b C b b b
1 2 3 4 5

MOCK TEST 10, 2024
HS 2ND YEAR SCIENCE

TIME : 1 HOUR

MARKS: 120(JEE), 200(NEET)

BIOLOGY

d a a a C
6 7 8 9 10

1. Rate of decomposition depends upon

- a. Chemical composition of detritus
- b. Temperature
- c. Soil moisture and soil pH
- d. All of these

2. The biomass available for consumption by the herbivores and the decomposers is called

a. Net primary productivity

b. Secondary productivity

c. Standing crop

d. Gross primary productivity

3. A series of organisms through which energy is transferred in the form of food is called __

a. food web
b. Food chain
c. Food cycle
d. ecosystem

4. A network of interconnected food chains is called __

a. food web
b. web cycle
c. chain web
d. ecosystem

5. Carnivores and omnivores are considered as

a. producers
b. consumers
c. primary consumers
d. secondary consumers

6. Identify the properties of a good vector used in rDNA technology:

a. It should have origin of replication supporting a high copy number

b. It should have preferably more than '2' recognition sites

c. The restriction sites in vector should be in the antibiotic-resistant genes

d. It should have suitable marker genes

e. It should be easy to isolate and purify

Choose the most appropriate answer from the options given below:

a. (a), (c) and (e) only
b. (c), (d) and (e) only
c. (a), (b) and (c) only
d. (a), (c), (d) and (e) only

7. 1. Which of the following is a type of autoimmune disease?

a) Tuberculosis
b) Cancer
c) Rheumatoid arthritis
d) Malaria

8. rop segment codes for pBR322?

a. Resistance protein
b. Protein for replication
c. Proteins for translation
d. Cloning site

9. In genetic engineering, a DNA segment (gene) of interest is transferred to the host cell through a vector. Consider the following four agents (A-D) in this regard and select the correct option about which one or more of these can be used as a vector/vectors:

A. a bacterium B. plasmid C. plasmodium D. bacteriophage

Options:

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

10. In pBR322, which of the following respectively represent recognition sequences of tetracycline resistant genes

a. BamH I and Sma I b. Hind II and Sma I c. BamHI and Sal I d. Sal I and Hind I

11. Which of the following options is correct about *Agrobacterium tumifaciens* in genetic engineering?

a. It is a pathogen of angiosperms

b. It is able to deliver a piece of DNA known as T-DNA to transform bacterial cell and direct the cell to produce chemicals required by the pathogen

c. Its Ti plasmid is now modified into an expression vector

d. Its Ti plasmid is modified into a cloning vector which is no more pathogenic

12. Which microbe is used in the production of vinegar?

a) Acetic acid bacteria b) Lactic acid bacteria c) Yeast d) Mould

13. What is the primary role of microbes in the human gut?

a) To produce antibiotics b) To break down complex food molecules

c) To produce vitamins d) To produce hormones

14. Which microbe is used as a biofertilizer to fix atmospheric nitrogen?

a) Rhizobium b) Azospirillum c) Azotobacter d) All of the above

15. Which microbe is used as a biocontrol agent to control insect pests?

a) Trichoderma b) Bacillus thuringiensis c) Pseudomonas d) Rhizobium

16. Assertion (A): Microbes are used in the production of yogurt.

Reason (R): Microbes convert lactose into lactic acid.

a) A is true, R is true, and A is correct because of R b) A is true, R is false

c) A is false, R is true d) A is true, R is true, but A is not correct because of R

17. Ovulation in the human female normally takes place during the menstrual cycle

a. at the mind secretory phase b. just before the end of the secretory phase

c. at the beginning of the proliferative phase d. at the end of the proliferative phase

