

**MOCK TEST 15, 2024**  
**HS 2ND YEAR SCIENCE**

**TIME : 1 HOUR**

**MARKS: 120( JEE), 200( NEET)**

**BIOLOGY**

1. What is young anther made up of?  
a) Meristematic cells                      b) Parenchyma                      c) Pores                      d) Seeds
2. Epidermis, Endothecium, Middle layers, Tapetum are \_\_\_\_  
a) pollen sac layers                      b) wall of anther                      c) pollen grain layers                      d) epidermal
3. What constitutes the stomium?  
a) Pollen sacs                      b) Hypodermal cells                      c) Microsporangia                      d) Meristematic cells
4. Flowers with both androecium and gynoecium are called  
a. Bisexual flowers                      b. Anther                      c. Stamens                      d. Unisexual flowers
5. The male reproductive parts of a flower, the stamens, are collectively known as  
a. Androecium                      b. Filament                      c. Anther                      d. Gynoecium
6. In human adult females oxytocin  
a. stimulates pituitary to secrete vasopressin                      b. causes strong uterine contractions during parturition  
c. is secreted by anterior pituitary                      d. stimulates growth of mammary gland
7. The third stage of parturition is called —after-birth. In this stage  
a. excessive bleeding occurs  
b. fetus is born and cervix and vagina contraction to normal condition happens  
c. fetus is born and contraction of uterine wall prevents excessive bleeding                      d. placenta is expelled out.
8. After birth, colostrum is released from mammary glands which is rich in  
a. fat and low in proteins                      b. proteins and low in fat  
c. proteins, antibodies and low in fat                      d. proteins, fat and low in antibodies.
9. Spot the odd one out from the following structures with reference to the male reproductive system.  
a. Rete testis                      b. Epididymis                      c. Vasa efferentia                      d. Isthmus
10. Seminal plasma, the fluid part of semen, is contributed by  
(i) seminal vesicle                      (ii) prostate                      (iii) urethra                      (iv) bulbourethral gland  
a. (i) and (ii)                      b. (i), (ii) and (iv)                      c. (ii), (iii) and (iv)                      d. (i) and (iv)
11. Assertion: Asthma is an allergic disorder.  
Reasoning: Asthma is caused by inflammation and constriction of airways, triggered by allergens.  
a) Both assertion and reasoning are correct and related  
b) Assertion is incorrect, reasoning is correct and unrelated  
c) Both assertion and reasoning are incorrect                      d) Assertion is correct, reasoning is incorrect
12. Assertion: Rabies is caused by a fungus.  
Reasoning: Rabies is caused by Lyssavirus, transmitted through animal bites.  
a) Both assertion and reasoning are correct and related  
b) Assertion is incorrect, reasoning is correct and unrelated  
c) Both assertion and reasoning are incorrect                      d) Assertion is correct, reasoning is incorrect
13. Assertion: Heart disease is caused by high blood pressure.  
Reasoning: High blood pressure is a risk factor for heart disease, leading to cardiovascular damage.  
a) Both assertion and reasoning are correct and related  
b) Assertion is incorrect, reasoning is correct and unrelated  
c) Both assertion and reasoning are incorrect                      d) Assertion is correct, reasoning is incorrect
14. Assertion: Meningitis is an inflammation of the brain.  
Reasoning: Meningitis is an inflammation of the meninges, protective membranes surrounding the brain and spinal cord.  
a) Both assertion and reasoning are correct and related  
b) Assertion is incorrect, reasoning is correct and unrelated                      c) Both assertion and reasoning are incorrect

d) Assertion is partially correct, reasoning is correct and related

15. Assertion: AIDS is a contagious disease.

Reasoning: AIDS is caused by HIV, transmitted through bodily fluids and sexual contact.

