

# Metallurgical Engineering\_Set2

Topic:- Mathematics\_Set2

1) If  $A+B = \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix}$  and  $A-B = \begin{bmatrix} 3 & 1 \\ 1 & 4 \end{bmatrix}$ , then  $AB =$

[Question ID = 13593]

1.  $\begin{bmatrix} -2 & 2 \\ 0 & -6 \end{bmatrix}$

2.  $\begin{bmatrix} -2 & -2 \\ 2 & -4 \end{bmatrix}$

3.  $\begin{bmatrix} -2 & -2 \\ 0 & -6 \end{bmatrix}$

4.  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Correct Answer :-

•  $\begin{bmatrix} -2 & -2 \\ 0 & -6 \end{bmatrix}$

2) If  $A = \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}$ ;  $B = \begin{bmatrix} 1 & -1 & 0 \\ 0 & 2 & 3 \\ 4 & 0 & -1 \end{bmatrix}$ , then  $A^T B A =$

[Question ID = 13594]

1. [5]

2. [0]

3. 
$$\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 0 \\ 0 & 6 & -2 \end{bmatrix}$$

4. 
$$\begin{bmatrix} 1 & -1 & 0 \\ 0 & 2 & 3 \\ 4 & 0 & -1 \end{bmatrix}$$

**Correct Answer :-**

• [5]

3) 
$$\begin{vmatrix} x-y & p-q & a-b \\ y-z & q-r & b-c \\ z-x & r-p & c-a \end{vmatrix} =$$

**[Question ID = 13595]**

1. 1
2. 2
3. xyz- pqr+ abc
4. 0

**Correct Answer :-**

• 0

4) The solution of the equation 
$$\begin{vmatrix} 5-x & 4 & 3 \\ 1-3x & 7 & 6 \\ 1-x & 6 & 5 \end{vmatrix} = 0$$
 is

**[Question ID = 13596]**

1.  $x = 1$
2.  $x = 2$
3.  $x = 0$

4.  $x = 5$

**Correct Answer :-**

•  $x = 1$

5) The inverse of the matrix  $A = \begin{bmatrix} a+ib & c+id \\ -c+id & a-ib \end{bmatrix}$ ,

if  $a^2 + b^2 + c^2 + d^2 = 1$  is

**[Question ID = 13597]**

1.  $\begin{bmatrix} a-ib & c-id \\ c+id & a+ib \end{bmatrix}$

2.  $\begin{bmatrix} a-ib & -c-id \\ c-id & a+ib \end{bmatrix}$

3.  $\begin{bmatrix} c-id & a-ib \\ a+ib & c+id \end{bmatrix}$

4.  $\begin{bmatrix} a-ib & c-id \\ -c-id & a+ib \end{bmatrix}$

**Correct Answer :-**

•  $\begin{bmatrix} a-ib & -c-id \\ c-id & a+ib \end{bmatrix}$

6)  $\frac{x^2}{x^2 - 3x + 2} =$

**[Question ID = 13598]**

1.  $\frac{1}{x-1} + \frac{2}{x-2}$

2.  $1 - \frac{1}{1-x} + \frac{3}{x-2}$

3.  $1 + \frac{1}{1-x} + \frac{4}{x-2}$

4.  $1 - \frac{1}{x-1} + \frac{2}{x-2}$

**Correct Answer :-**

•  $1 + \frac{1}{1-x} + \frac{4}{x-2}$

7) If  $\sin\theta + \operatorname{Cosec}\theta = 2$ , then the value of  $\sin^3\theta + \operatorname{Cosec}^3\theta =$

**[Question ID = 13599]**

- 1. 0
- 2. 1
- 3. 2
- 4. 8

**Correct Answer :-**

- 2

8) The value of  $\sin^2\left(\frac{\pi}{8} + \frac{\theta}{2}\right) - \sin^2\left(\frac{\pi}{8} - \frac{\theta}{2}\right) =$

**[Question ID = 13600]**

- 1.  $\frac{1}{\sqrt{2}}$
- 2.  $\frac{1}{2} \sin\theta$
- 3.  $\frac{1}{\sqrt{2}} \sin\theta$

4.  $\sin\left(\frac{\theta}{2}\right)$

**Correct Answer :-**

•  $\frac{1}{\sqrt{2}}\sin\theta$

9) If  $x, y$  are in first quadrant,  $\tan(x - y) = \frac{7}{24}$  and  $\tan(x) = \frac{4}{3}$ , then  $x + y =$

