# MOCK TEST 12, 2024
## HS 2ND YEAR SCIENCE

**TIME : 1 HOUR** **MARKS: 120( JEE), 200( NEET)**

# BIOLOGY

1. Acrosomal reaction of the sperm occurs due to
a. its contact with zona pellucida of theova b.reactions within the uterine environment of the female
c.reactions within the epididymal environment of the male d.androgens produced in the uterus.

2. Which one of the following is not a male accessory gland?

a.Seminal vesicle b.Ampulla c. Prostate d.Bulbourethral gland

3. Which among the following has 23 chromosomes ?

a.Spermatogonia b. Zygote c.Secondary oocyte d.Oogonia

4. Which of the following hormones is not secreted by human placenta?

a. Hcg b.Estrogens c. Progesterone d.LH

5. The vas deferens receives duct from the seminal vesicle and opens into urethra as

a. epididymis b.ejaculatory ductc. efferent ductile d.ureter

6. What is a graphical representation of the relationship (producers forming the base and top carnivores forming the tip) between the individuals present in various trophic levels of a food chain called?

a) Ecological succession b) Ecological pyramid c) Ecological problems d) Ecological Services

7. Who formulated the ecological pyramids?

a) Charles Darwin b) Raymond Lindemann c) Charles Elton d) Gregor Mendel

8. Which of the following pyramids represent the rate of flow of energy at successive level?

a) Animals b) Age structure c) Plants d) Pyramid of energy

9. Which of these refers to the ecological succession on sand?

a. Xerosere b. Psammosere c. Hydrosere d. halosere

10. Which of these about ecological succession is incorrect?
a. Food chain relationships become more complex b. species diversity increases as succession proceeds
c. role of decomposers becomes all the more important d. Is a random process

11. Following are vectorless gene transfer except one. Mark the except one

a. Micro injectionb. Electroporation c. Cosmid d. Biolistic

12. Selection of recombinants is based on all except one. Find out the exception
a. Expression and non-expression of genes encoding for tetracycline-resistant compound
b. Expression and non-expression of genes encoding for insulin-resistant compound
c. Expression and non-expression of genes encoding for ampicillin-resistant compound
d. Insertional inactivation

13. When recombinant DNA is inserted within the coding sequence of an enzyme ß- galactosidase. This results in the following except
a. Insertional inactivation b. Recombinant colonies do not produce any color
c. Inactivation of enzyme
d. Chromogenic substrate is converted into product by recombinant colonies

14. Biolistic (gene gun) is suitable for
a. disarming pathogen vectors
b. transformation of plant cell
c. constructing recombinant DNA by joining with vectors
d. DNA fingerprinting

15. Transposons are genetic elements that can move within a genome. What is another common name for transposons?

a. Plasmids b. Jumping genes c. Introns d. Retroviruses

16. Transposons were first discovered in which organism?

a.Corn b. Humans c. Bacteria d. Fruit flies

17. What is the primary cause of AIDS?
a) Human Immunodeficiency Virus (HIV)
b) Human Cancer Virus (HCV)
c) Human Influenza Virus (HIV)
d) Human Hepatitis Virus (HHV)

18. Which of the following is a common symptom of cancer?

a) Fever b) Weight loss c) Fatigue d) All of the above

19. How is HIV transmitted?
a) Through airborne droplets
b) Through contaminated food and water
c) Through direct contact with infected bodily fluids
d) Through insect vectors

20. What is the name of the white blood cells that are depleted in AIDS patients?

a) Neutrophils b) Lymphocytes c) Monocytes d) Eosinophils

21. Which of the following is a type of cancer that affects the blood cells?

a) Carcinoma b) Sarcoma c) Leukemia d) Lymphoma

22. In which direction do the DNA dependent DNA polymerases catalyse the polymerization reaction?
a) 3' → 5' b) 5' → 3' c) In both the directions d) Is not direction dependent

23. Match the following-

| Column 1 | Column 2 |
|---|---|
| A.Helicase | (i)Connect small fragments |
| B.Polymerase | (ii)Disrupts H-bond |
| C.Ligase | (iii)Create a new strand |
| D.Primase | (iv)Create RNA sequence |

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

24. Which of the following statements about DNA replication is incorrect?

a) DNA replication is bidirectional in prokaryotes.
b) DNA polymerase requires a primer to start DNA synthesis.
c) Okazaki fragments are found on the leading strand.
d) DNA ligase is responsible for joining the Okazaki fragments.

25. Assertion: DNA polymerase I removes RNA primers and fills in the gaps with DNA.
Reason: DNA polymerase I can also synthesize DNA in the 3' to 5' direction.
a) Both assertion and reason are correct, and the reason is the correct explanation for the assertion.
b) Both assertion and reason are correct, but the reason is not the correct explanation for the assertion.
c) The assertion is correct, but the reason is incorrect.
d) The assertion is incorrect, but the reason is correct.

