

[130/145]

SARDAR PATEL UNIVERSITY

M.Sc (III Semester) Biochemistry/Zoology Examination (CBCS)

Friday, 1st January 2021, 2:00 pm to 4:00 pm

PS03CBIC21/PS03CZOO21 – Human Physiology

TOTAL MARKS: 70

Q.1 (A) Choose the most correct answer for the following and write in your answer sheet. (08 Marks)

1. Most of the body's compensatory homeostatic mechanisms function by
 - (a) Positive feedback system
 - (b) Sensory division of PNS
 - (c) Negative feedback system
 - (d) CNS
2. The liver is a unique organ as it receives a dual blood supply from
 - (a) Hepatic artery and hepatic duct
 - (b) Hepatic artery and hepatic portal vein
 - (c) Hepatic portal triad
 - (d) The liver does not receive dual blood supply
3. Which of the following valve prevents gastric juices from flowing back out of the stomach into the oesophagus
 - (a) Cardiac sphincter
 - (b) Pharyngeal valve
 - (c) Pyloric sphincter
 - (d) None of these
4. In which organ of the digestive system, food is thoroughly mixed with its own digestive juices by a vigorous, to-and-fro churning motions caused by contractions of strong muscle in its wall?
 - (a) small intestine
 - (b) large intestine
 - (c) liver
 - (d) stomach
5. Which of the following Ion Channel is opened by neurotransmitters in the membrane of a neuron cells?
 - (a) K⁺ Leakage channel
 - (b) A ligand-gated channel
 - (c) A mechanically gated channel
 - (d) A voltage gated channel
6. In the resting state of the neural membrane, diffusion due to concentration gradient, if allowed would drive,
 - (a) K⁺ into the cell
 - (b) K⁺ and Na⁺ out of the cell
 - (c) Na⁺ into the cell
 - (d) None
7. Angiotensinogen is a protein produced and secreted by
 - (a) Liver cells
 - (b) Endothelial cells
 - (c) Macula Dansa cells
 - (d) JuxtaGlomerular cells
8. Which of the following increases GFR?
 - (a) Atrial natriuretic peptide (ANP)
 - (b) Constriction of the afferent arterioles
 - (c) Increased sympathetic stimulation to the afferent arterioles
 - (d) ADH

Q. 1 (B) Fill in the blanks.

(16 marks)

1. _____ produced by parietal cells forms a complex with Vitamin B12, which is necessary for its absorption in ileum.
2. Under normal resting conditions, _____, _____, and _____ receive excess blood because of their importance in maintaining homeostasis.

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[P.T.O.]

3. The products of lipid digestion are coated with proteins and transported into lymphatic capillaries called _____.
4. Action potentials has two main phases, _____ and _____.
5. Each day within the mucosa of the gastric walls in the GI tract secrete a total of about _____ of digestive juice.
6. A period of time after an action potential begins during which an excitable cell can not generate another action potential in response to a normal threshold stimulus is called the _____.
7. As food reaches the pylorus, each mixing wave periodically forces about 3 ml of chyme into the duodenum, a phenomenon known as _____.
8. Gastric emptying is slowest after a _____ meal because it stimulates cholecystokinin, which slows stomach emptying.

Q. 1 (B) Mark the following statements as TRUE or FALSE.

1. With increase in age, the blood supply to the digestive tract decreases.
2. Unmyelinated axons exhibit continuous conduction; whereas myelinated axons exhibit saltatory conduction of nerve impulses.
3. The pressure generated by left ventricular contraction is the driving force for the flow of blood through the entire systemic as well as pulmonary circulation.
4. Renin is a proteolytic enzyme that converts an inactive angiotensinogen, into angiotensin I.
5. The length of the GI tract is about 5 -7 meters in a living person and 7-9 meters in cadavers.
6. The histamine receptors on the parietal cells are called H₂ receptors, and are different from H₁ receptors involved in allergic reactions.
7. Glomerular filtrate has the same ratio of water and solute particles as blood.
8. Under normal physiological conditions, hematocrit and blood viscosity do not vary considerably within an individual.

Q.2 (A) Answer any SEVEN of the following questions briefly:

(14 marks)

1. Human body is constantly challenged with altering external environmental conditions, how the cells and tissues in the various systems maintain internal order to function efficiently?
2. Through which type of blood capillaries and how the exchange of blood constituents takes place between blood and interstitial fluid?
3. Name major secretory cells in the stomach along with their secretion.
4. What is the significance of high and low WBC counts? Do WBCs live longer in healthy individuals or infected individuals?
5. Which pathway of blood coagulation occurs faster?
6. Narrate the functions of liver.
7. Differentiate between phagocytosis by neutrophils and phagocytosis by macrophages.
8. What is the role of ADH in urine formation?
9. Which cells form myelin sheath on axons? How?