**[Question ID = 13601]**

1.  $\frac{3}{4}$

2.  $\frac{\pi}{2}$

3.  $\frac{\pi}{4}$

4. 1

**Correct Answer :-**

•  $\frac{\pi}{2}$

10) If  $A - B = \frac{3\pi}{4}$ , then  $(1 - \tan A)(1 + \tan B) =$

**[Question ID = 13602]**

1. 2

2. 1

3. 0

4. -1

**Correct Answer :-**

• 2

11)  $\sec^2(\tan^{-1} 3) + \operatorname{cosec}^2(\cot^{-1} 3) =$

[Question ID = 13603]

1. 1
2. 10
3. 20
4. 30

Correct Answer :-

- 20

12)  $3\operatorname{Cosec} x = 4\operatorname{Sin} x \Rightarrow x =$

[Question ID = 13604]

1.  $n\pi \pm \frac{\pi}{2}; n \in \mathbb{Z}$
2.  $n\pi \pm \frac{\pi}{3}; n \in \mathbb{Z}$
3.  $2n\pi \pm \frac{\pi}{2}; n \in \mathbb{Z}$
4.  $n\pi \mp \frac{\pi}{4}; n \in \mathbb{Z}$

Correct Answer :-

- $n\pi \pm \frac{\pi}{3}; n \in \mathbb{Z}$

13) If  $x = \log_e(5 + \sqrt{26})$ , then  $\operatorname{Sin}hx =$

[Question ID = 13605]

1. 5
2. 1
3. 2

4.  $\log_e 5$

**Correct Answer :-**

• 5

**14)**

If a, b and c are the lengths of the sides opposite to the angles A, B and C of a triangle ABC, then

$$(b-c)^2 \cos^2 \frac{A}{2} + (b+c)^2 \sin^2 \frac{A}{2} =$$

**[Question ID = 13606]**

1. a

2. b

3.  $b^2$

4.  $a^2$

**Correct Answer :-**

•  $a^2$

**15)** If  $z = 2 - i\sqrt{7}$ , then  $2z^2 - 8z + 22 =$

**[Question ID = 13607]**

1. 0

2. 1

3. 2

4. 4

**Correct Answer :-**

• 0

**16)**

The least positive integer n, satisfying  $\left(\frac{1+i}{1-i}\right)^n = 1$  is

**[Question ID = 13608]**

1. 2

2. 1
3. 4
4. 8

**Correct Answer :-**

- 4

17) The distance between the parallel straight lines  $3x + 4y - 3 = 0$  and  $6x + 8y - 1 = 0$  is

[Question ID = 13609]

1.  $\frac{1}{2}$
2.  $\frac{1}{4}$
3. 1
4.  $\sqrt{2}$

**Correct Answer :-**

- $\frac{1}{2}$

18) Angle between the lines  $3x - 5y - 9 = 0$ ;  $4x - y + 7 = 0$  is

[Question ID = 13610]

1.  $\theta = 30^\circ$
2.  $\theta = 45^\circ$
3.  $\theta = 60^\circ$
4.  $\theta = 15^\circ$

**Correct Answer :-**



•  $\theta = 45^\circ$

19)

Equation of the circle passing through (3,-4) and concentric with  $x^2 + y^2 + 4x - 2y + 1 = 0$  is

[Question ID = 13611]

1.  $x^2 + y^2 + 4x - 2y - 15 = 0$

2.  $x^2 + y^2 + 4x - 2y - 30 = 0$

3.  $x^2 + y^2 + x - 2y - 45 = 0$

4.  $x^2 + y^2 + 4x - 2y - 45 = 0$

Correct Answer :-

•  $x^2 + y^2 + 4x - 2y - 45 = 0$

20) The eccentricity of Ellipse  $9x^2 + 16y^2 = 144$  is

[Question ID = 13612]

1.  $\frac{7}{4}$

2.  $\frac{\sqrt{7}}{4}$

3.  $\frac{5}{4}$

4.  $\frac{5}{3}$

Correct Answer :-

$$\frac{\sqrt{7}}{4}$$

21) 
$$\lim_{x \rightarrow 0} \frac{8^x - 2^x}{x} =$$

[Question ID = 13613]

1. log 2
2. 0
3. log 4
4. 1

Correct Answer :-

- log 4

22) If  $y = \cos^{-1}(4x^3 - 3x)$ , then  $\frac{dy}{dx} =$

[Question ID = 13614]

1. 
$$\frac{-3}{\sqrt{1-x^2}}$$

2. 
$$\frac{4}{\sqrt{1-x^2}}$$

3. 
$$\frac{1}{\sqrt{1+x^2}}$$

4. 
$$\frac{-4}{3\sqrt{1-x^2}}$$

Correct Answer :-

• 
$$\frac{-3}{\sqrt{1-x^2}}$$

23)