26. Which of the following is an example of a population?
a) A forest with various species of trees
b) A school of fish in a lake
c) A single tree in a forest
d) A species of bird found worldwide

27. Which of the following is a characteristic of a population?

a) Genetic diversity b) Uniform distribution c) Constant size d) No interactions among individuals

28. What is the benefit of biogas production from microbes?
a) Produces greenhouse gases
b) Reduces waste management
c) Generates renewable energy
d) All of the above

29. Which of the following is a substrate for biogas production?

a) Food waste b) Agricultural waste c) Sewage sludge d) All of the above

30. What is the process by which microbes produce biogas?

a) Respiration b) Fermentation c) Photosynthesis d) Decomposition

## MATHEMATICS

1. The value of $\begin{vmatrix} x & x+y & x+2y \\ x+2y & x & x+y \\ x+y & x+2y & x \end{vmatrix}$ is

(a) $9x^2(x+y)$ (b) $9y^2(x+y)$ (c) $3y^2(x+y)$ (d) None of these

2) If $A = \begin{bmatrix} x & 2 \\ 2 & x \end{bmatrix}$ and $|A^3| = 27$, then x =

(a) $\pm 1$ (b) $\pm 2$ (c) $\pm\sqrt{5}$ (d) $\pm\sqrt{7}$

3) If $A = \begin{vmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{vmatrix}$ and $B = \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}$, then

(a) $A \neq B$ (b) $A = B$ (c) $A = 2B$ (d) $A = -B$

4. The minimum value of $x \log_e x$ is equal to

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

5. The maximum value of $sinx(1 + cosx)$ will be at :

(a) $x = \frac{\pi}{2}$ (b) $x = \frac{\pi}{6}$ (c) $x = \frac{\pi}{3}$ (d) None of these

6. A wire of length 2 units is cut into two parts which are bent respectively to form a square of side = x units and a circle of radius = r units. If the sum of the areas of the square and the circle so formed is minimum , then:

(a) $(4-\pi)x = \pi r$ (b) $x = 2r$ (c) $2x = r$ (d) None of these

7. $\int logx\, dx$ is equal to

(a) $xlog\left(\frac{e}{x}\right)$ (b) $xlog\left(\frac{x}{e}\right)$ (c) $xlogx$ (d) None of these

8. $\int \frac{1}{(x^2+1)(x^2+4)} dx = atan^{-1}x + btan^{-1}\frac{x}{2} + c$, then

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

9. $\int_0^1 x\log\left(1+\frac{x}{2}\right)dx = a + b\log\frac{2}{3}$, then

(a) $a = b$ (b) $a = \frac{3}{4}, b = \frac{3}{2}$ (c) $a = \frac{3}{2}, b = \frac{3}{2}$ (d) $a = \frac{3}{4}, b = -\frac{3}{4}$

10. If sum of two numbers is 3, then the maximum value of the product of first and square of second is

(a) 4 (b) 3 (c) 2 (d) 1

## CHEMISTRY

1. If p is the momentum of the fastest electron ejected from a metal surface after the irradiation of light having wavelength λ, then for 1.5 p momentum of the photoelectron, the wavelength of the light should be (Assume kinetic energy of ejected photoelectron to be very high in comparison to work function)

(a) $\frac{4}{9}\lambda$ (b) $\frac{3}{4}\lambda$ (c) $\frac{2}{3}\lambda$ (d) $\frac{1}{2}\lambda$

2. 18 g of glucose ($C_6H_{12}O_6$) is added to 178.2 g water. The vapour pressure of water (in torr) for this aqueous solution is

(a) 76.0 (b) 752.4 (c) 759.0 (d) 7.6

3. The vapour pressure of acetone at 20°C is 185 torr. When 1.2 g of a non-volatile substance was dissolved in 100g of acetone at 20°C, its vapour pressure was 183 Torr. The molar mass of the substance is

(a) 32 (b) 64 (c) 128 (d) 488

4. A cell contains two hydrogen electrodes. The negative electrode is in contact with a solution of $10^{-6}$ M hydrogen ions. The emf of the cell is 0.118 V at 25 C °. Calculate the concentration of hydrogen ions at the positive electrode.

(a) $10^{-6}$ M (b) $10^{-4}$ M (c) $10^{-16}$ M (d) $10^{-2}$ M

5. The decreasing order of electrical conductivity of the following aqueous solution is
0.1 M formic acid (A), 0.1 M acetic acid (B), 0.1 M benzoic acid (C).