18. After ovulation Graafian follicle regresses into

a. corpus atresia b. corpus callosum c. corpus luteum d. corpus albicans

19. Immediately after ovulation, the mammalian egg is covered by a membrane known as

a.chorion   b. zona pellucid   c. corona radiate   d. vitelline membrane

20. Which one of the following events is correctly matched with the time period in a normal menstrual cycle?

a. Release of egg : ---------------5 th day

b. Endometrium regenerates---------- 5 – 10 days

c. Endometrium secretes nutrients for implantation------------------11 – 18days

d. Rise in progesterone level-------------------- 1 – 15 days

21. If mammalian ovum fails to get fertilised, which one of the following is unlikely?

a. Corpus luteum will disintegrate.   b. Progesterone secretion rapidly declines.

c. Estrogen secretion increases   d. Primary follicle starts developing

22. A human female reaches menopause around the age of

a. 50 years   b. 15 years   c. 70 years   d.25 years

23. Which of the following is NOT a type of immunity?

a) Active immunity   b) Passive immunity   c) Innate immunity   d) Acquired tolerance

24. The primary function of the immune system is to:

a) Produce antibodies   b) Destroy foreign substances

c) Protect against pathogens   d) Regulate body temperature

25. Which disease is caused by the bacterium Mycobacterium tuberculosis?

a) Malaria   b) Tuberculosis   c) Cancer   d) AIDS

26. The term "vaccine" was coined by:

a) Louis Pasteur   b) Edward Jenner   c) Robert Koch   d) Alexander Fleming

27. What is the primary cause of AIDS?

a) HIV virus   b) Cancer cells   c) Bacterial infection   d) Viral hepatitis

28. Which experiment provided visual evidence for the semi-conservative model of DNA replication in plants, and what was the primary method of visualizing the DNA replication process?

a) Meselson-Stahl experiment using cesium chloride gradients; Density gradient centrifugation

b) Taylor et al. experiment using radioactive labeling; Autoradiography

c) Hershey-Chase experiment using bacteriophages; Protein labeling

d) Griffith's experiment using Streptococcus pneumoniae; Transformation assay

29. After one round of DNA replication in the Meselson-Stahl experiment, what was the observed density of the DNA?

a) Intermediate density between heavy and light

b) Heavy density

c) Light density

d) Two distinct bands, one heavy and one light

30. What was the primary isotope used by Meselson and Stahl to label the DNA in their experiment?

a) ^14C (Carbon-14)   b). ^32P (Phosphorus-32)   c) ^15N (Nitrogen-15)   d) ^3H (Tritium)

PHYSICS

Q1. A circular coil of radius 4 cm and of 20 turns carries a current of 3 amperes. It is placed in a magnetic field of intensity of 0.5 weber/m^2. The magnetic dipole moment of the coil is

(a) 0.15 ampere-m^2 (b) 0.3 ampere-m^2 (c) 0.45 ampere-m^2 (d) 0.6 ampere-m^2

Q2. A solenoid of 1000 turns per metre has a core with relative permeability 500. Insulated windings of the solenoid carry an electric current of 5 A. The magnetic flux density produced by the solenoid is (permeability of free space = $4\pi t \times 10^{-7}$H/m)

(a) $2 \times 10^{-3}\pi$ T   (b) π T   (c) $10^{-4}\pi$ T   (d) $\pi/5$ T

Q3. The magnitude of the magnetic field at the centre of an equilateral triangular loop of side 1 m which is carrying a current of 10 A is

(a) 1µT   (b) 18 µT   (c) 3µT   (d) 9µT

Q4. A rod of length 10 cm lies along the principal axis of a concave mirror of focal length 10 cm in such a way that its end closer to the pole is 20 cm away from the mirror. The length of the image is

(a) 10 cm   (b) 15 cm   (c) 2.5 cm   (d) 5 cm

Q5. In a coil of self-induction 5 H, the rate of change of current is 2 As^{-1}. Then emf induced in the coil is

(a) 10 V   (b) 5 V   (c) -10V   (d) -5 V

Q6. Which of the following series in the spectrum of hydrogen atom lies in the visible region of the electromagnetic spectrum?

