

**RAMAKRISHNA MISSION VIVEKANANDA CENTENARY COLLEGE, RAHARA, KOLKATA**  
**Undergraduate Admission Test 2025: Microbiology Honours**

**Full Marks: 75**

**Time: 1 hour**

1. A 45-year-old male presents with pain in the upper abdomen, particularly after meals. He has a history of alcohol consumption. On examination, he is tender to palpation in the epigastric region. His laboratory tests reveal elevated amylase and lipase levels. What is the most likely diagnosis?
  - a) Gallstones
  - b) Peptic ulcer disease
  - c) Acute pancreatitis
  - d) Gastroesophageal reflux disease (GERD)
2. A person experiences sudden blood loss due to trauma. Shortly after, their urine output drops drastically, and renin levels are elevated. Which sequence best describes the physiological response to restore GFR (Glomerular Filtration Rate)?
  - a) Renin → angiotensin II → afferent vasodilation → increased filtration
  - b) Renin → angiotensin II → efferent vasoconstriction → increased GFR
  - c) Renin → aldosterone → proximal tubule water secretion → increased GFR
  - d) Renin → increased ADH → afferent constriction → increased pressure
3. Which of the following best explains why the physiological calorific value of protein (4.0 kcal/g) is significantly lower than its gross calorific value (5.65 kcal/g), while carbohydrates and fats show much smaller differences between their gross and physiological values?
  - a) Proteins are poorly combusted in the bomb calorimeter due to incomplete oxidation.
  - b) A significant portion of the energy from proteins is lost in the form of urea during metabolism.
  - c) Proteins are used mainly for structural functions in the body and not for energy.
  - d) The calorific value of protein depends on the type of amino acid present, unlike carbohydrates and fats.
4. A 22-year-old athlete has a resting heart rate of 50 bpm. His ECG shows a normal P wave, a prolonged PR interval, and a regular QRS complex. Which of the following is most likely?
  - a) Myocardial infarction
  - b) Second-degree heart block
  - c) First-degree AV block
  - d) Ventricular fibrillation
5. Which of the following statements is incorrect about the G<sub>0</sub> phase?
  - a) Mitosis occurs after the G<sub>0</sub> phase
  - b) Biocatalysts can be used to exit the G<sub>0</sub> phase
  - c) Cell volume goes on increasing during the G<sub>0</sub> phase
  - d) Cell metabolism occurs continuously in the G<sub>0</sub> phase.
6. Which of the following is an important molecule present in the outer membrane of HIV that helps the virus to enter and infect host cells?
  - a) Polysaccharides
  - b) Glycoproteins
  - c) Proteins
  - d) Lipopolysaccharides

7. Compare the column M with column N for justify the most appropriate data.

Column M		Column N	
i)	Geitonogamy	A	Automatic self-pollination of certain plants that can propagate by using non-opening, self-pollinating flowers.
ii)	Cleistogamy	B	Unique form of polymorphism and herkogamy in flowers, which shows heteromorphic self-incompatibility.
iii)	Protandry	C	Pollen is transferred from the anther of one flower to the stigma of another flower on the same flowering plant.
iv)	Heterostyly	D	The anthers ripen first, so the anther bursts, it pollinates stigmas of other flowers but not its own stigma which is not yet ripe.

- a) i) -A, ii) -C, iii) -B, iv) -D  
 b) i) -B, ii) -D, iii) -A, iv) -C  
 c) i) -C, ii) -A, iii) -D, iv) -B  
 d) i) -D, ii) -B, iii) -C, iv) -A

8. Hemophilia is X chromosome linked recessive trait in human. Which of the following statements is/are correct for the offsprings, born to hemophilic father and hemophilia carrier mother?

- A. All the daughters are carriers and all the sons are hemophilic.  
 B. Daughters can be either carrier or normal.  
 C. Daughters can be either hemophilic or normal.  
 D. Daughters can be either hemophilic or carrier.  
 E. Sons can be either carrier or normal.  
 F. Sons can be either hemophilic or normal.  
 G. Sons can be either hemophilic or carrier.

- a) Only A  
 b) Both B & E  
 c) Both D & F  
 d) Both C & G

9. Which of the following statement/s is/are true?

- A. Diffusion is a passive movement of molecules from higher to lower concentration.  
 B. Facilitated diffusion requires special membrane proteins but does not need energy.  
 C. Active transport can move molecules from low to high concentration using ATP.  
 D. Simple and facilitated diffusion allow transport against a concentration gradient.

- a) Only A is true  
 b) Only A and B are true  
 c) Only A, B and C are true  
 d) All the above statements are true

10. The wild type *Escherichia coli* cells are growing in presence of glucose as sole carbon source. If they are transferred to a medium containing both lactose and glucose, what would be the initial effect on its lac operon?

- a) Induction.  
 b) Repression.  
 c) No change would occur.  
 d) Insufficient information.





21. What is the correct acidity order
- benzoic acid > *para*-chlorobenzoic acid > *para*-nitrobenzoic acid > *para*-methylbenzoic acid > *para*-methoxybenzoic acid
  - para*-nitrobenzoic acid > *para*-chlorobenzoic acid > benzoic acid > *para*-methylbenzoic acid > *para*-methoxybenzoic acid
  - para*-methoxybenzoic acid > *para*-methylbenzoic acid > benzoic acid > *para*-chlorobenzoic acid > *para*-nitrobenzoic acid
  - para*-nitrobenzoic acid > *para*-methoxybenzoic acid > *para*-chlorobenzoic acid > *para*-methylbenzoic acid > benzoic acid.
22. If you have a mixture of 0.35 (M)  $\text{NaH}_2\text{PO}_4$  + 0.35 (M)  $\text{Na}_2\text{HPO}_4$ ; what is the pH of this mixture? [pK of  $\text{NaH}_2\text{PO}_4$  = 7.2]
- 7.0
  - 7.1
  - 7.2
  - 7.3
23. At room temperature  $\text{H}_2\text{O}$  is liquid but  $\text{H}_2\text{S}$  is gas. But molecular weight of  $\text{H}_2\text{O}$  is less than  $\text{H}_2\text{S}$ . Which is the cause of this type of observation?
- Dipole-Dipole interaction
  - Dipole-induces Dipole interaction
  - Induced dipole-induced dipole interaction
  - Hydrogen bonding
24. If pH of the solution of an amino acid is greater than the iso-electronic point of that amino acid, then the amino acid moves towards which direction?
- Positive electrode
  - Negative electrode
  - Both the positive and negative electrodes
  - Stay at same position
25. A researcher is analyzing a newly isolated compound from a marine organism. The compound tests positive for the Molisch test, yields no color with iodine, is hydrolyzed by  $\alpha$ -amylase, and upon hydrolysis gives only glucose. Which of the following is the most likely identity of the compound?
- Starch
  - Sucrose
  - Cellulose
  - Glycogen