(a) A > C > B (b) C > B > A (c) A > B > C (d) C > A > B

6. At 518°C, the rate of decomposition of a sample of gaseous acetaldehyde, initially at a pressure of 363 Torr, was 1.00 Torr $s^{-1}$ when 5% had reacted and 0.5 Torr $s^{-1}$ when 33% had reacted. The order of the reaction is :

(a) 2 (b) 3 (c) 1 (d) 0

7. As per IUPAC nomenclature, the name of the complex $[Co(H_2O)_4(NH_3)_2]Cl_3$

(a) tetraaquadiaminecobalt (III) chloride (b) tetraaquadiamminecobalt (III) chloride
(c) diaminetetraaquacobalt (III) chloride (d) diamminetetraaquacobalt (III) chloride

8. The IUPAC name of $[Ni(NH_3)_4][NiCl_4]$ is

(a) Tetrachloronickel (II)-tetraamminenickel (II) (b) Tetraamminenickel (II)-tetrachloronickel (II)
(c) Tetraamminenickel (II)-tetrachloronickelate (II) (d) Tetrachloronickel (II)-tetraamminenickelate (0)

9. Which of the following will have least hindered rotation about carbon-carbon bond ?

(a) Ethane (b) Ethylene (c) Acetylene (d) Hexachloroethane

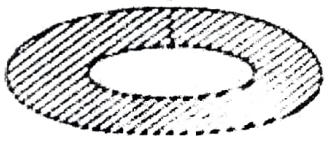
10. 1-chlorobutane on reaction with alcoholic potash gives

(a) 1-butene (b) 1-butanol (c) 2-butene (d) 2-butanol

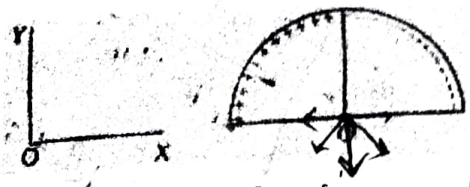
## PHYSICS

Q1. A thin disc of radius b= 2α has a concentric hole of radius a in it (see figure). It carries uniform surface charge σ on it. If the electric field on its axis at height h (h <α) from its centre is given as Ch then value of C is

(a) $\sigma/\alpha\varepsilon^0$ (b) $\sigma/2\alpha\varepsilon^0$ (c) $\sigma/4\alpha\varepsilon^0$ (d) $\sigma/8\alpha\varepsilon^0$



Q2. A wire of length L(= 20 cm) is bent into a semi circular arc. If the two equal halves of the arc were each to be uniformly charged with charges +Q, (|Q|= $10^3$ $\varepsilon_0$ Coulomb, where $\varepsilon_0$ is the permittivity (in SI units) of free space]. The net electric field at the centre O of the semi-circular arc would be




(a) (50× $10^3$ N/C $\hat{j}$ (b) (25X$10^3$ N/C)$\hat{i}$ (c) (25x$10^3$ N/C) $\hat{j}$ (d) (50x$10^3$ N/C)$\hat{i}$

Q3. The magnitude of the average electric field normally present in the atmosphere just above the surface of the Earth is about 150 N/C, directed inward towards the centre of Earth. This gives the total net surface charge carried by the Earth to be [Given R(Earth) = 6.37 x $10^6$ m]

(a) + 670 kC (b) – 670 kC (c) – 680 kC (d) + 680 kC

Q4. The surface charge density of a thin charged disc of radius R is σ. The value of the electric field at the centre of the disc is σ/2ε°. With respect to the field at the centre, the electric field along the axis at a distance R from the centre of the disc

(a) Reduces by 70.7% (b) reduces by 29.3% (c) reduces by 9.7% (d) reduces by 14.6%

Q5. The total number of turns and cross-section area in a solenoid is fixed. However, its length L is varied by adjusting the separation between windings. The inductance of solenoid will be proportional to

(a) $1/L^2$ (b) $L^2$ (c) L (d) 1/L

Q6. Two coils P' and Q' are separated by some distance. When a current of 3A flows through coil P, a magnetic flux of $10^{-3}$ Wb passes through 'Q'. No current is passed through Q. When no current passes through P and a current of 2 A passes through 'Q, the flux through 'P is

(a) 6.67x $10^{-3}$ Wb (b) 3.67x $10^{-4}$ Wb (c) 6.67x $10^{-4}$ Wb (d) 3.67 x $10^{-3}$ Wb

Q7. The self induced emf of a coil is 25 volts. When the current in it is changed at uniform rate from 10 A to 25 A in 1s, the change in the energy of the inductance is

(a) 637.5J (b) 540J (c) 437.5 J (d) 740 J

Q8. An ice cube has a bubble inside. When viewed from one side the apparent distance of the bubble is 12 cm. When viewed from the opposite side, the apparent distance of the bubble is observed as 4 cm. If the side of the ice cube is 24 cm, the refractive index of the ice cube is

(a) 4/3 (b)6/5 (c) 2/3 (d) 3/2

Q9. A microscope is focused on an object at the bottom of a bucket. If liquid with refractive index 5/3 is poured inside the bucket, then microscope have to be raised by 30 cm to focus the object again. The height of the liquid in the bucket is

(a) 12 cm (b) 18 cm (c) 50 cm (d) 75 cm

Q10. Which of the following statement is correct?

(a) In primary rainbow, observer sees red colour on the top and violet on the bottom.

(b) In primary rainbow, observes sees violet colour on the top and red on the bottom.

(c) In primary rainbow, light waves suffers total internal reflection twice before coming out of water drops.

(d) Primary rainbow is less bright than secondary rainbow.

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