a) Both assertion and reasoning are correct and related

b) Assertion is incorrect, reasoning is correct and unrelated

c) Both assertion and reasoning are incorrect

d) Assertion is correct, reasoning is incorrect

16. Which of the following is not a component of downstream processing?

a. Separation

b. Purification

c. Preservation

d. Expression

17. Which of the following methods is most useful for the enzymatic amplification of specific gene segment of DNA?

a. DNA hybridization

b. Nucleotide sequencing

c. Polymerase chain reaction

d. Reverse transcription

18. Steps of Recombinant DNA technology are given below:

A. Identification and isolation of the genetic material. B. Fragmentation of DNA.

C. Obtaining the foreign gene product

D. Downstream processing.

E. Ligation of DNA fragmentation into the vector. F. Isolation of desired DNA fragments.

G. Amplification of gene of interest. H. Transfer of Recombinant DNA into the host cell/organism.

The correct sequence of steps is

a. A-D-C-B-E-G-F-H

b. A-B-F-G-E-H-C-D

c. H-F-G-E-A-D-B-C

d. C-A-B-D-F-E-G-H

19. During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out :

a. RNA

b. DNA

c. Protein

d. Amino acids

20. The enzyme used in the polymerase chain reaction is a:

a. DNA dependent RNA polymerase

b. RNA dependent DNA polymerase

c. DNA dependent DNA polymerase

d. RNA dependent RNA polymerase

21. What is population density?

a) Number of individuals per unit area

b) Number of individuals per unit volume

c) Total number of individuals in a population

d) Average distance between individuals

22. Which of the following factors can affect population density?

a) Birth rate

b) Death rate

c) Migration rate

d) All of the above

23. What is the term for the movement of individuals from one population to another?

a) Migration

b) Emigration

c) Immigration

d) Dispersion

24. Which of the following is an example of a population attribute?

a) Birth rate

b) Death rate

c) Sex ratio

d) All of the above

25. Organisms which tolerate narrow range of salinity are

a) Euryhaline

b) Stenohaline

c) Eurythermal

d) Hypersaline

26. Which part of the tRNA molecule binds to an amino acid?

a) Anticodon loop

b) D loop

c) CCA terminal

d) TΨC loop

27. The anticodon of tRNA is complementary to which part of the mRNA?

a) Codon

b) Intron

c) Exon

d) Promoter

28. What is the role of the DHU loop in tRNA?

a) Binding to the ribosome

b) Recognition by aminoacyl-tRNA synthetase

c) Transporting the amino acid

d) Pairing with mRNA

29. Which enzyme is responsible for attaching the correct amino acid to tRNA?

a) DNA polymerase

b) RNA polymerase

c) Aminoacyl-tRNA synthetase

d) Ligase

30. The anticodon loop of tRNA contains how many nucleotides?

a) 5

b) 3

c) 6

d) 10

## MATHEMATICS

1. General solution of the differential equation  $\frac{dy}{dx} + y \tan x = \sec x$  is

(a)  $y \sec x = \tan x + c$

(b)  $y \tan x = \sec x + c$

(c)  $\tan x = y \tan x + c$

(d) None of these

2) The solution of the differential equation  $\frac{dy}{dx} + \frac{y}{x} = x^2$  is



- (a)  $x + y = \frac{x^2}{2} + c$  (b)  $x - y = \frac{1}{3}x^3 + c$  (c)  $xy = \frac{1}{4}x^4 + c$  (d) None of these
3. If  $A \cdot (\text{adj}A) = 8I$  for a  $3 \times 3$  matrix  $A$ , then  $\det A$  is equal to  
 (a) 1 (b) 8 (c) 4 (d) None of these
4. The value of  $\sin\left(\sin^{-1}\frac{1}{3} + \sec^{-1}3\right) + \cos\left(\tan^{-1}\frac{1}{2} + \tan^{-1}2\right)$  is  
 (a) 2 (b) 1 (c) 3 (d) 4
5. If  $\cos^{-1}\frac{x}{a} + \cos^{-1}\frac{y}{b} = \alpha$ , then  $\frac{x^2}{a^2} - \frac{2xy}{ab}\cos\alpha + \frac{y^2}{b^2} =$   
 (a)  $\cot^2\alpha$  (b)  $\cos^2\alpha$  (c)  $\tan^2\alpha$  (d) None of these
6. The solution of the differential equation  $x + y \frac{dy}{dx} = 2y$  is  
 (a)  $\log\left(\frac{x}{x-y}\right) = c + y - x$  (b)  $\log(y - x) = c + \frac{x}{y-x}$  (c)  $xy^2 = c^2(x + 2y)$  (d) None of these
7.  $\int_0^{\frac{\pi}{2}} \frac{3\sin x}{3\sin x + 3\cos x} dx$   
 (a) 2 (b)  $\frac{\pi}{4}$  (c)  $\frac{\pi}{2}$  (d) None of these
8. The interval on which the function  $f(x) = 2x^3 + 9x^2 + 12x - 1$  is decreasing is  
 (a)  $[-1, \infty)$  (b)  $(-\infty, -2]$  (c)  $[-1, 1]$  (d)  $[-2, -1]$
9. If  $xdy = ydx + y^2dy$  and  $y(1) = 1$ , then  $y(-3)$  is equal to :  
 (a) 1 (b) 5 (c) 4 (d) None of these
10. 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)  $\pm \sqrt{7}$

