

Correct Answer - A
Ans. A. Axontemesis
Motor march (sequential reinervation of muscles from proximal to distal) is seen in axontemesis.
In neuroPraxiathereis no anatomic disruption, so motor march is not seen.
In neurotemesis there is no recovery, thus no motor march'

527. When the tension in a muscle fibre is maximum, its length is called as ?

a) Equilibrium length

b) Optimum length

c) Initial length

d) None

Correct Answer - B
Ans. B. Optimum length
Upto a limit greater the initial length (i.e., length at relaxed-state) greater is the force of contraction.
I.e., there is an optimal length, at which the force generated by a muscle is maximal'

528. Tetanic contraction is due to accumulation of ?

a) Na^+

b) Ca^+

c) K^+

d) Cl?

Correct Answer - B

Ans. B. Ca^+

Tetanic contraction is aboutfour times the twitch tension,
Following theory has been put forward for this higher tension generated during muscle tetanus:-
During a single twitch, the amount of Ca+2 is released into sarcoplasm is not enough to produce tetanic tension.
When the muscle is stimulated in rapid succession, Ca+2 comes out into the sarcoplasm with each stimulus and there is a progressive accumulation of Ca+2, in the sarcoplasm.
Tetanic tension is reached when sarcoplasmic Ca+2 levels reach their maximum.

529. During acclimitisation, decreased sweating is due to down regulation of ?

a) Epinephrine receptors

b) Norepinephrine receptors

c) Acetylcholine receptors

d) Dopamine receptors

Correct Answer - C
Ans. C. Acetylcholine receptors
Examiner just wants to know the receptors which are present in sweat gland.
Sweatingis under the control of sympathetic system. But the neurotransmitter is acetylcholine which acts on cholinergic sympathetic receptors.

530. Substance that is completely reabsorbed from the kidney?

a) Na^+

b) K^+

c) Urea

d) Glucose

Correct Answer - D
Ans. D. Glucose
On a normal diet maximum solutes are reabsorbed almost completely: - Glucose, Aminoacids & HCO3-: 100%

531. Substrate which is both secreted & filtered ?

a) Uric Acid

b) Glucose

c) Urea

d) Na^+

Correct Answer - A
Ans, A. Uric Acid
Substances which are both secreted and filtered are K^+, uric acid and creatinine.

532. ANP acts at which site ?

a) Glomerulus

b) Loop of Henle

c) PCT

d) Collecting duct

Correct Answer - D
Ans. D. Collecting duct
The atrial natriuretic peptides (ANPs) are present as granules in the atrial muscle cells.
ANP is released in response to increased plasma
Na+ concentration.
In general, the effects of ANP are physiologically antagonistic to those of angiotensin II.
ANP causes natriuresis due to increased GFR by relaxing mesangial cells of glomerulus.
ANP decreases the Na+ reabsorption from the distal tubule and collecting duct.
ANP decreases the secretion of renin, aldosterone, and ADH.
In addition, NP also relaxes the vascular smooth muscle in arterioles and venules and therefore lowers BP.

533. As fluid comes down the PCT, what is true ?

a) Concentration of urea falls

b) Concentration of HCO3- falls

c) Concentration of Na' increases

d) Concentration of inulin decreases

Correct Answer - D
Ans. D. Concentration of inulin decreases

534. Which of the following is most important in sodium and water retention ?

a) Rennin angiotensin system

b) ANP

c) BNP

d) Vasopressin

Correct Answer - D
Ans.D. Vasopressin
Despite its effect on Na+ and water reabsorption, aldosterone is a weak regulator of body Na, and water balance, the major regulator being the 'thirst-ADH' mechanism.
Aldosterone is the sole regulator of external potossium balance".

535. Cephalic phase of gastric secretion ?

a) 20%

b) 70 %

c) 10%

d) 100%

Correct Answer - A
Ans. A. 20%
Cephalic phase accounts for 20% of gastric acid secretion and gastric phase accounts 70-80% of gastric acid secretion.

536. Cephalic phase of gastric secretion ?

a) On food entering stomach

b) On food entering intestine

c) On seeing food

d) On stress

Correct Answer - C
Ans. C. On seeing food
The cephalic phase of gastric secretion occurs even before food enters the stomach, especially while it is being eaten.
It results from the sight, smell, thought, or taste of food, and the greater the appetite, the more intense is the stimulation.