If  $y = (\sin x)^{\log x}$ , then  $\frac{dy}{dx} =$

[Question ID = 13615]

1.  $(\sin x)^{\log x} \{ \tan x \cdot \log x + \log(\sin x) \}$

2.  $\log x \left\{ \cot x \cdot \sin x + \frac{1}{x} \log(\sin x) \right\}$

3.  $(\sin x)^{\log x} \left\{ \cot x \cdot \log x + \frac{1}{x} \log(\sin x) \right\}$

4.  $(\cos x)^{\log x} \left\{ \tan x \cdot \log x + \frac{1}{x} \log(\cos x) \right\}$

Correct Answer :-

•  $(\sin x)^{\log x} \left\{ \cot x \cdot \log x + \frac{1}{x} \log(\sin x) \right\}$

24)

If  $y = \log(x + \sqrt{1+x^2})$ , then  $(1+x^2) \frac{d^2y}{dx^2} + x \frac{dy}{dx} =$

[Question ID = 13616]

1. 1

2. 0

3. x

4.  $\frac{1}{\sqrt{1+x^2}}$

Correct Answer :-

• 0

25) At  $\theta = \frac{\pi}{4}$ , the slope of the normal to the curve  $x = a \cos^3 \theta$ ;  $y = a \sin^3 \theta$  is

[Question ID = 13617]

1. -1
2. -2
3. 2
4. 1

Correct Answer :-

- 1

26) If  $x^y = e^{x-y}$ , then  $\frac{dy}{dx} =$

[Question ID = 13618]

1.  $\frac{\log x}{(1 + \log x)^2}$

2.  $\frac{1}{(1 + \log x)^2}$

3.  $\frac{\log x}{1 + \log x}$

4.  $\frac{(\log x)^2}{(1 + \log x)^2}$

Correct Answer :-

•  $\frac{\log x}{(1 + \log x)^2}$

27) Equation of the tangent to the curve  $y = 5x^4$  at the point (1,5) is

[Question ID = 13619]

1.  $y = 15(x - 1)$

2.  $y = 20x - 15$

3.  $x = 15y - 20$

4.  $y = 20(x - 1)$

**Correct Answer :-**

•  $y = 20x - 15$

28) If  $u = \sin^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$ , then  $x \frac{\partial u}{\partial y} + y \frac{\partial u}{\partial x} =$

**[Question ID = 13620]**

1.  $\cot u$
2.  $\tan u$
3. 1
4.  $\sin u$

**Correct Answer :-**

- $\tan u$

29)  $\int \frac{a}{b + ce^x} dx =$

**[Question ID = 13621]**

1.  $\frac{a}{b} \log\left(\frac{e^x}{b + ce^x}\right) + C$
2.  $\frac{b}{a} \log\left(\frac{e^{-x}}{b + e^{-x}}\right) + C$
3.  $\frac{a}{b} \log\left(\frac{1}{be^x + ce^{-x}}\right) + C$
4.  $\frac{b}{a} e^{(b+ce^x)} + C$

**Correct Answer :-**

•  $\frac{a}{b} \log\left(\frac{e^x}{b+ce^x}\right) + C$

30)  $\int \frac{1}{(1+x^2) \tan^{-1} x} dx =$

**[Question ID = 13622]**

1.  $\tan^{-1}x + C$
2.  $\cot^{-1}x + C$
3.  $\log(\sec x) \tan x + C$
4.  $\log(\tan^{-1}x) + C$

**Correct Answer :-**

•  $\log(\tan^{-1}x) + C$

31)  $\int \frac{\cos(\log x^2)}{x^4} dx =$

**[Question ID = 13623]**

1.  $\frac{1}{x^3} \cos\left[\log x^2 + \tan^{-1}\left(\frac{3}{2}\right)\right] + C$
2.  $\frac{x^3}{\sqrt{13}} \cos\left[\log x^2 + \cot^{-1}\left(\frac{2}{3}\right)\right] + C$
3.  $\frac{-1}{2x^3} \cos\left[\log x^2 + \tan^{-1}\left(\frac{2}{3}\right)\right] + C$
4.  $\frac{1}{x^3 \sqrt{13}} \cos\left[\log x^2 + \cot^{-1}\left(\frac{3}{2}\right)\right] + C$

**Correct Answer :-**

$$\frac{1}{x^3} \cos \left[ \log x^2 + \tan^{-1} \left( \frac{3}{2} \right) \right] + C$$

32)  $\int \frac{dx}{e^x - 1} =$

[Question ID = 13624]

