MOCK TEST 13, 2024
HS 2ND YEAR SCIENCE

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

BIOLOGY

1. Which of the following is an example of a population interaction?
a) Predation b) Competition C) Symbiosis d) All of the above

2. What is the term for the study of the distribution and abundance of organisms?
a) Ecology b) Biogeography c) Population biology d) Conservation biology

3. Which type of forest is found near the equator?
a) Coniferous forests b) Grasslands c) Tropical forests d) Deciduous forests

4. Which one of the following is an abiotic factor?
a) Bacteria b) Plants c) Climate d) Animals

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6. The letter 'R' in EcoRI is derived from

a) the name of genus b) the name of strain c) the name of species d) the term 'restriction'

7. If a plasmid vector is digested with EcoRI at a single site, then

a) one sticky end will be produced b) two sticky ends will be produced

c) four sticky ends will be produced d) six sticky ends will be produced.

8. Consider the following characters:

(A) ori site (B) Large size (C) Selectable marker sites (D) Cloning site (E) rop gene

Out of these characters choose option which has essential characters for ideal plasmid vectors.

(a) A, B, C and E b) A, B, C (c) A, B, C and D (d) A, C, D and E

9. Identify the incorrectly matched pair.

a) Bacterial artificial chromosome ------ 400- 500 Kb b) Yeast artificial chromosome ----500 Kb

c) Cosmid -- 200kb d) Lamda phage --- 23 Kb

10. Which of the following type of restriction enzymes are used in rDNA technology?

a) Type I Restriction enzyme b) Type II Restriction enzyme

c) Type III Restriction enzymes d) Both Type I and Type II Restriction enzymes

11. Urethral meatus refers to the-

a. urinogenital duct b. opening of vas deferens into urethra

c. external opening of the urinogenital duct d. muscles surrounding the urinogenial duct

12. Morula is a developmental stage

a. between the zygote and blastocyst   b. between the blastocyst and gastrula

c. after the implantation   d.between implantation and parturition

13. The membranous cover of the ovum at ovulation is

a. corona radiate b. zona radiate   c. zona pellucida   d. chorion

14. Identify the odd one from the following

a. Labia minora   b. Fimbriae   c. Infundibulum   d. Isthmus

15. Temperature of the scrotum which is necessary for the functioning of testis is always around below body temperature.

a. 2°C   b. 4°C   c.6°C   d. 8°C

16. The energy and biomass relationship between the organism at different trophic levels can better expressed by-

a. Food chain   b. Food web   c. Ecological pyramids   d. Energy flow

17. The stable community during an ecological succession that would be near equilibrium with the environment is called-

a. Climax community   b. Pioneer community   c. Sere   d. carnivores

18. Which one of the following statements is correct for secondary succession?

a. It begins on a bare rock   b. It occurs on a deforested site

c. It follows primary successions

d. It is similar to primary successions except that primary successions has a relatively fast pace

19. The second stage of hydrosere is occupied by plants like

a. Azolla   b. Typha   c. Carex.   d. Vallisneria

20. Which one of the following is not a gaseous biogeochemical cycle in ecosystem?

a. Water cycle   b. Phosphorus cycle   c. Nitrogen cycle d. Carbon cycle

21. Which of the following is a communicable disease?

a) Diabetes   b) Hypertension   c) Tuberculosis   d) Cancer

22. What is the primary cause of cancer?

a) Genetic mutation   b) Viral infection c) Bacterial infection   d) Environmental factor

23. Which vaccine is used to prevent Hepatitis B?

a) BCG   b) DPT   c) MMR   d) Hepatitis B vaccine

24. Assertion: AIDS is a communicable disease.

Reason: It is caused by a virus that can be transmitted through bodily fluids.

a) Both assertion and reason are true

b) Assertion is true, reason is false

c) Assertion is false, reason is true

d) Both assertion and reason are false

25. What is the primary function of the immune system?

a) To fight off pathogens

b) To produce hormones

c) To regulate body temperature

d) To digest food

26. Which of the following correctly defines a split gene?

a. A gene that is continuously expressed

b. A gene that contains both exons and introns

c. A gene that is found only in prokaryotes

d. A gene that undergoes recombination frequently

27. In eukaryotes, which part of the gene is transcribed but not translated into protein?

a. Exon

b. Intron

c. Promoter

d. Terminator

28. The transcription unit in DNA typically includes:

a. Promoter, operator, and enhancer

b. Promoter, coding sequence, and terminator

c. Operator, coding sequence, and introns

d. Enhancer, coding sequence, and terminator

29. In the context of a gene, the term "upstream" refers to:

a. The direction towards the 5' end of the coding strand

b. The direction towards the 3' end of the coding strand

c. The direction towards the 5' end of the mRNA

d. The direction towards the 3' end of the mRNA

30. Which direction does RNA polymerase move along the DNA strand during transcription?

a. 5' to 3' on the template strand

b. 3' to 5' on the template strand

c. 5' to 3' on the coding strand

d. 3' to 5' on the coding strand

MATHEMATICS

1. Let α, β be the distinct roots of $ax^2 + bx + c = 0$, then $\lim_{x \to \alpha} \frac{1 - \cos(ax^2 + bx + c)}{(x - \alpha)^2}$ is equal to