537. Motilin secretion decreased in ?

a) Thirsty

b) Starving

c) Ingested meal

d) Interdigestive state

Correct Answer - C
Ans. C. Ingested meal
When a meal is ingested, secretion of motilin is suppressed until digestion and absorption are complete.

538. Which is maximally absorbed from GIT ?

a) Pentose

b) Hexose

c) Diasaccharide

d) Polysaccharide

Correct Answer - B
Ans. B. Hexose
Hexoses are rapidly absorbed across the wall of the small intestine.

539. Pancreatic lipase hydrolyses ester linkage of triacid glycerides at position?

a) 1 & 2

b) 1 & 3

c) 2 & 3

d) Only 3

Correct Answer - B
Ans. B. 1 & 3
Most fat digestion therefore begins in the duodenum, pancreatic lipase being one of the most important enzymes involved.
This enzyme hydrolyzes the 1- and 3-bonds of the triglycerides (triacylglycerols) with relative ease but acts on the 2- bonds at a very low rate, so the principal products of its action are free fatty acids and 2- monoglycerides (2-monoacylglycerols).
It acts on fats that have been emulsified.

540. Gastric secretions are essential for absorption of -

a) Cobalmin

b) Fat

c) Thiamine

d) Folic acid

Correct Answer - A
Ans. A. Cobalmin
Vitamin B12 is absorbed in the ileum.
This vitamin binds to intrinsic factor, a protein secreted by the stomach, and the complex is absorbed across the ileal mucosa.

541. Effect of aceytylcholine on LES ?

a) Contraction

b) Relaxation

c) No effect

d) Contraction followed by relaxation

Correct Answer - A

Ans. A. Contraction

This barrier against reflux of the harmful gastric juice (pepsin and HCD is strengthened when the splincter pressure is raised by-

1. Acetylcholine
2. Adrenergic agonists
3. Gastrin
4. Motilin
5. Somatostatin
6. Substance P
7. Histamine
8. PGF 2-alpha.
9. Protein rich food
10. High intraabdominal pressure.

542. Ptylin is secreted by ?

a) Gastric gland

b) Salivary gland

c) Duodenal gland

d) Pancreatic gland

Correct Answer - B
Ans. B. Salivary gland
Salivary amylase is also called ptylin which is secreted in saliva by salivary gland.

543. PGs in semen are secreted by ?

a) Prostate

b) Seminal vesicle

c) Sperms

d) Testes

Correct Answer - B
Ans. B. Seminal vesicle

544. 17 OH steroid ?

a) Androgen

b) Progesterone

c) Estrogen

d) None

Correct Answer - B
Ans. B. Progesterone

545. GLUT2 is present mainly in ?

a) Beta cells of pancreas

b) Placenta

c) Skeletal muscle

d) Cardiac muscle

Correct Answer - A
Ans. A. Beta cells of pancreas

546. Glucose transporter involved in insulin stimulated glucose transport is GLUT ?

a) 1

b) 2

c) 3

d) 4

Correct Answer - D
Ans, D. 4

547. Insulin is essential for glucose entry in?

a) Muscle

b) Cortical neurons

c) Renal tubular cells

d) Beta cells of pancreas

Correct Answer - A
Ans. A. Muscle
Glucose enters cells by facilitated diffusion or, in the intestine and kidneys, by secondary active transport with Na^+.
In muscle, adipose, and some other tissues, insulin stimulates glucose entry into cells by increasing the number of glucose transporters In the cell membranes.

548. Wolff–Chaikoff effect is due to?

a) Suppression of TSH secretion

b) Decreased iodination of MIT

c) Decreased T_3 to T_4 conversion

d) Iodine intake

Correct Answer - D
Ans. D. Iodine intake
Iodine is the fastest acting thyroid inhibitor.
The most important action is inhibition of hormone release (thyroid constipation), but all facets of thyroid synthesis may be affected.
Excess iodide inhibits its own transport in thyroid cells and may alter the redox potential of cells, thus interfering iodination reduced T3/T4 synthesis (**Wolff**–**Chaikoff effect**).

549. Major adrenal androgen is ?

a) Testosterone

b) 11-hydroxy derivative of androstenedione

c) 17-ketosteroid dehydroepiandrosterone

d) Cortisol

Correct Answer - C
Ans. C. 17-ketosteroid dehydroepiandrosterone
The major adrenal androgen is the l7-ketosteroid dehydroepiandrosterone, although androstenedione is also secreted.
The major androgen of testis is testosterone.

