

MOCK TEST 11, 2024
HS 2ND YEAR SCIENCE

TIME : 1 HOUR

MARKS: 120(JEE), 200(NEET)

BIOLOGY

1. Which enzyme is responsible for unwinding the DNA double helix during replication?
a) DNA polymerase b) Helicase c) Ligase d) Primase
2. What is the role of DNA polymerase in DNA replication?
a) Unwinds the DNA strand b) Joins Okazaki fragments
c) Synthesizes new DNA strand by adding nucleotides d) Forms RNA primer
3. Which of the following statements is true regarding the direction of DNA synthesis?
a) DNA is synthesized in the 3' to 5' direction b) DNA is synthesized in the 5' to 3' direction
c) DNA can be synthesized in both 3' to 5' and 5' to 3' directions
d) DNA synthesis occurs randomly in both directions
4. Which enzyme is responsible for removing RNA primers and filling the gaps with DNA?
a) DNA ligase b) DNA polymerase I c) Helicase d) Topoisomerase
5. Okazaki fragments are associated with which strand during DNA replication?
a) Leading strand b) Lagging strand
c) Both leading and lagging strands d) Neither leading nor lagging strands
6. A reaction of granules content which harden the zona pellucida and ensures sure block to polyspermy is
a. acrosomal reaction b. cortical reaction c. acrosin reaction d. bindin reaction.
7. Which part of the sperm plays an important role in penetrating the egg membrane?
a. Allosome b. Tail c. Autosome d. Acrosome
8. In oocyte secondary maturation occurs in
a. ovary b. abdominal cavity c. Fallopian tube d. uterus.
9. Besides activating the egg another role of a sperm is to carry to egg
a. RNA b. mitochondria c. DNA d. ribosome:
10. Preparation of sperm before penetration of ovum is
a. spermiation b. cortical reaction c. spermiogenesis d. capacitation
11. Spermiation is the process of the release of sperms from
a. seminiferous tubules b. vas deferens c. epididymis d. prostate gland
12. The process by which antibodies are produced is called:

- a) Humoral immunity b) Cell-mediated immunity c) Active immunity d) Passive immunity
13. Which disease is caused by the parasite *Plasmodium vivax*?
- a) Malaria b) Tuberculosis c) Cancer d) AIDS
14. The term "antigen" refers to:
- a) A foreign substance that triggers an immune response b) An antibody produced in response to an antigen
- c) A type of white blood cell d) A type of vaccine
15. Which of the following is a type of immunodeficiency disease?
- a) AIDS b) Cancer c) Tuberculosis d) Malaria
16. Ecological pyramids were first devised by:
- a. Charles Elton b. R. Hesse c. R.A. Lindermann d. Justus von Liebig
17. Today we know more than restriction enzymes that have been isolated from over.....strains
- a. 700; 350. b. 900; 230 c. 600; 270 d. 550; 210
18. In a food chain, the total amount of living material is depicted by-
- a. Pyramids of biomass b. Trophic level c. Pyramids of number d. Pyramids of energy
19. In an ecosystem
- a. Movement of energy is unidirectional b. Energy cycling is an independent process
- c. Energy cycling and nutrient cycling are coupled processes d. Micro and macronutrients cycle at the same place
20. Earthworm is a -
- a. Herbivore b. Secondary consumer c. Tertiary consumer d. Detritivore
21. In the process of plant ecological succession, the final stage is -
- a. Seral stage b. Ecesis c. Climax community d. Competition
22. What is the basic structural and functional unit of life?
- a) Cell b) Tissue c) Organ d) Organ system
23. Which of the following is a characteristic of living organisms?
- a) Growth and development b) Reproduction c) Response to stimuli d) All of the above
24. What is the process by which organisms maintain a stable internal environment?
- a) Homeostasis b) Metabolism c) Photosynthesis d) Respiration
25. Which microbe is used in the production of citric acid?
- a) *Aspergillus niger* b) *Penicillium chrysogenum*
- c) *Saccharomyces cerevisiae* d) *Escherichia coli*
26. Which microbe is used in the production of streptomycin?
- a) *Streptomyces griseus* b) *Bacillus subtilis*

$\phi = BA \cos \theta$
 $= 0.5 \times 1 \times 0$
 $= 0.5 \text{ wb}$

$E = 2 \text{ N/C}$
 $d = 30 \times 10^{-2}$
 $d = 3 \times 10^{-1}$

$\frac{kq^2}{r^2}$
 $+9 \rightarrow 25\% \rightarrow \frac{9+25}{100}$
 $\frac{34}{100}$