(a) 0   (b) $\frac{a^2}{2}(\alpha - \beta)^2$ (c) $\frac{1}{2}(\alpha - \beta)^2$ (d) None of these

2) If $A.(adjA) = 8I$ for a 3 x 3 matrix A, then det. A is equal to

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

3) If $A = \begin{bmatrix} 3 & 2 \\ 0 & 1 \end{bmatrix}$, then A^{-3} is

(a) $\frac{1}{27}\begin{bmatrix} 1 & -26 \\ 0 & 27 \end{bmatrix}$ 　　(b) $\frac{1}{27}\begin{bmatrix} -1 & 26 \\ 0 & -27 \end{bmatrix}$ 　　(c) $\frac{1}{27}\begin{bmatrix} 1 & -26 \\ 0 & -27 \end{bmatrix}$ 　　(d) *None of these*

4. Family $y = Ax + A^3$ of curves will correspond to a differential equation of order:

(a) 3 　　　　(b) 2 　　　　(c) 1 　　　　(d) not defined

5. $\lim_{x \to \infty} \left(\frac{x^2 + 5x + 3}{x^2 + x + 3} \right)^{\frac{1}{x}} =$

(a) e^4 　　(b) e^2 　　(c) e^3 　　(d) 1

6. If $y = \frac{e^{2x} + e^{-2x}}{e^{2x} - e^{-2x}}$, then $\frac{dy}{dx} =$

(a) $\frac{8}{(e^{2x} - e^{-2x})^2}$ 　　(b) $\frac{-8}{(e^{2x} - e^{-2x})^2}$ 　　(c) $\frac{4}{(e^{2x} - e^{-2x})^2}$ 　　(d) $\frac{4}{(e^{2x} - e^{-2x})^2}$

7. The solution of the equation $\begin{vmatrix} x & 2 & -1 \\ 2 & 5 & x \\ -1 & 2 & x \end{vmatrix} = 0$ are

(a) $-3,1$ 　　(b) $-1,3$ 　　(c) $-3,-1$ 　　(d) None of these

8. If $\begin{vmatrix} x-4 & 2x & 2x \\ 2x & x-4 & 2x \\ 2x & 2x & x-4 \end{vmatrix} = (A + Bx)(x - A)^2$ then the ordered pair (A,B) is equal to

(a) $(4,5)$ 　　(b) $(-4,-5)$ 　　(c) $(-4,3)$ 　　(d) $(-4,5)$

9. If p,q,r are 3 real numbers satisfying the matrix equation, $[p \quad q \quad r]\begin{bmatrix} 3 & 4 & 1 \\ 3 & 2 & 3 \\ 2 & 0 & 2 \end{bmatrix} = [3 \quad 0 \quad 1]$, then

$2p + q - r$ equal

(a) -1 　　(b) -3 　　(c) 4 　　(d) None of these

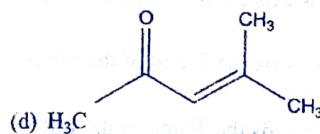10. In a throw of a dice the probability of getting one is even number of throw is
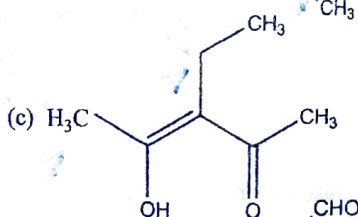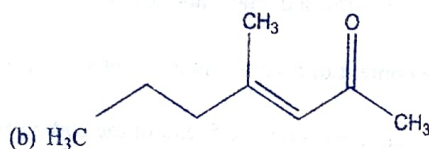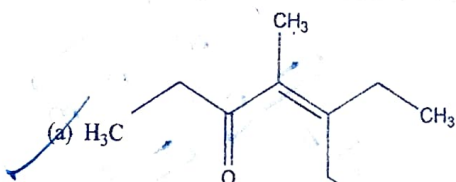
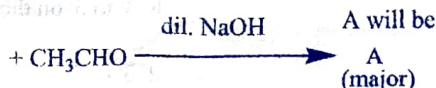(a) $\frac{5}{36}$ 　　(b) $\frac{6}{11}$ 　　(c) $\frac{1}{6}$ 　　(d) $\frac{5}{11}$

CHEMISTRY

1. Which one of the following is not formed when acetone reacts with 2-pentanone in presence of dilute NaOH followed by heating? (a)

(a) H₃C ...

(b) H₃C ...

(c) H₃C ...

(d) H₃C ...

