

MHT CET 2021 Mathematics Memory Based Question Paper PDF

1. If $4 \sin x + 6 \cos x = 3\pi$, then the value of x is:
 - (1) $\pi/2$
 - (2) $\pi/4$
 - (3) $\pi/3$
 - (4) No real solution
2. What is the unit of the rate constant for a first-order reaction?
 - (1) $\text{mol L}^{-1}\text{s}^{-1}$
 - (2) s^{-1}
 - (3) $\text{L mol}^{-1}\text{s}^{-1}$
 - (4) mol L^{-1}
3. The distance of the point $P(\vec{\alpha})$ from the line $\vec{r} = \vec{a} + \lambda \vec{b}$ is given by:
 - (1) $\frac{|(\vec{\alpha} - \vec{a}) \times \vec{b}|}{|\vec{b}|}$
 - (2) $\frac{|(\vec{\alpha} - \vec{a}) \cdot \vec{b}|}{|\vec{b}|}$
 - (3) $|(\vec{\alpha} - \vec{a}) \times \vec{b}|$
 - (4) $\frac{|\vec{a} \times \vec{b}|}{|\vec{\alpha}|}$
4. Which of the following is a typical example of a crystal showing Frenkel defect?
 - (1) NaCl
 - (2) CsCl
 - (3) ZnS
 - (4) KCl
5. Evaluate the integral: $\int \frac{x + \sin x}{1 - \cos x} dx$
 - (1) $x \cot(x/2) + C$
 - (2) $-x \cot(x/2) + C$
 - (3) $x \tan(x/2) + C$

(4) $\log(\sin x) + C$

6. The value of $\sin 18^\circ$ is:

(1) $\frac{\sqrt{5}-1}{4}$

(2) $\frac{\sqrt{5}+1}{4}$

(3) $\frac{\sqrt{10-2\sqrt{5}}}{4}$

(4) $\frac{\sqrt{10+2\sqrt{5}}}{4}$

7. The value of $\int \log(\sec x + \tan x) dx$ is:

(1) $x \log(\sec x + \tan x) - \log(\sec x) + C$

(2) $x \log(\sec x + \tan x) + \log(\cos x) + C$

(3) $x \log(\sec x + \tan x) - \int x \sec x dx$

(4) $x \log(\sec x + \tan x) - \tan x + C$

8. Which of the following elements has a completely filled $4d$ orbital ($4d^{10}$)?

(1) Copper (Cu)

(2) Palladium (Pd)

(3) Ruthenium (Ru)

(4) Iron (Fe)

9. Which of the following statements is true regarding an isochoric process?

(1) $\Delta P = 0$

(2) $\Delta T = 0$

(3) $\Delta V = 0$

(4) $W \neq 0$

10. Which of the following substances does not contain carbon?

(1) Diamond

(2) Graphite

(3) Silica

(4) Fullerene

11. Which type of sugar is primarily present in milk?

- (1) Fructose
- (2) Glucose
- (3) Lactose
- (4) Maltose

12. The value of $\lim_{x \rightarrow \infty} (\sqrt{x^2 + 5x - 7} - x)$ is:

- (1) 0
- (2) 5
- (3) $5/2$
- (4) $7/2$

13. How many carbon atoms are present in a molecule of undecane?

- (1) 10
- (2) 11
- (3) 12
- (4) 13

14. If the constant 1 is added to every observation in a set of the first n natural numbers, the new variance will be:

- (1) $\frac{n^2-1}{12} + 1$
- (2) $\frac{n^2-1}{12}$
- (3) $\frac{n^2+1}{12}$
- (4) $\frac{n+1}{12}$

15. Which halogen is found in the liquid state at room temperature?

- (1) Chlorine
- (2) Fluorine
- (3) Bromine
- (4) Iodine

16. Which of the following is a common use of Buna-N rubber?

- (1) Making handles of cricket bats
- (2) Oil seals and tank linings

- (3) Making floor tiles
 - (4) Making electrical switches
- 17.** Which of the following polymers is used as a supporting medium in electrophoresis?
- (1) Polyethylene
 - (2) Polyacrylamide
 - (3) Polystyrene
 - (4) Bakelite
- 18.** Which of the following polymers is widely used as an adhesive?
- (1) Buna-N
 - (2) Nylon-6
 - (3) Terylene
 - (4) PVC
- 19.** In the ozone (O_3) molecule, the average bond length of the O–O bond is:
- (1) 121 pm
 - (2) 148 pm
 - (3) 128 pm
 - (4) 110 pm
- 20.** Which of the following is an example of a multimolecular colloid?
- (1) Starch sol
 - (2) Gold sol
 - (3) Soap solution
 - (4) Proteins
- 21.** If $\vec{e}_1, \vec{e}_2$ and $\vec{e}_1 + \vec{e}_2$ are all unit vectors, then the angle between $\vec{e}_1$ and $\vec{e}_2$ is:
- (1) 60°
 - (2) 120°
 - (3) 90°
 - (4) 30°
- 22.** What is the approximate bond angle in a sulfur dioxide (SO_2) molecule?

- (1) 180°
- (2) 104.5°
- (3) 119°
- (4) 120°

23. Radioactive decay follows the kinetics of which order?

- (1) Zero order
- (2) First order
- (3) Second order
- (4) Third order

24. Which of the following is the standard solution used to determine the cell constant of a conductivity cell?

- (1) NaCl
- (2) ZnSO_4
- (3) KCl
- (4) CuSO_4

25. A rectifier is a device used to convert:

- (1) DC to AC
- (2) AC to DC
- (3) Low voltage to High voltage
- (4) High frequency to Low frequency

26. If $\sec x = 25/24$, then find the value of $\sin(x/2) + \cos(x/2)$:

- (1) $7/5$
- (2) $4\sqrt{2}/5$
- (3) $1/5$
- (4) $3/5$

27. Which among the following aldehydes has the highest boiling point?

- (1) Hexanal
- (2) Pentanal

- (3) Butanal
- (4) Propanal

28. Which among the following is an example of a negatively charged sol?

- (1) TiO_2 sol
- (2) Haemoglobin
- (3) Clay sol
- (4) Hydrated metallic oxides

29. Which polymer is specifically used for the manufacture of cinema films?

- (1) Cellulose nitrate
- (2) Bakelite
- (3) PVC
- (4) Polyethylene