$-9 \rightarrow +25\% \rightarrow \frac{-9+25}{100}$
 $\frac{16}{100}$
 $\frac{16}{100}$

$\frac{15}{16}$

$\frac{d \tan t}{dt}$
 $\frac{d \sec t}{dt}$

$3 \sec t$
 $3 \sec t \tan t$
 $3 \sec t \tan t$
 $3 \sec t$

- (a) 0.02 V (b) 2V (c) 0.2V (d) 2×10^{-3} V

Q7. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 \gg R_2$, the mutual inductance M between them will be directly proportional to :

- (a) R_1/R_2 (b) R_2/R_2 (c) R_1^2/R_2 (d) R_2^2/R_1

Q8. A square loop of side 1m and resistance 1 Ω is placed in a magnetic field of 0.5 T. If the plane of loop is perpendicular to the direction of magnetic field, the magnetic flux through the loop is :

- (a) zero weber (b) 2 weber (c) 0.5 weber (d) 1 weber

Q9. The magnitude of point charge due to which the electric field 30cm away has magnitude 2N/C will be

- (a) 2×10^{-11} C (b) 3×10^{-11} C (c) 5×10^{-11} C (d) 9×10^{-11} C

Q10. Two point charges A and B, having charges +Q and -Q respectively, placed at certain distance apart a force acting between them is F. If 25% charge of A is transferred to B, then force between the charges becomes

- (a) F (b) $9F/16$ (c) $16F/9$ (d) $4F/3$

MATHEMATICS

1. If $A \cdot (\text{adj} A) = 8I$ for a 3×3 matrix A, then det. A is equal to

- (a) 1 (b) 8 (c) 4 (d) None of these

2. Let $\begin{bmatrix} 5 & 5x & x \\ 0 & x & 5x \\ 0 & 0 & 5 \end{bmatrix}$. If $|A^2| = 25$, then $|x| =$

- (a) 1 (b) $\frac{1}{5}$ (c) 5 (d) None of these

3. If α, β are non-real number satisfying $x^3 - 1 = 0$, then the value of $\begin{vmatrix} \mu+1 & \alpha & \beta \\ \alpha & \mu+\beta & 1 \\ \beta & 1 & \mu+\alpha \end{vmatrix}$ is equal to

- (a) 0 (b) μ^3 (c) $\mu^3 + 1$ (d) 5!

4. If $A = \begin{bmatrix} 5a & -b \\ 3 & 2 \end{bmatrix}$ and $A \cdot \text{adj} A = AA^T$, then $5a + b$ is equal to

- (a) -1 (b) 5 (c) 13 (d) none of these

5. The function $g(x) = \frac{x}{2} + \frac{2}{x}$ has a local minimum at

- (a) $x = 2$ (b) $x = -2$ (c) $x = 0$ (d) $x = 1$

6. The integral $\int \frac{3x^{13} + 2x^{11}}{(2x^4 + 3x^2 + 1)^4} dx$ is equal to

- (a) $\frac{x^4}{6(2x^4 + 3x^2 + 1)^3} + c$ (b) $\frac{x^4}{(2x^4 + 3x^2 + 1)^3} + c$ (c) $\frac{x^{12}}{6(2x^4 + 3x^2 + 1)^3} + c$ (d) None of these

7. If $x > 1$ for $(2x)^{2y} = 4e^{2x-2y}$, then $(1 + \log_e 2x)^2 \frac{dy}{dx}$ equals

- (a) $\frac{x \log_e 2x - \log_e 2}{x}$ (b) $\log_e 2x$ (c) $\frac{x \log_e 2x + \log_e 2}{x}$ (d) none of these

8. If $x = 3 \tan t$ and $y = 3 \sec t$ then the value of $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{4}$ is

- (a) $\frac{1}{6\sqrt{2}}$ (b) $\frac{3}{2\sqrt{2}}$ (c) $\frac{1}{3\sqrt{2}}$ (d) None of these

$\frac{16}{9}$
 $\frac{16}{9}$

$2 = 9 \times 10^9 \times \frac{a}{30 \times 10^{-2}}$

$2 = \frac{3 \times 10^{10}}{3}$
 $2 = \frac{2}{3} \times 10^{10}$

0.66×10

$\frac{1}{2} \times \frac{2}{x^2} = \frac{1}{x^2}$

$2x^3$

$\frac{1}{2} - \frac{2}{x^2} = 0$

$\frac{2}{x^2} = \frac{1}{2} \times \frac{\tan \frac{\pi}{4}}{\sec \frac{\pi}{4}}$