1.  $\log \left( \frac{1 - e^x}{e^x} \right) + C$

2.  $\log(e^x - 1) + C$

3.  $\log \left( \frac{e^x - 1}{e^x} \right) + C$

4.  $\log \left( \frac{e^{-x} - 1}{e^{-x}} \right) + C$

Correct Answer :-

•  $\log \left( \frac{e^x - 1}{e^x} \right) + C$

33)  $\int \frac{\sin^3 x + \cos^3 x}{\sin^2 x \cos^2 x} dx =$

[Question ID = 13625]

1.  $\sec x + \cot x$

2.  $\operatorname{cosec} x - \cot x$

3.  $\operatorname{cosec} x + \tan x$

4.  $\sec x - \operatorname{cosec} x$

**Correct Answer :-**

•  $\sec x - \cos ecx$

34)  $\int_0^{\pi/4} \frac{e^{\tan x}}{\cos^2 x} dx$

[Question ID = 13626]

1.  $e - 1$

2.  $e^{-1} - 1$

3.  $e^{-1} + 1$

4.  $e^{-2} - 1$

**Correct Answer :-**

•  $e - 1$

35)  $\int_0^{\pi} \sin^3 x (1 - \cos x)^2 dx =$

[Question ID = 13627]

1.  $5/3$

2.  $8/5$

3.  $1$

4.  $0$

**Correct Answer :-**

•  $8/5$

36)

The volume generated by the revolution of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  about its major axis is

[Question ID = 13628]



1.  $4\pi ab^2$

2.  $\frac{4}{3}\pi ab^2$

3.  $\frac{4}{3}\pi a^2 b$

4.  $\frac{8}{3}\pi a^2 b^2$

**Correct Answer :-**

•  $\frac{4}{3}\pi ab^2$

37) The general solution of  $x \frac{dy}{dx} = y[\log y - \log x + 1]$  is

**[Question ID = 13629]**

1.  $y = Ce^x$

2.  $y = Ce^y$

3.  $y = xe^{cx}$

4.  $x = Ce^{y/x}$

**Correct Answer :-**

•  $y = xe^{cx}$

38) A and B are arbitrary constants, the differential equation having

$$xy = Ae^x + Be^{-x} + x^2 \text{ as its general solution is}$$

**[Question ID = 13630]**

1.  $y'' + 2xy' - xy + x^2 = 0$

2.  $xy'' + y' - xy - 2 = 0$

3.  $xy'' + 2y' - 2xy + 3x^2 - 2 = 0$

4.  $xy'' + 2y' - xy + x^2 - 2 = 0$

**Correct Answer :-**

•  $xy'' + 2y' - xy + x^2 - 2 = 0$

39) The solution of  $(e^{-2\sqrt{x}} - y)\frac{dx}{dy} = \sqrt{x}$

**[Question ID = 13631]**

1.  $y = e^{-2\sqrt{x}}(2\sqrt{x} + C)$

2.  $y = e^{-2\sqrt{x}} + \sqrt{x} + C$

3.  $y = e^{-2\sqrt{x}} + e^{\sqrt{x}}\sqrt{x} + C$

4.  $y = e^{2\sqrt{x}} + \log x + C$

**Correct Answer :-**

•  $y = e^{-2\sqrt{x}}(2\sqrt{x} + C)$

40) The solution of  $\cos x \, dy = (\sin x - y) \, y \, dx$

**[Question ID = 13632]**

1.  $y = \sec x \tan x + C$

2.  $y^{-1} \operatorname{Cosec} x = \cot x + C$

3.  $y^{-1} \sec x = \tan x + C$

4.  $y = \log \sin x + C$

**Correct Answer :-**

•  $y^{-1} \sec x = \tan x + C$

41) The solution of  $\frac{d^2 y}{dx^2} + 4 \frac{dy}{dx} + 5y = 0$  satisfying  $y(0) = 1$  and  $y'(0) = 0$  is

**[Question ID = 13634]**

1.  $y = e^{-2x} [\cos x + 2 \sin x]$

2.  $y = e^{-x} [2 \cos x + \sin x]$

3.  $y = e^{2x} [2 \cos x + 3 \sin x]$

4.  $y = e^x [\cos x + 2 \sin x]$

**Correct Answer :-**

•  $y = e^{-2x} [\cos x + 2 \sin x]$

42)  $\frac{d^2 y}{dx^2} - 5 \frac{dy}{dx} + 6y = 2e^x$ ; with  $y(0) = 1$ ;  $y'(0) = 1$  satisfies

**[Question ID = 13635]**

1.  $y = c_1 e^{2x} + c_2 e^{3x} + e^x$

2.  $y = 2e^{2x} + 3e^{3x} + e^x$

3.  $y = e^{2x} + 2e^{3x} + e^{-x}$

4.  $y = e^x$

**Correct Answer :-**

•  $y = e^x$

43) The solution of  $(y \log x - 2)y dx = x dy$

[Question ID = 13636]

1.  $y = x(\log x + C)$

1.