(a) Paschen series   (b) Balmer series (c) Lyman series (d) Brackett series

Q7. In a hydrogen atom, which of the following electronic transitions would involve the maximum energy change

(a) n = 3 to n = 1 (b) n = 2 to n = 1   (c) n = 4 to n = 2   (d) n = 3 to n = 2

Q8. A point charge q is placed at a distance a/2 directly above the centre of a square of side a. The electric flux through the square is

(a) $q/\varepsilon°$ (b) $q/\pi\varepsilon°$ (c) $q/4\varepsilon°$ (d) $q/6\varepsilon$

Q9. A point charge q is placed at a distance a/2 directly above the centre of a square of side a. The electric flux through the square is

(a) $q/\varepsilon°$ (b) $q/\pi\varepsilon°$ (c) $q/4\varepsilon°$ (d) $q/6\varepsilon$

Q10. What happens when some charge is placed on a soap bubble?

(a) Its radius decreases (b) Its radius increases   (c) The bubble collapses (d) None of these

MATHEMATICS

1. $\int \frac{x^3}{x+1} dx =$

(a) $x + \frac{x^2}{2} + \frac{x^3}{3} - \log|1-x| + c$

(b) $x + \frac{x^2}{2} - \frac{x^3}{3} - \log|1-x| + c$

(c) $x - \frac{x^2}{2} + \frac{x^3}{3} - \log|1-x| + c$

(d) None of these

2. $\int \frac{dx}{9+16\sin^2 x}$ is

(a) $\frac{1}{3} \tan^{-1}\left(\frac{3\tan x}{5}\right)$

(b) $\frac{1}{5} \tan^{-1}\left(\frac{\tan x}{15}\right)$

(c) $\frac{1}{15} \tan^{-1}\left(\frac{\tan x}{5}\right)$

(d) $\frac{1}{15} \tan^{-1}\left(\frac{5\tan x}{3}\right)$

3. A coin is tossed three times in succession. If E is the event that there are atleast two heads and F is the event in which first throw is a head, then $P(E/F)$ equals

(a) $\frac{3}{4}$

(b) $\frac{3}{8}$

(c) $\frac{1}{2}$

(d) None of these

4. The value of "f" at x = 0 so that the function $f(x) = \frac{2^x - 2^{-x}}{x}, x \neq 0$, id continuous at x = 0 , is

(a) $\log_e 4$

(b) 0

(c) 4

(d) None of these

5. If a, b, c are in G.P, then the value of determinant $\Delta = \begin{vmatrix} a & b & ax+by \\ b & c & bx+cy \\ ax+by & bx+cy & 0 \end{vmatrix}$ is

(a) 1

(b) 0

(c) −1

(d) None of these

6. Maximum value of $f(x) = \sin x + \cos x$ is

(a) 1

(b) 2

(c) $\frac{1}{\sqrt{2}}$

(d) $\sqrt{2}$

7. The maximum value of $f(x) = \frac{x}{1+4x+x^2}$ on $[-1,1]$ is

(a) $-\frac{1}{4}$

(b) $-\frac{1}{3}$

(c) $\frac{1}{6}$

(d) none of these

8. If the vectors $\overrightarrow{AB} = 3\hat{\imath} + 4\hat{k}$ and $\overrightarrow{AC} = 5\hat{\imath} - 2\hat{\jmath} + 4\hat{k}$ are sides of a triangle ABC, then the length of the median through A is