550. Diurnal variation of ACTH depends on ?

a) Suprachiasmatic nucleus

b) Supraoptic nucleus

c) Ventrolateral nucleus

d) Thalamus

Correct Answer - A
Ans. A. Suprachiasmatic nucleus
The biologic clock responsible for the diurnal ACTH rhythm is located in the suprachiasmatic nuclei of the hypothalamus.

551. Hypothalamus increases release of all hormones from the pituitary except ?

a) TSH

b) FSH

c) CRH

d) Prolactin

Correct Answer - D
Ans, D. Prolactin
For most of the anterior pituitary hormones.
It is the releasing hormone that are important but prolactin is mainly under the inhibitory control.

552. 1st response to hypoglycemia ?

a) Decreased insulin

b) Increased glucagon

c) Increased cortisol

d) Increased nor epinephrine

Correct Answer - A
Ans. A. Decreased insulin
Decreased insulin is the first response followed successively by increase in glucagon, epinephrine, cortisol and GH.

553. Velocity of human sperm -

a) 1-3 mm/min

b) 4-6 mm/min

c) 6-9 mm/min

d) 10-13 mm/min

Correct Answer - A
Ans. A. 1-3 mm/min
Human sperm move at a speed of - 3mm/min through the female genital tract.
Sperms reach uterine tubes 30-60 minutes after copulation.

554. Acidophils secrete

a) GH

b) TSH

c) ACTH

d) FSH

Correct Answer - A
Ans. A . GH
Acidophils of the anterior pituitary secretes growth hormone and prolactin.

555. Vasopressin is secreted by

a) Supraoptic

b) Preoptic

c) Paraventricular

d) Posterior nucleus

Correct Answer - A
Ans. A. Supraoptic
ADH is formed primarily in the supraoptic nuclei, whereas oxytocin is formed primarily in the paraventricular nuclei".

556. Growth hormone level decreased in

a) Hypoglycemia

b) Fasting

c) Sleep

d) Exercise

Correct Answer - C
Ans. C. Sleep
REM sleep decreases GH secretion whereas Slow-wave sleep (N3 of NREM) causes an increase in GH secretion.

557. Pituicytes are seen in ?

a) Anterior lobe

b) Posterior lobe

c) Intermediate lobe

d) All

Correct Answer - B
Ans. B. Posterior lobe
Pituicytes are glial cells of posterior pituitary.

558. Size of sperm ?

a) 100 microns

b) 65nm

c) 100 nm

d) 65 microns

Correct Answer - D
Ans. D. 65 microns

559. cAMP action mediates all except ?

a) Glucagon

b) Follicle stimulating hormone

c) Leutinizing hormone

d) Estrogen

Correct Answer - D
Ans. D. Estrogen

560. In Thyroid follicle for how long Thyroxine is stored?

a) 2-3 weeks

b) 2-3 days

c) 2-3 months

d) 2-3 years

Correct Answer - C
Ans. C. 2-3 months
Thyroid hormones are stored in the follicles in an amount sufficient to supply the body with its normal requirements of thyroid hormones for 2 to 3 months.

561. Ghrelin false is ?

a) Produced by stomach cells

b) Increased appetite

c) Is related to regulation of thyroid hormone

d) Stimulates growth

Correct Answer - C
Ans. C. Is related to regulation of thyroid hormone
Ghrelin is secreted primarily by the stomach and appears to play an important role in the central control of food intake.
It also stimulates growth hormone secretion by acting directly on recePtors in the pituitary.
It is also produced in the hypothalamus and has marked growth hormone-stimulating activity.

562. Isotope used to measure RBC volume is ?

a) Cr 51

b) H3

c) D_20

d) I^{135}

Correct Answer - A
Ans. A. Cr 51
Blood cell volume is measured by Cr51 labeled RBC.

563. Glucose is transported in renal tubular cells by

a) K symport

b) Kantiport

c) Na antiport

d) Na cotransport

Correct Answer - D
Ans. D. Na cotransport
Sodium-dependent glucose transporters, SGLT I and SGLT 2, are responsible for the secondary active transport of glucose in the intestine and renal tubules.
Glucose and Na+ bind to the sodium-dependent glucose transPorter (SGLT) 2 in the apical membrane, and glucose is carried into the cell as Na+ moves down its electrical and chemical gradient.