2.  $y = \frac{1}{x} \log x + x + C$

2.

3.  $\frac{1}{y} = x \log x + x + Cx$

3.

4.  $\frac{1}{y} = x^2 \log x + x + C$

4.

**Correct Answer :-**

•  $\frac{1}{y} = x^2 \log x + x + C$

44) Mean deviation about the median for the data 4,6,9,3,10,13,2 is [Question ID = 13641]

1. 4.31
2. 5.253
3. 3.285
4. 3.785

**Correct Answer :-**

- 3.285

45) If  $E_1, E_2$  are any two events of a random experiment and

P is a probability function then

[Question ID = 13642]

$$1. \quad P(E_1 \cap E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2)$$

$$2. \quad P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2)$$

$$3. \quad P(E_1 \cap E_2) = P(E_1) + P(E_2) + P(E_1 \cup E_2)$$

$$4. \quad P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cup E_2)$$

**Correct Answer :-**

$$\bullet \quad P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2)$$

46) The solution of the initial value problem  $\frac{d^2x}{dt^2} - 3\frac{dx}{dt} + 2x = 0;$

with  $x(0) = 2;$   $x'(0) = 0$  is

[Question ID = 23975]

$$1. \quad x(t) = Ae^t + Be^{2t}$$

$$2. \quad x(t) = 2e^t - 4e^{2t}$$

$$3. \quad x(t) = 4e^t - 2e^{2t}$$

$$4. \quad x(t) = e^t - 2e^{2t}$$

**Correct Answer :-**

$$\bullet \quad x(t) = 4e^t - 2e^{2t}$$

47) The Laplace transform of  $\left\{ \frac{e^{-at}t^{n-1}}{(n-1)!} \right\} =$

[Question ID = 23976]

$$\frac{e^{-at}}{(s+a)^n}$$

1.

$$\frac{1}{(s+a)^n}$$

2.

$$\frac{1}{(s-a)^n}$$

3.

$$\frac{e^{at}}{(s-a)^n}$$

4.

**Correct Answer :-**

$$\frac{1}{(s+a)^n}$$

•

**48)**

The inverse Laplace transform of  $\left\{ \frac{1}{(8s-27)^{1/3}} \right\} =$

**[Question ID = 23977]**

$$\frac{e^{(3/2)t} t^{-2/3}}{\Gamma\left(\frac{1}{3}\right)}$$

1.

$$\frac{e^{(8/27)t} t^{-3/2}}{2\Gamma\left(\frac{1}{3}\right)}$$

2.

$$\frac{e^{(2/3)t} t^{-3/2}}{2\Gamma\left(\frac{1}{3}\right)}$$

3.

$$\frac{e^{(27/8)t} t^{-2/3}}{2\Gamma\left(\frac{1}{3}\right)}$$

4.

Correct Answer :-

$$\frac{e^{(27/8)t} t^{-2/3}}{2\Gamma\left(\frac{1}{3}\right)}$$

49)

$$\text{If } f(x) = \begin{cases} 0 & ; -\pi \leq x \leq 0 \\ \sin x & ; 0 \leq x \leq \pi \end{cases}, \quad f(x+2\pi) = f(x) \text{ and}$$

$$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} (a_n \cos nx + b_n \sin nx), \text{ then } a_0 =$$

[Question ID = 23978]

1.  $\frac{1}{\pi}$

2. 1

3. 0

4.  $\frac{2}{\pi}$

Correct Answer :-

•  $\frac{2}{\pi}$

50)

$$\text{The inverse Laplace transform of } \left\{ \frac{s+3}{s^2+6s+25} \right\} =$$

[Question ID = 23979]

1.  $e^{-3t} \cos 4t$

2.  $e^{3t} \sin 4t$

3.  $e^{3t} \cos 4t$

4.  $e^{-3t} \cos 3t$

**Correct Answer :-**

•  $e^{-3t} \cos 4t$

Topic:- Physics\_set2

1) The physical quantity having the dimension  $[ML^2T^{-3}]$  is

**[Question ID = 34198]**

1. work
2. power
3. pressure
4. impulse

**Correct Answer :-**

- power

2) Force F is given by  $F=at +bt^2$  where t is time. The dimensions of a and b are