Q.3 Describe the functions, life cycle and regulation of formation red blood cells.

(08)

OR

Q.3 What is mean arterial pressure (MAP)? Discuss how cardiac output and total peripheral resistance affect MAP.

(08)

Q.4 Describe the mechanical and chemical digestion in the stomach.

(08)

OR

Q.4 Describe the major hormones that regulate digestive activities. (08)

Q.5 What is countercurrent multiplication? How does a kidney produce concentrated urine in summer? (08)

OR

Q.5 Describe the routes and mechanisms of tubular reabsorption and secretion. Which substances are reabsorbed most and which substance is not reabsorbed at all? (08)

Q. 6 What are the roles of FSH, LH, oestrogen and progesterone in the female reproductive system? (08)

OR

Q.6 Explain the propagation of action potential (AP). (08)

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SARDAR PATEL UNIVERSITY
M.Sc. (III SEMESTER) EXAMINATIONS2nd January, 2021 (Saturday)

Time: 02.00 – 04.00 p.m.

PAPER: PS03CBIC22 - GENETIC ENGINEERING

Total Marks: 70
(8 x 1 = 8 marks)

Choose the most appropriate answer:

1. EDTA is used in DNA isolation for _____
 - a) Inhibiting DNA degradation by DNase
 - b) Removing Mg²⁺ required for bacterial cell wall structure maintenance
 - c) Removing outer LPS layer of Gram negative bacteria
 - d) All of these.
2. Which of the following ions is required for activity of type 2 restriction enzymes?
 - a) Ca²⁺
 - b) Mg²⁺
 - c) Na²⁺
 - d) Mn²⁺.
3. Which of the following libraries would be expected to be the same?
 - a) Genomic libraries from mouse liver cells and kidney cells
 - b) cDNA libraries from mouse liver cells and kidney cells
 - c) Genomic libraries from human liver cells and mouse liver cells
 - d) cDNA libraries from human liver cells and mouse liver cells.
4. Site directed mutagenesis on DNA is possible through
 - a) Physical mutagens
 - b) Chemical mutagens
 - c) Random cleavage and ligation
 - d) None of these
5. Eukaryotic genes may not function properly when cloned into bacteria because bacteria
 - a. Cannot excise introns
 - b. Destroy the eukaryotic DNA by native endonucleases
 - c. Eukaryotic promoters are not recognized by bacterial RNA polymerase
 - d. all of the above
6. A mouse in which one particular gene has been replaced by its inactivated form generated *in vitro* is called
 - a) transgenic mouse
 - b) knockout mouse
 - c) abnormal mouse
 - d) mutant mouse
7. Stringency in Southern blotting is essential to
 - a. allow the DNA to get cross linked to the membrane
 - b. denature the dsDNA
 - c. allow specific binding of the probe to the target DNA
 - d. avoid specific interaction between probe and target DNA
8. In conventional PCR, quantification of the initial DNA used is NOT possible since
 - a. Ethidium Bromide does not bind quantitatively to DNA
 - b. the reaction is not optimized in the first few cycles
 - c. the amplification of DNA is not exponential

[4]

[P.T.O.]

II. Fill in the blanks / Write True or False:

(16 x 1 = 16 marks)

Fill in the blanks:

1. The EMBL vectors are derived from _____ DNA.
2. IPTG and X-Gal are used in the _____ screening technique
3. Adding monomeric nucleotides at DNA ends to improve ligation is known as _____.
4. The part of the Ti plasmid that integrates into the host plant chromosome is known as _____.
5. Sanger's DNA sequencing technique uses _____ nucleotides for chain termination.
6. In pyrosequencing _____ is used as reporter system for base incorporation

Write true or False

7. Recognition sites for restriction enzymes have higher GC content.
8. A variant of human tissue type plasminogen activator proteins in transgenic Goat is usually expressed in milk
9. Bt genes or Cry genes to make BT Cotton are obtained from Boll worm
10. Luciferase reporter system is a sensitive, stand alone system.
11. Maxam-Gilbert's method of DNA sequencing could not be automated since toxic chemicals are used.
12. RAPD is an expensive as well as difficult method of DNA finger printing
13. Novel plant varieties could be protected under patents law
14. BAC vectors have less insert capacity but greater stability than YAC vectors
15. SYBR Green binds to DNA in a sequence specific manner.
16. Tungsten microprojectiles used for Biolistics have better DNA holding capacity and no toxicity

III. Answer briefly any seven:

(7 x 2 = 14 marks)

1. Differentiate between Isoschizomers and Neoschizomers.
2. What is star activity of restriction enzymes?
3. Enlist the properties of an ideal plasmid vector.
4. Differentiate between Cloning vector and Expression vector.
5. Use of alkaline phosphatase in rDNA technology

6. Differentiate between *E. coli* and T4 DNA ligase
7. Taqman probes
8. Principle of VNTRs
9. Golden rice

IV. Answer in detail

(4 x 8 = 32 marks)

1. Explain in detail the principle, procedure and the precautions to be taken for isolation of genomic DNA from *E. coli*.