(a) $\sqrt{72}$

(b) $\sqrt{33}$

(c) $\sqrt{45}$

(d) None of these

9. Let P and Q be 3 x 3 matrices with $P \neq Q$. If $P^3 = Q^3$ and $P^2Q = Q^2P$, then determinant of $(P^2 + Q^2)$

Is equal to

(a) 0

(b) −1

(c) −2

(d) None of these

10. A bag contains 4 red and 6 black balls. A ball is drawn at random from the bag, its colour is observed and this ball along with two additional balls of the same colour are returned to the bag. If now a ball is drawn at random from the bag, then the probability that this drawn ball is red :
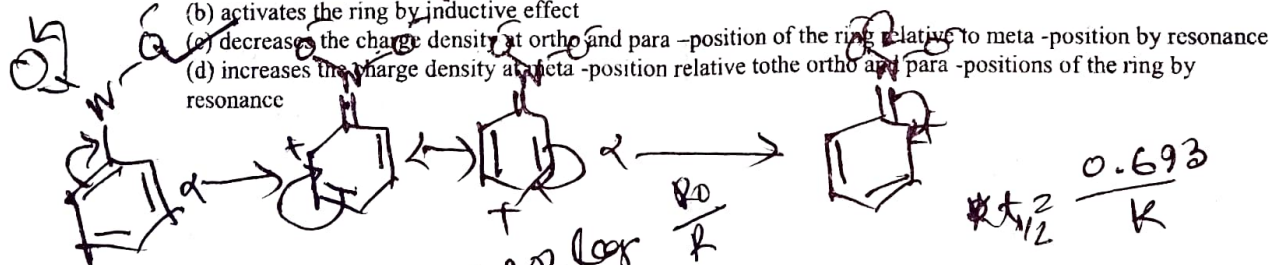
(a) $\frac{3}{4}$

(b) $\frac{3}{10}$

(c) $\frac{2}{5}$

(d) $\frac{1}{5}$

25

CHEMISTRY

1. What is the oxidation number of Cr in $Na_2Cr_2O_7$?

(a) 2   (b) 6   (c) 10   (d) 16

2. The oxidation state of Cr in CrO_5 is

(a) -6 (b) $+12$ (c) $+6$ (d) $+4$

3. Which of the following statements is true about Henry's law?

(a) The solubility of solid in a liquid is directly proportional to the partial pressure of the solid present above the surface of liquid or solution

(b) The solubility of a gas in a liquid is directly proportional to the partial pressure of the gas present above the surface of liquid or solution

(c) The solubility of a liquid in gas is directly proportional to the partial pressure of liquid present above the surface of gas

(d) The solubility of a gas in solid is directly proportional to the partial pressure of gas present above the surface of solid

4. The solubility of N_2 in water at 300 K and 500 torr partial pressure, is 0.01g L^{-1}. The solubility in (g L^{-1}) at 750 torr partial pressure is

(a) 0.02   (b) 0.015   (c) 0.0075   (d) 0.005

5. For the cell, $Cu | Cu^{2+} || Ag^{+} | Ag$, $E°_{cell} = +0.46$ V. If concentration of Cu^{2+} ions is doubled, then $E°_{cell}$ will be

(a) halved   (b) doubled   (c) four times   (d) remains the same

6. Standard electrode potential of three metals X, Y and Z are -1.2V, $+0.5$V and -3.0 V respectively. The reducing power of these metals will be

(a) X > Y > Z   (b) Y > Z > X   (c) Y > X > Z   (d) Z > X > Y

7. On mixing 1dm^3 of 3M ethanol with 1dm^3 of 2M ethanoic acid, an ester is formed.

$$C_2H_5OH + CH_3COOH \rightarrow CH_3COOC_2H_5 + H_2O$$

If each solution is diluted with an equal volume of water, the decrease in the initial rate would be

(a) 0.5 times   (b) 4 times   (c) 5 times   (d) 2 times

8. 99% completion of a first order reaction takes place in 32 min. The time taken in 99.9% completion of the reaction will be

(a) 48 min   (b) 52 min   (c) 56 min   (d) 44 min

9. The trans-alkenes are formed by the reduction of alkynes with

(a) H_2-Pd/C, $BaSO_4$ (b) $NaBH_4$ (c) Na/liq. NH_3 (d) Sn-HCl

10. In an electrophilic substitution reaction of nitrobenzene, the presence of nitro group

(a) activates the ring by resonance effect

(b) activates the ring by inductive effect

(c) decreases the charge density at ortho and para –position of the ring relative to meta -position by resonance

(d) increases the charge density at meta -position relative to the ortho and para -positions of the ring by resonance

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