**[Question ID = 34199]**

1.  $[MLT^{-3}]$  and  $[MLT^{-4}]$
2.  $[MLT^{-1}]$  and  $[MLT^0]$
3.  $[MLT^{-3}]$  and  $[MLT^4]$
4.  $[MLT^{-4}]$  and  $[MLT^{-1}]$

**Correct Answer :-**

- $[MLT^{-3}]$  and  $[MLT^{-4}]$

3)



The magnitudes of two vectors are 4 and 5 and their scalar product is 10. Then the angle between the two vectors is [Question ID = 34200]

1.  $30^\circ$
2.  $45^\circ$
3.  $60^\circ$
4.  $0^\circ$

Correct Answer :-

- $60^\circ$

4) If  $\vec{a} + \vec{b} = \vec{c}$  and  $\vec{a}^2 + \vec{b}^2 = \vec{c}^2$ , then the angle between the vectors  $\vec{a}$  and  $\vec{b}$  is

[Question ID = 34201]

1.  $0^\circ$
2.  $20^\circ$
3.  $45^\circ$
4.  $90^\circ$

Correct Answer :-

- $90^\circ$

5)

$\vec{a}$  and  $\vec{b}$  are two vectors and  $\theta$  is the angle between them. If  $|\vec{a} \times \vec{b}| = \sqrt{3} (\vec{a} \cdot \vec{b})$ , the value of  $\theta$  is

[Question ID = 34202]

1.  $30^\circ$
2.  $45^\circ$

3.  $60^\circ$

4.  $90^\circ$

**Correct Answer :-**

•  $30^\circ$

**6) A body under action of five forces can be in equilibrium [Question ID = 34203]**

1. if all forces are equal
2. sum of resolved components along x-axis is zero
3. sum of resolved components along y-axis is zero
4. sum of resolved components along x-axis and y-axis, individually zero

**Correct Answer :-**

- sum of resolved components along x-axis and y-axis, individually zero

**7) Two vibrating systems are said to be in resonance, if their [Question ID = 34204]**

1. amplitudes are equal
2. temperatures are equal
3. frequencies are equal
4. phase values are equal

**Correct Answer :-**

- frequencies are equal

**8)**

A balloon is ascending at the rate of  $9.8 \text{ ms}^{-1}$  at a height of 39.2 m above the ground when a food packet is dropped from the balloon. The velocity with which the food packet reach the ground is

**[Question ID = 34205]**

1.  $-9.8 \text{ ms}^{-1}$

2.  $-58.8 \text{ ms}^{-1}$

3.  $-4.9 \text{ ms}^{-1}$

4.  $-29.4 \text{ ms}^{-1}$

**Correct Answer :-**

•  $-29.4 \text{ ms}^{-1}$

9) The walls of hall built for music concerts should [Question ID = 34206]

1. amplify sound
2. reflect sound
3. transmit sound
4. absorb sound

Correct Answer :-

- absorb sound

10) When a star approaches the earth , the waves are shifted towards [Question ID = 34207]

1. green colour
2. yellow colour
3. blue end
4. red end

Correct Answer :-

- blue end

11)

A body of mass  $m$  is placed on a rough surface with coefficient of friction  $\mu$  inclined at  $\theta$ . If the mass is in equilibrium, then the value of  $\theta$  is

[Question ID = 34208]

1.  $\text{Tan}^{-1}\mu$
2.  $\text{Tan}^{-1}(1/\mu)$
3.  $\text{Tan}^{-1}(m/\mu)$
4.  $\text{Tan}^{-1}(\mu/m)$

Correct Answer :-

- $\text{Tan}^{-1}\mu$

12)

If water falls from a dam into a turbine wheel 19.6 m below, then the velocity of water at the turbine is (given  $g=9.8 \text{ ms}^{-2}$ )

[Question ID = 34209]

1.  $9.8 \text{ ms}^{-1}$
2.  $19.6 \text{ ms}^{-1}$
3.  $39.2 \text{ ms}^{-1}$
4.  $98 \text{ ms}^{-1}$

Correct Answer :-

- $19.6 \text{ ms}^{-1}$

13) Two springs of spring constants 1000 N/m and 1500 N/m respectively are stretched with a same force. Their potential energies will be in the ratio of

[Question ID = 34210]

1. 2:3
2. 1:3
3. 3:2
4. 2:1

Correct Answer :-

- 3:2

14) The mass of a body at the centre of earth is

[Question ID = 34211]

1. less than that at the surface
2. remain constant
3. more than that at the surface
4. zero

Correct Answer :-

- remain constant

15)

The maximum velocity of a particle executing simple harmonic motion with an amplitude 7 mm is  $4.4 \text{ ms}^{-1}$ . The period of oscillation is