2.

$$+ \text{CH}_3\text{CHO} \xrightarrow{\text{dil. NaOH}} \begin{array}{c} A \text{ will be} \\ A \\ (\text{major}) \end{array}$$

(a) $H_5C_6-CH(OH)-CH_2-CHO$ 　(b) $C_6H_5CH = CH - CHO$ 　(c) $C_6H_5CH_2CH_2CHO$ 　(d) both (b) and (c)

3. Aldehydes that do not undergo aldol condensation are

(i) Propanal 　　(ii) Trichloroethanal 　　(iii) Methanal 　　(iv) Ethanal 　　(v) Benzaldehyde

(a) i, ii and iii only 　(b) ii, iii and v only 　(c) iii and iv only 　(d) iii and v only

4. With what velocity should an α-particle travel towards the nucleus of a copper atom so as to arrive at a distance 10^{-13} m from the nucleus of the copper atom?

(a) 6.3×10^6 m/s 　(b) 5.3×10^6 m/s 　(c) 6.3×10^6 cm/s 　(d) 5.3×10^6 cm/s

5. Liquids A and B form ideal solution for all compositions of A and B at 25°C. Two such solutions with 0.25 and 0.50 mole fractions of A have the total vapour pressure of 0.3 and 0.4 bar, respectively. What is the vapour pressure of pure liquid B in bar?

(a) 0   (b) 0.1   (c) 0.01   (d) 0.2

6. Decomposition of X exhibits a rate constant of 0.05 µg/year. How many years are required for the decomposition of 5 µg of X into 2.5 µg?

(a) 20   (b) 25   (c) 40   (d) 50

7. One of the hazards of nuclear explosion is the generation of Sr^{90} and its subsequent incorporation in bones. This nucleide has a half-life of 28.1 yr. Suppose one microgram was absorbed by a new-born child, how much Sr^{90} will remain in his bones after 20 yr.

(a) 6.1×10^{-7} g   (b) 5.1×10^{-5} g   (c) 6.1×10^{-6} g   (d) 7.1×10^{-7} g

8. C_{60} an allotrope of carbon contains

(a) 16 hexagons and 16 pentagons   (b) 20 hexagons and 12 pentagons
(c) 12 hexagons and 20 pentagons   (d) 18 hexagons and 14 pentagons

9. Wilkinson catalyst is
(a) $[(Et_3P)_3RhCl]$ (b) $[(Et_3P)_3 IrCl]$ ($Et = C_2H_5$)
(c) $[(Ph_3P)_3RhCl]$ (d) $[(Ph_3P)_3 IrCl]$

10. 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) Geometrical isomers   (d) Linkage isomers

PHYSICS

Q1. A point object is placed at the centre of a glass sphere of radius 6 cm and refractive index 1.5. The distance of the virtual image from the surface of the sphere is
(a) 2 cm   (b) 4 cm   (c) 6 cm   (d) 12 cm

Q2. A planoconvex lens of focal length 16 cm, is to be made of glass of refractive index 1.5. The radius of curvature of the curved surface should be
(a) 8 cm   (b) 12 cm   (c) 16 cm   (d) 24 cm

Q3. Let T1 and T2 be the ene.rgy of an electron in the first and second excited states of hydrogen atom respectively. According to the Bohr's model of an atom the ratio T1 :T2 is:
(a) 4:1   (b) 4:9   (c) 9:4   (d) 1:4

Q4. The radius of inner most orbit of hydrogen atom is 5.3×10^{-11} m. What is the radius of third allowed orbit of hydrogen atom?
(a) 0.53Å   (b) 1.06 Å   (c) 1.59 Å   (d) 4.77 Å

Q5. In hydrogen spectrum, the shortest wavelength in the Balmer series is λ. The shortest wavelength in the Bracket series is
(a) 2λ   (b) 4λ   (c) 9λ   (d) 16λ

Q6. A nucleus with mass number 240 breaks into two fragments each of mass number 120, the binding energy per nucleon of unfragmented nuclei is 7.6 MeV while that of fragments is 8.5 MeV. The total gain in the binding energy in the process is
(a) 216 MeV   (b) 0.9 MeV   (c) 9.4 MeV   (d) 804 MeV

Q7. The constituents of nucleus are
(a) electrons and protons   (b) protons and neutrons.
(c) neutrons and electrons.   (d) electrons, protons and neutrons

Q8. A hollow metal sphere of radius 5 cm is charged such that the potential on its surface is 10 V. The potential at a distance of 2 cm from the centre of the sphere is
(a) zero   (b) 10V   (c) 4V   (d) 10/3 V

Q9. An ac source is connected to a capacitor C. Due to decrease in its operating frequency
(a) Capacitive reactance decreases   (b) Displacement current increases
(c) Capacitive reactance increases   (d) Capacitive reactance remains constant

Q10. Newton's corpuscular theory could not explain the phenomenon for
(a) reflection   (b) refraction   (c) diffraction   (d) rectilinear propagation