564. Water travelling from extracellular to intracellular is by?

a) Co-transport

b) Diffusion

c) Filtration

d) Active transport

Correct Answer - B
Ans. B. Diffusion
Best answer of this question is none because transport of water (solvent) across the cell membrane is caused by osmosis.
All the given options are the transport processes of solute across the cell membrane (not for solvent).
However among the given options, diffusion is the closest one : "Diffusion of solvent towards an area where there is higher concentration of solute is called osmosis".

565. Osmolarity is defined as ?

a) Number of osmole per litre

b) Number of osmole per kg

c) Weight of solute per litre

d) Weight of solvent per litre

Correct Answer - A
Ans. A. Number of osmole per litre
Osmolarity > Number of osmole per litre.
Osmolality > Number of osmole per kg.

566. Insensible water loss per day is ?

a) 100 ml

b) 300 ml

c) 700 ml

d) 1000 ml

Correct Answer - C
Ans. C. 700 ml
Insensible water loss- There is continuous loss of water by evaporation from respiratory tract and diffusion through the skin, which together accounts 700 ml/day of water loss under normal conditions.
The insensible water loss from skin (diffusion through skin) occurs independently of sweating and accounts 350 ml ofwater loss per day.
So, in the absence of sweating, water loss from the skin is 350 ml/day

567. Which of the following increases particle diffusion across the cell membrane ?

a) Increasing size of particle

b) Decreasing lipid solubility of substance

c) Increasing lipid solubility of substance

d) Decreasing size of opening in cell membrane

Correct Answer - C
Ans. C. Increasing lipid solubility of substance
Simple diffusion is favored by small size, lipid solubility and absence of polarity (non-polar substance) and charge (neutral molecule) through a thin, large membrane where the concentration gradient is more.

568. Most potent anti oxidant ?

a) Vit A

b) Vit K

c) Vit E

d) Vit C

Correct Answer - C
Ans. C. Vit E
Vitamin E (tocopherol) is the most in potent antioxidant in the body, acting in the lipid phase of membranes protecting against the effects offree radicals.

569. In moderate excercise the respiratory rate is increased due to response of ?

a) Propioception receptor in the joints

b) ↓PCO_2 in arterial blood

c) ↓PO_2 in arterial blood

d) J-receptor stimulation

Correct Answer - A

Ans. A. Propioception receptor in the joints

In moderate exercise the abrupt increase in ventilation at the start of exercise is due to psychic stimuli and afferent impulses from proprioceptors in muscles, tendons and joints.

570. Myosin filament has a fixed length of

a) 0.16 nm

b) 1.6 micrometers

c) 16 nm

d) l.6 mm

Correct Answer - B
Ans. B. 1.6 micrometers
The total length of each myosin filament is uniform, almost exactly 1.6 micrometers.

571. Plasma membrane is mainly composed of ?

a) Cholesterol

b) Carbohydrate

c) Phospholipid

d) Protein

Correct Answer - D
Ans. D. Protein

572. On weight basis, the membrane contains protein and lipid in the ratio of ?

a) 1 : 2

b) 1 : 1

c) 2 : 1

d) 4 : 1

Correct Answer - B
Ans. B. 1 : 1
The cell membrane contains proteins and lipids in a 50:50 ratio. This refers to the ratio of their masses and not numbers".
It is worth noting here that above described percentage is in terms of area occupied. However, in terms of masses, the cell membrane contains proteins and lipids in a 50 : 50 ratio.

573. Which receptors are blocked in Myasthenia Gravis?

a) Ach receptors

b) Ca++receptors

c) Na2+ receptors

d) Opioid receptors

Correct Answer - A
Answer: A - Ach receptors
An autoimmune disease
Antibody mediated autoimmune attack of acetylcholine receptors.
Inability of neuromuscular junctions to transmit signals from nerve to muscle
Resulting in muscle weakness and fatigability.
Unresponsive respiratory muscles may cause respiratory failure in severe cases.
Analysis of neuromuscular transmission reveal

- Decrease in acetylcholine receptors (AChRs)
- Loss of post-junctional folds.
- Circulating antibodies to acetylcholine receptors positive.

Diagnosis:

- **Clinical test:** Strength improvement in response to administration of anticholinesterase agents.