[Question ID = 34212]

1. 0.01 s
2. 0.1 s
3. 10 s
4. 100 s

**Correct Answer :-**

- 0.01 s

16) In a simple harmonic oscillator, at the mean position [Question ID = 34213]

1. both kinetic energy and potential energies are minimum
2. kinetic energy is maximum, potential energy is minimum
3. kinetic energy is minimum, potential energy is maximum
4. both kinetic energy and potential energies are maximum

**Correct Answer :-**

- kinetic energy is maximum, potential energy is minimum

17) The intensity of sound produced by thunder is  $0.1 \text{ Wm}^{-2}$ . The intensity level in decibels is

[Question ID = 34214]

1. 110 dB
2. 100 dB
3. 90 dB
4. 140 dB

**Correct Answer :-**

- 110 dB

18) A classroom has dimensions  $20 \times 15 \times 5 \text{ m}^3$ . The reverberation time is 3.5 s. The average absorption coefficient is

[Question ID = 34215]

1. 0.05
2. 0.09
3. 0.03
4. 0.07

**Correct Answer :-**

- 0.07

**19) Which of the following is not a characteristic of musical sound? [Question ID = 34216]**

1. pitch
2. loudness
3. frequency
4. quality

**Correct Answer :-**

- frequency

**20) In a simple harmonic motion, the particle is [Question ID = 34217]**

1. always accelerated
2. alternately accelerated and retarded
3. always retarded
4. neither accelerated nor retarded

**Correct Answer :-**

- alternately accelerated and retarded

**21)**

100 g of water is heated from 30°C to 50°C. Ignoring the slight expansion of water, the change in its internal energy is (specific heat of water is 4200 J kg<sup>-1</sup>K<sup>-1</sup>)

**[Question ID = 34218]**

1. 4.2 kJ
2. 84 kJ
3. 2.1 kJ
4. 8.4 kJ

**Correct Answer :-**

- 8.4 kJ

**22) Which of the following is correct [Question ID = 34219]**

1.  $(T_1/H_2) + (T_2/H_1) = 0$
2.  $(H_1/T_1) = (H_2/T_2)$
3.  $H_1 T_1 = H_2 T_2$
4.  $H_1 T_1 + H_2 T_2 = 0$

**Correct Answer :-**

•  $(H_1/T_1) = (H_2/T_2)$

**23) An ideal gas in a cylinder is compressed adiabatically to one-third its original volume. During the process 50J of work is done on the gas by the compressing agent. The change in the internal energy of the gas in the process is [Question ID = 34220]**

1. 50 J
2. 50/3 J
3. 150 J
4. 45 J

**Correct Answer :-**

- 50 J

**24) The maximum kinetic energy of photoelectrons ejected from a potassium surface by ultraviolet light of wavelength 200 nm is (photoelectric threshold wavelength for potassium is 440 nm) [Question ID = 34221]**

1. 2.82 eV
2. 4.40 eV
3. 6.20 eV
4. 3.38 eV

**Correct Answer :-**

- 3.38 eV

**25)**

For a light wave to undergo total internal reflection (' $i_c$ ' is critical angle, ' $i$ ' is incident angle)

**[Question ID = 34222]**

1. light moves from rarer to denser medium and  $i > i_c$
2. light moves from denser to rarer medium and  $i > i_c$
3. light moves from rarer to denser medium and  $i < i_c$
4. light moves from denser to rarer medium and  $i < i_c$

**Correct Answer :-**

- light moves from denser to rarer medium and  $i > i_c$

Topic:- Chemistry\_Set2

1) For an f-orbital, the values of 'm' are [Question ID = 23999]

1. -1, 0, +1
2. -3, -2, -1, 0, +1, +2, +3
3. 0, +1, +2, +3
4. -2, -1, 0, +1, +2

**Correct Answer :-**

- -3, -2, -1, 0, +1, +2, +3

2) Among LiCl, BeCl<sub>2</sub>, BCl<sub>3</sub> and CCl<sub>4</sub>, the covalent character follows the order:

[Question ID = 24000]

1. LiCl > BeCl<sub>2</sub> > BCl<sub>3</sub> > CCl<sub>4</sub>
2. LiCl < BeCl<sub>2</sub> < BCl<sub>3</sub> < CCl<sub>4</sub>
3. LiCl > BeCl<sub>2</sub> < BCl<sub>3</sub> > CCl<sub>4</sub>
4. LiCl < BeCl<sub>2</sub> < BCl<sub>3</sub> > CCl<sub>4</sub>