OR

1. Explain mechanism of ligation of DNA. Write a note on linkers and homopolymer tailing.
2. Write a note on: a) colony hybridization b) Subtractive hybridization.

OR

2. What are the salient features of expression vectors? Discuss the method for recombinant protein production using expression vectors
3. Explain the basic principle of Sanger's dideoxy sequencing. What are the applications of DNA sequencing.

OR

3. Describe the principle and advantages of VNTR DNA fingerprinting. With suitable examples outline its applications in forensics.
4. Explain the strategy used for the production of any one transgenic plant in detail

OR

4. Give an account of the rules and regulations for the release and use of GMOs in India

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SEAT NO. _____

No. of Printed Pages : 2

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SARDAR PATEL UNIVERSITY
M.Sc. (III-SEMESTER) Examination (CBCS)
M.Sc. Biochemistry/Biotechnology/Microbiology
PS03EBIC214 PS03EBIT214 PS03EMIC214 PLANT BIOCHEMISTRY

Date: 05/01/2021, Tuesday

TIME: 02:00 PM-04:00PM

TOTAL MARK 70

1.(A) Choose the correct answer.

(1x8=8)

- i. Passive, directional movement of molecules is part of the process called ____
(a) free energy (b) Brownian movement (c) diffusion (d) lysis
- ii. The membrane around the vacuole is known as
(a) Tonoplast (b) Elaioplast (c) Cytoplasm (d) Amyloplast
- iii. The quantum yield of oxygen evolution during photosynthesis drastically drops in far red light. This effect is known as
(a) Far red drop (b) Red drop (c) Blue drop (d) Visible spectrum drop
- iv. Hatch-Slack cycle takes place in
(a) Mesophyll (b) Bundle sheath (c) Both a and b (d) none
- v. Nitrite reductase is present in
(a) Cytoplasm (b) Leucoplast (c) Chloroplast (d) Both b and c
- vi. Bolting of rosette plants is caused by
(a) Auxin (b) Cytokinin (c) Gibberellins (d) Ethylene
- vii. Which one of the following is not a phenolic compound?
(a) Flavonoids (b) Anthocyanins (c) Lignin (d) Cocaine
- viii. Canavanine is an analog of
(a) Arginine (b) Proline (c) Glycine (d) None

1. (B) Do as directed

(16)

- i. The middle lamella is a layer which cements the cell walls of two adjoining plant cells together. True/False
- ii. Meristematic cells will have large vacuoles. True/False
- iii. Guttation happens through ____.
- iv. Transpiration is known as 'necessary evil'. True/False
- v. Chlorophyll pigments have one porphyrin ring and a ____ 'tail'.
- vi. In some plants leaves are purple due to the presence of anthocyanins. True/False
- vii. Kranz anatomy is associated with C₃ plants. True/False
- viii. 'Rubisco' is the first enzyme in the Calvin-Benson cycle. True/False
- ix. To take up one nitrate from soil, plant spends two ATPs. True/False
- x. In chloroplast NADPH is used as a reducing agent for ammonia synthesis. True/False
- xi. The host plant signals its readiness to form nodules by excreting several ____ as signal compounds.
- xii. Homocitrate is a component in the cofactor of nitrogenase. True/false
- xiii. Casparian strip of root endodermis is formed of ____.
- xiv. Glucosinolates are present in Brassicaceae. True/False
- xv. Artemisinin is a sesquiterpenoid used as ____ drug.
- xvi. Condensed tannins are made up of ____.

[1]

[P.T.O.]

2. Attempt any seven

(14)

- a. Why plasma membrane is called semipermeable membrane?
- b. Comment upon the importance of water in plant life.
- c. Why photorespiration almost negligible in C4 plants?
- d. What is meant by cyclic photophosphorylation?
- e. List factors which activate nitrate reductase gene.
- f. What is the function of leghemoglobin?
- g. What are cyanogenic glycosides?
- h. Define 'systemic acquired resistance'.
- i. What is cutin?

3. Define: water potential and explain three major factors influencing water potential of cell?

(08)

OR

3. Write an account on plant cell wall.

(08)

4. Give an account of the mechanism of CO₂ fixation, explain major steps and the end products in photosynthesis.

(08)

OR

4. Explain the structural feature of chloroplast support the light reaction and describe the role of PS-I and PS-II in the light reaction of photosynthesis.

(08)

5. Briefly explain the process of biological nitrogen fixation.

(08)

OR

5. Explain the transport and mode of action of auxins.

(08)

6. Write an account on synthesis of phenolic compounds.

(08)

OR

6. What are terpenes? Explain their role in plant defense.

(08)

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