Treatment:

- **Anti-cholinesterase drugs:** Allows accumulation of larger amounts of acetylcholine in synaptic junctions.
- Neostigmine.

574. What is Prosopagnosia?

a) Impairment of consciousness

b) Being unaware of one's problems

c) Difficulty in identifying known faces

d) Failure to identify objects

Correct Answer - C

Ans. C. Difficulty in identifying known faces.

- A feature of anxiety disorder
- **Prosopagnosia is difficulty in identifying known faces**
- Other features of anxiety disorder include,
- Memory impairment without impairment of consciousness
- Being unaware of one's problem (Agnosognosia)

575. What is the characteristic pattern seen in Brown sequard syndrome -

a) C/L loss of joint sense and position

b) C/L loss of pain

c) I/L loss of complete sensory functions

d) C/L motor functions

Correct Answer - B

Answer: B - Contralateral loss of pain sensations

If the spinal cord is completely transected – All the sensations and motor functions distal to segment of transection are blocked.

Transection of spinal cord on single side results in "Brown Sequard Syndrome"

Functions affected:

Function affected	**Position**	**Description**
Motor	**Ipsilateral side**	Complete loss of motor functions below the level of transection
Sensory	**Combined effects observed**	Some sensory functions are lost on transected side and others on opposite side.
	On the Contralateral side: Sensation of pain, cold, & heat	Result of disturbance in Spinothalamic pathway. Loss observed 2 to 6 segments below the level of transection.
	Discrete Crude touch	Poorly localized (Still persists).

		Partial transmission occurs in opposite Spinothalamic tract

576. Insulin like growth factor is secreted by:

a) Liver

b) Pituitary gland

c) Pancreas

d) Adrenal glands

Correct Answer - A

Answer:A. Liver

- Growth hormone **acts on the liver** to form small proteins called "Somatomedins"
- Somatomedins increases bone growth in all aspect
- **Effects are similar to insulin, hence referred to as "Insulin-like Growth Factor" (IGF)**.

Four types available -

- Most important is Somatomedin C - Specifically referred to as "Insulin - Growth Factor -1 / IGF - 1"
- Binds to a carrier protein in blood
- Hence, a longer duration of action than growth hormone.
- Half-life - about 20 Hrs (compared to growth hormone - 20 mins)
- Blood concentration of IGF-1 follows the levels of growth hormone.
- Growth effects of GH are mostly attributed to somatomedin (rather than its direct effect on bones & peripheral tissues)

577. When Va / Q is infinity?

a) Partial pressure of O2 becomes zero

b) No exchange of O2 & CO2

c) Partial pressure of CO2 alone becomes zero

d) Partial pressure both CO2 and O2 remain normal

Correct Answer - B

Answer: B - No exchange of O2 & CO2

- Va represents the ventilation in alveoli.
- Q represents the blood flow through the alveolus.
- The ratio of Va and Q explains the respiratory exchange when there is an imbalance between alveolar ventilation and alveolar blood flow. The ventilation-perfusion ratio is considered normal there is an equal amount of blood flow & ventilation through alveolus.
- Va /q ratio is Zero -
  - There is inadequate or nil, but perfusion persists
- **Va /q ratio is infinity -**
  - **There is adequate ventilation but no perfusion**.
- Both in the Zero and infinity Va /Q ratio, there is no exchange of gases through the respiratory membranes of corresponding alveoli.
- **When Va /Q ratio is infinity,**
  - The alveolar air equilibrates the humidified inspired air
  - No exchange of oxygen and carbon-di-oxide occurs.
  - Partial pressures of the O2 and CO2 are 149mmHg & 0 mmHg respectively

578. Glucose is absorbed in intestine by?

a) Secondary active transport

b) Facilitated diffusion

c) Simple diffusion

d) Primary active transport

Correct Answer - B
Answer:B. Facilitated diffusion
Facilitated diffusion is a diffusion of large water soluble molecule by a carrier protein.
Glucose and amino acids are transported across the membrane by this method.

579. C wave is seen in -

a) Iso -volumetric contraction

b) Slow filling at end of diastole

c) End of systole

d) Start of diastole

Correct Answer - A
Ans. A. Iso -volumetric contraction
C wave:

- Produced by bulging of tricuspid valve into right atrium during Iso-volumetric contraction of right ventricle.