## CHEMISTRY

1. 3.0 g of oxalic acid  $[(\text{CO}_2\text{H})_2 \cdot 2\text{H}_2\text{O}]$  is dissolved in a solvent to prepare a 250 mL solution. The density of the solution is 1.9 g/mL. The molality and normality of the solution, respectively, are closest to

- (a) 0.10 and 0.38 (b) 0.10 and 0.19 (c) 0.05 and 0.19 (d) 0.05 and 0.09

2. What transition in  $\text{He}^+$  ion shall have the same wave number as the first line in Balmer series of H atom?

- (a)  $7 \rightarrow 5$  (b)  $6 \rightarrow 4$  (c)  $5 \rightarrow 3$  (d)  $4 \rightarrow 2$

3. The bond dissociation energy of B - F in  $\text{BF}_3$  is  $646 \text{ kJ mol}^{-1}$  whereas that of C - F in  $\text{CF}_4$  is  $515 \text{ kJ mol}^{-1}$ . The correct reason for higher B - F bond dissociation energy as compared to that of C - F is

- (a) stronger  $\sigma$  bond between B and F in  $\text{BF}_3$  as compared to that between C and F in  $\text{CF}_4$ .  
 (b) significant  $p\pi - p\pi$  interaction between B and F in  $\text{BF}_3$  whereas there is no possibility of such interaction between C and F in  $\text{CF}_4$ .  
 (c) lower degree of  $p\pi - p\pi$  interaction between B and F in  $\text{BF}_3$  than that between C and F in  $\text{CF}_4$ .  
 (d) smaller size of B-atom as compared to that of C-atom

4. Standard reduction electrode potentials of three metals A, B & C are respectively +0.5 V, -3.0 V & -1.2 V. The reducing powers of these metals are

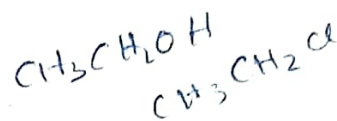
- (a)  $A > B > C$  (b)  $C > B > A$  (c)  $A > C > B$  (d)  $B > C > A$

5. The higher stabilities of tert-butyl cation over iso-propyl cation and trans-2-butene over propene, respectively, are due to orbital interactions involving.

- (a)  $\sigma \rightarrow \pi$  and  $\sigma \rightarrow \pi^*$  (b)  $\sigma \rightarrow$  vacant p and  $\sigma \rightarrow \pi$   
 (c)  $\sigma \rightarrow \sigma^*$  and  $\sigma \rightarrow \pi$  (d)  $\sigma \rightarrow$  vacant p and  $\sigma \rightarrow \pi^*$

6. A certain non-volatile electrolyte contains 40% carbon, 6.7% hydrogen and 53.3% oxygen. An aqueous solution containing 5% by mass of the solute boils at  $100.15^\circ\text{C}$ . The molecular formula of the compound is ( $K_b = 0.51^\circ\text{C/m}$ )

- (a)  $\text{HCHO}$  (b)  $\text{CH}_3\text{OH}$  (c)  $\text{C}_2\text{H}_5\text{OH}$  (d)  $\text{C}_6\text{H}_{12}\text{O}_6$



7. If 0.01 M solution of an electrolyte has a resistance of 40 ohms in a cell having a cell constant of  $0.4 \text{ cm}^{-1}$ , then its molar conductance in  $\text{ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$  is  
 (a)  $10^2$  (b)  $10^4$  (c) 10 (d)  $10^3$