$4 = x^2$
 $\frac{1}{\sqrt{2}}$

9. If $A = \begin{bmatrix} x & 1 & x \\ 0 & 1 & -1 \\ x & 0 & 7 \end{bmatrix}$ and $\det(A) = \begin{bmatrix} 3 & 0 \\ 2 & -1 \\ 0 & 0 \end{bmatrix}$, then the value of x is :

- (a) -3 (b) 3 (c) -8 (d) -2

10. In a class of 60 students, 40 opted for NCC, 10 opted for NSS and 20 opted for both NCC and NSS. If one of these students is selected at random, then the probability that the student selected has opted neither for NCC nor for NSS is

- (a) $\frac{1}{6}$ (b) $\frac{5}{6}$ (c) $\frac{1}{3}$ (d) None of these

CHEMISTRY

1. At 300 K, the vapour pressure of a solution containing 1 mole of *n*-hexane and 3 moles of *n*-heptane is 550 mm of Hg. At the same temperature, if one more mole of *n*-heptane is added to this solution, the vapour pressure of the solution increases by 10 mm of Hg. What is the vapour pressure in mm Hg of *n*-heptane in its pure state?

- (a) 600 (b) 300 (c) 500 (d) 200

2. At 35°C, the vapour pressure of CS_2 is 512 mm Hg and that of acetone is 344 mm Hg. A solution of CS_2 in acetone has a total vapour pressure of 600 mm Hg. The false statement amongst the following is

- (a) Raoult's law is not obeyed by this system
(b) a mixture of 100 mL CS_2 and 100 mL acetone has a volume < 200 mL
(c) CS_2 and acetone are less attracted to each other than to themselves
(d) heat must be absorbed in order to produce the solution at 35°C

3. The species given below that does not show disproportionation reaction is

- (a) BrO_2^- (b) BrO^- (c) BrO_4^- (d) BrO_3^-

4. The highest electrical conductivity from the following aqueous solutions is of

- (a) 0.1 M acetic acid (b) 0.1 M fluoroacetic acid
(c) 0.1 M chloroacetic acid (d) 0.1 M difluoroacetic acid

5. If 60% of a first order reaction was completed in 60 min, 50% of the same reaction would be completed in approximately ($\log 4 = 0.60$, $\log 5 = 0.69$)

- (a) 45 min (b) 50 min (c) 60 min (d) 40 min

6. The rate of first order reaction is $1.5 \times 10^{-2} \text{ mol L}^{-1} \text{ min}^{-1}$ at 0.5 M concentration of the reactant. The half-life of the reaction is

- (a) 0.383 min (b) 23.1 min (c) 8.73 min (d) 7.53 min

7. The coordination number of Th in $\text{K}_4[\text{Th}(\text{C}_2\text{O}_4)_4(\text{OH}_2)_2]$ is ($\text{C}_2\text{O}_4^{2-} = \text{Oxalato}$)

- (a) 14 (b) 8 (c) 10 (d) 6

8. A reaction of cobalt (III) chloride and ethylene diamine in a 1:2 mole ratio generates two isomeric products A (violet coloured) and B (green coloured). A can show optical activity, but B is optically inactive. What type of isomers does A and B represent?

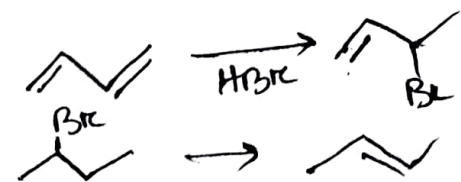
- (a) Ionisation isomers (b) Coordination isomers (c) Linkage isomers (d) Geometrical isomers

9. Reaction of one molecule of HBr with one molecule of 1, 3-butadiene at 40°C gives predominantly

- (a) 1-bromo-2-butene under kinetically controlled conditions
(b) 3-bromobutene under thermodynamically controlled conditions
(c) 1-bromo-2-butene under thermodynamically controlled conditions
(d) 3-bromobutene under kinetically controlled conditions

10. Elimination of bromine from 2-bromobutane results in the formation of

- (a) predominantly 2-butyne (b) predominantly 1-butene
(c) predominantly 2-butene (d) equimolar mixture of 1 and 2-butene



$$t_{50} = \frac{6 \times 2}{0.4} = \frac{18}{0.4}$$

$$\frac{2.303 \times 0.40}{60} \times 750 = 2.303 \log 2$$

$$\frac{0.40}{60} \times 750 = 0.30$$