580. Components responsible for counter current mechanism in kidney are all except:

a) Sodium outflow in thick ascending limb

b) Water outflow in thin descending limb

c) Sodium outflow in thin ascending limb

d) Flow of tubular fluid from PCT to DCT

Correct Answer - C

Answer:C. Sodium outflow in thin ascending limb

Counter-current system occurs in kidney

A system in which inflow runs parallel to, counter to, and in close proximity to the outflow for some distance.

2 countercurrent mechanisms available:

- Countercurrent multiplier at Loop of Henle
- Generate high medullary osmotic gradient pressure
- Countercurrent exchanger at vasa recta of medullary capillaries
- Helps in maintain the medullary osmotic pressure gradient

Substances involved in countercurrent mechanism include:

- Sodium actively absorbed with co-transport of potassium & chlorine in thick ascending limb of loop of Henle.
- Water reabsorbed in thin descending limb of loop of Henle.
- Urea diffuse out from the medullary collecting ducts into medullary interstitium.

581. Alpha waves are seen during?

a) Sleep

b) REM movements

c) Relaxed state

d) Active state

Correct Answer - C
Answer: C - Relaxed state

- Regarded as normal wavefront
- Occur **when at rest and eyes closed with active/wandering mind**
  - ie., associated with a **decreased level of attention (either during relaxed/subconscious thinking**)
- Regular Rhythm (Frequency 8-13 Hz Amplitude - 50-100 V)

582. In hypovolemic shock there is -

a) Afferent arteriolar constriction

b) Efferent arteriolar constriction

c) Increased blood flow to kidney

d) Normal cardiac output

Correct Answer - A
Answer: A. Afferent arteriole constriction
Inadequate circulation volume.
Poor venous return to heart will decrease the stroke volume & cardiac output.
Compensation by tachycardia & increased systemic vascular resistance (SVR).
Become cold peripherally (shut down).
Most common causes - Fluid loss of any etiology
Hemorrhage
Salt & water loss
Sepsis
Burns

583. Aldosterone synthesis is stimulated by which of the following?

a) ACTH

b) Hyperkalemia

c) Hypernatremia

d) Exogenous steroids

Correct Answer - B

Ans. B. Hyperkalemia

Mineralocorticoid secretion is stimulated by hyperkalemia, angiotensin-II, ACTH and hyponatremia, in reducing order of efficacy.

1. Aldosterone secretion in response to hyperkalemia is the most important and forms the basis for renal regulation of body potassium balance.
2. Stimulation of aldosterone by angiotensin II (through the renin-angiotensin system) is important for the correction of hypovolemia and hypotension in conditions like salt depletion or renal ischemia.
3. Stimulation of aldosterone secretion by ACTH results in diurnal variation of aldosterone secretion. However, ACTH is not an important physiological regulator for aldosterone secretion.
4. Hyponatremia is a weak stimulator of aldosterone secretion

584. When the value of V/q is infinity, it means?

a) No O2 goes from alveoli to blood and no co2 goes from blood to alveoli

b) Dead space

c) The PO2 of alveolar air is 159mmHg and PCO2 is 40mmHg

d) Partial pressure of O2 and CO2 are equal

Correct Answer - B
Ans: B. Dead space
Dead space
An area with ventilation but no perfusion.
* V/Q undefined, though approaching infinity.
Interpretations of V/Q ratio values:
* Value is 0.8
  - Ventilation-Perfusion matching
* If V/Q is > 0.8 –
  - This means more ventilation than perfusion.
* If V/Q is < 0.8 –
  - V/Q mismatch
Ref: Arvind Arora review book of physiology (p. 240 - 241)

585. Proteoglycan present in the glomerular basement membrane is?

a) Keratan sulphate 1

b) Keratan sulphate 2

c) Heparan sulphate

d) Chondroitin sulphate

Correct Answer - C
Ans: c. Heparan sulphate
The glomerular membrane (or the filtration barrier) is the filtration surface through which the fluid is filtered out from the blood.
The glomerular membrane (filtration barrier) comprises:
* The glomerular capillary endothelium.
* The basement membrane (basal lamina).
* The Bowman's visceral epithelium (podocytes).
* Important constituents of glomerular membrane include,
  - Laminin
  - Type 4 collagen
  - Nidogen
  - Proteoglycans - (Heparan sulphate)

Ref: Arvind Arora review book of physiology (p. 371 - 372)