8. The activation energy for a reaction is 9.0 kcal/mol. The increase in the rate constant when its temperature is increased from 298K to 308K is  
 (a) 63% (b) 50% (c) 100% (d) 10%

9. Although hexafluoroethane ( $\text{C}_2\text{F}_6$ , b.p.  $-79^\circ\text{C}$ ) and ethane ( $\text{C}_2\text{H}_6$ , b.p.  $-89^\circ\text{C}$ ) differ very much in their molecular weights, their boiling points differ only by  $10^\circ\text{C}$ . This is due to

(a) low polarizability of F (b) nearly similar size of F and H (c) both (a) and (b) (d) Neither of the two

10. Ethanol when reacted with  $\text{PCl}_5$  gives A,  $\text{POCl}_3$  and  $\text{HCl}$ . A reacts with silver nitrite to form B (major product) and  $\text{AgCl}$ . A and B respectively are

(a)  $\text{C}_2\text{H}_5\text{Cl}$  and  $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$  (b)  $\text{C}_2\text{H}_6$  and  $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$  (c)  $\text{C}_2\text{H}_5\text{Cl}$  and  $\text{C}_2\text{H}_5\text{NO}_2$  (d)  $\text{C}_2\text{H}_6$  and  $\text{C}_2\text{H}_5\text{NO}_2$

## PHYSICS

Q1. There are four concentric shells A, B, C and D of radii  $a$ ,  $2a$ ,  $3a$  and  $4a$  respectively. Shells B and D are given charges  $+q$  and  $-q$  respectively. Shell C is now earthed. The potential difference  $V_A - V_C$  is

(a)  $Kq/2a$  (b)  $Kq/3a$  (c)  $Kq/4a$  (d)  $Kq/6a$

Q2. Two capacitors having capacitances  $8 \mu\text{F}$  and  $16 \mu\text{F}$  have breaking voltages 20V and 80V. They are combined in series. The maximum charge they can store individually in the combination is

(a)  $160 \mu\text{C}$  (b)  $200 \mu\text{C}$  (c)  $320 \mu\text{C}$  (d)  $480 \mu\text{C}$

Q3. Two parallel plate condensers of capacity 20mF and 30mF are charged to the potentials of 30V and 20V respectively. If likely charged plates are connected together then the common potential difference will be

(a) 100 V (b) 50 V (c) 24 V (d) 10 V

Q4. The minimum number of condensers each of capacitance of  $2 \mu\text{F}$ , in order to obtain resultant capacitance of  $5 \mu\text{F}$  will be

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

Q5. A capacitor and a coil in series are connected to a 6 volt ac source. By varying the frequency of the source, maximum current of 600 mA is observed. If the same coil is now connected to a cell of emf 6 volt dc and internal resistance of 2 ohm, the current through it will be

(a) 0.5 A (b) 0.6 A (c) 1.0 A (d) 2.0 A

Q6. In a Young's double slit experiment, the fringes are displaced by a distance  $x$  when a glass plate of refractive index 1.5 is introduced in the path of one of the beams. When this plate is replaced by another plate of same thickness, the shift of fringes is  $(3/2)x$ . The refractive index of second plate is

(a) 1.75 (b) 1.40 (c) 1.25 (d) 1.67

Q7. Two coherent monochromatic light beams of intensities  $I$  and  $4I$  are superposed. The maximum and minimum possible intensities in the resulting beam are

(a)  $5I$  and  $I$  (b)  $5I$  and  $3I$  (c)  $9I$  and  $I$  (d)  $9I$  and  $3I$

Q8. A convex lens forms a real image three times larger than the object on a screen. Object and screen are moved until the image becomes twice the size of the object. If the shift of the object is 6 cm. The shift of screen is

(a) 36 cm (b) 72 cm (c) 18 cm (d) 9 cm

Q9. A real image is formed by a convex lens. Then it is put in contact with a concave lens and again a real image is formed. This image will

(a) shift towards the lens system (b) shift away from the lens system (c) remain in its original position (d) shift to infinity

Q10. A convex lens is in contact with a concave lens. The magnitude of the ratio of their powers is  $3/2$ . Their equivalent focal length is 30 cm. What are their individual focal lengths?

(a) -75, 50 (b) -10, 15 (c) -75, 25 (d) -15, 10