586. 35yr old female was watching TV for long hours with hands under her head. She complains of tingling sensation over her arm. Which type of nerve fibers is most likely to be affected?

a) Fibers

b) B - fibers

c) C - Fibers

d) Sympathetic nerve fibers

Correct Answer - A

Ans: A. Fibers

A-delta	Features: Diameter - 1-5 Myelination - Some myelination Conduction - 5-30	Functions: Pain - - "Fast/Epicritic/First" pain. - Since fibers are relatively fast Temperature Pressure Touch	High susceptible to Pressure

Ref: Arvind Arora review book of physiology (p. 58 - 59)

587. The reflex in which there is inhibition of gastric emptying when there is acid and hypertonic solution in the duodenum?

a) Enterogastric

b) Gastroileal

c) Gastrocolic

d) Myenteric

Correct Answer - A

Ans: A. Enterogastric

The enterogastric reflex is one of the three extrinsic reflexes of the gastrointestinal tract, the other two being the gastroileal reflex and the gastrocolic reflex.

The enterogastric reflex is stimulated by duodenal distension. It can also be stimulated by a pH of 3-4 in the duodenum and by a pH of 1.5 in the stomach.

The main neural influence in gastric emptying is thought to be mediated via an inhibitory mechanism referred to as the enterogastric reflex. Fats, fatty acids, soaps, protein digestive products, acids, and hypertonic solutions in the small intestine inhibit motility.

Ref: ***https://www.gastrojournal.org/article/S0016-5085(75)80295-2/pdf***

588. In multiple sclerosis, slow conduction of motor and the sensory pathways is due to?

a) Defect in the node of Ranvier

b) Loss of myelin sheath

c) Leaking of sodium channels

d) Leaking calcium channels

Correct Answer - B
Ans: B. Loss of myelin sheath
Multiple Sclerosis (MS) is a disabling progressive neurological disorder
The pathophysiology of MS results in disruption or loss of axonal myelin in the central nervous system (CNS), leading to the formation of scar tissue (sclerosis).
Demyelination produces alterations in saltatory conduction, slowed conduction velocity, and a predisposition to conduction block
Ref: https://www.physiology.org/doi/pdf/10.1152/japplphysiol.0046

589. Which of the following clotting factor in a patient on Warfarin therapy, would have decreased gamma carboxyglutamate residue?

a) Factor 2

b) Factor 11

c) Tissue factor

d) Factor 5

Correct Answer - A

Ans: A. Factor 2

- Vitamin K is a cofactor for the enzymatic conversion of glutamic acid (Glu) residues to gamma-carboxyglutamic acid (GLA) in vitamin K-dependent proteins, via the endoplasmic reticulum resident vitamin K-dependent gamma-glutamyl carboxylase.
- This carboxylase activity is found in essentially all mammalian tissues, and its reaction product, Gla, has been observed in both vertebrates and invertebrates; both play an important biological role in protein function.
- Vitamin K–dependent clotting factor deficiency (VKCFD) is a rare autosomal recessive bleeding disorder that often presents with severe hemorrhage during infancy.
- A rare inherited form of defective γ-carboxylation resulting in the early onset of bleeding was first described by McMillan and Roberts in 1966 and subsequently has been termed *vitamin K–dependent clotting factor deficiency* (VKCFD).
- Combined deficiency of vitamin K–dependent clotting factors II, VII, IX, and X (and proteins C, S, and Z) is usually an acquired clinical problem, often resulting from liver disease, malabsorption, or warfarin overdose.

- Patients plasma showed less than 3% activity of factors II, VII, IX, and X.

590. Blood stored in citrate-phosphate-dextrose is better for hypoxic patients than acidic-citrate-dextrose because?

a) It has less P_{50}

b) It is less acidic

c) The fall in 2, 3 DPG is less

d) None of the above

Correct Answer - C

Ans: C. The fall in 2, 3 DPG is less

- The infusion of ACD blood caused P_{50} and 2,3-DPG concentration to decrease significantly.
- The infusion of blood stored in citrate phosphate dextrose (**CPD**) did not significantly increase the oxygen affinity.
- To compensate for the increased oxygen affinity, there must be a rise in cardiac output or more likely a decrease in venous PO_2.
- The transfusion of CPD blood, therefore, is more favorable in terms of oxygen supply, particularly in patients who have had cardiac surgery.