**Correct Answer :-**

- LiCl < BeCl<sub>2</sub> < BCl<sub>3</sub> < CCl<sub>4</sub>

3) Lowest oxidation state in its compound is exhibited by

[Question ID = 24001]

1. N
2. O
3. C
4. F

**Correct Answer :-**

- F

4) Which of the following contains ionic, covalent and coordinate covalent bonds

[Question ID = 24002]

1. NH<sub>4</sub>Cl
2. K<sub>3</sub>[Fe(CN)<sub>6</sub>]
3. CuSO<sub>4</sub>
4. NH<sub>4</sub>Cl, CuSO<sub>4</sub> and K<sub>3</sub>[Fe(CN)<sub>6</sub>]



**Correct Answer :-**

- $\text{NH}_4\text{Cl}$ ,  $\text{CuSO}_4$  and  $\text{K}_3[\text{Fe}(\text{CN})_6]$

**5) Molarity of 4% (W/V) solution of NaOH is [Question ID = 24003]**

1. 0.1
2. 0.5
3. 0.001
4. 1

**Correct Answer :-**

- 1

**6) The weight of  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  required to prepare 500mL of 0.2 N solution is**

**[Question ID = 24004]**

1. 1.26 g
2. 6.3g
3. 1.575g
4. 3.15g

**Correct Answer :-**

- 6.3g

**7) The conjugate base of hydrogen molecule is [Question ID = 24005]**

1. Electron
2. Hydride ion
3. Proton
4. Hydroxide ion

**Correct Answer :-**

- Hydride ion

**8)  $\text{p}^{\text{H}}$  of a solution is 1. It is diluted by  $1 \times 10^3$  times. The  $\text{p}^{\text{H}}$  of the resulting solution will be**

**[Question ID = 24006]**

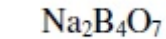
1. 1
2. 3
3. 4
4. 5

**Correct Answer :-**

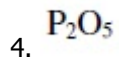
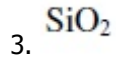
- 4

9) Which of the following is a basic flux

[Question ID = 24007]



2. **CaO**



**Correct Answer :-**

- **CaO**

10) Roasting of a metal oxide is carried out in which of the following furnaces

[Question ID = 24008]

1. Blast furnace

2. Reverberatory furnace

3. Both reverberatory furnace and blast furnace

4. Muffle furnace

**Correct Answer :-**

- Reverberatory furnace

11) Three faradays of electricity was passed through an aqueous solution of Ferrous chloride. The weight of iron metal (at Wt = 56) deposited at the cathode in grams is [Question ID = 24009]

1. 56

2. 84

3. 112

4. 168

**Correct Answer :-**

- 84

12) Which one of the following could not be liberated from a suitable electrolyte by the passage of 0.25 Faraday of electricity through the electrolyte

[Question ID = 24010]

1. 0.25 mole of Ag

2. 16 gms of Cu

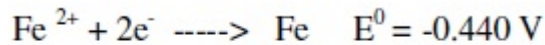
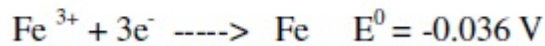
3. 2gms of O<sub>2</sub> (g)

4. 2.8 lit of H<sub>2</sub> at STP

**Correct Answer :-**

- 16 gms of Cu

13) Given standard electrode potentials



The standard electrode potential E<sup>0</sup> for Fe<sup>3+</sup> + e<sup>-</sup> ----> Fe<sup>2+</sup> is

**[Question ID = 24011]**

1. 0.476 V
2. -0.404 V
3. 0.40 V
4. 0.772 V

**Correct Answer :-**

- 0.772 V

14) Water acts as an excellent solvent, due to which property among the following:

**[Question ID = 24012]**

1. High viscosity
2. High Enthalpy of formation
3. High dielectric constant
4. High density

**Correct Answer :-**

- High dielectric constant

15) A sample of water has Mg(HCO<sub>3</sub>)<sub>2</sub> = 73 mg/L, Ca(HCO<sub>3</sub>)<sub>2</sub> = 162 mg/L, MgCl<sub>2</sub> = 95 mg/L and CaSO<sub>4</sub> = 136 mg/L. Temporary hardness in ppm is

**[Question ID = 24013]**

1. 150

2. 350

3. 500

4. 200

**Correct Answer :-**

- 150

**16) The process which removes all ionic, colloidal and high molecular weight organic matter in water is [Question ID = 24014]**

1. Ion exchange process
2. zeolite process
3. Reverse osmosis
4. Lime soda process

**Correct Answer :-**

- Reverse osmosis

**17) The monomer used in PVC preparation is [Question ID = 24015]**

1. Ethene
2. Chloroethene
3. Dichloroethene
4. Tetrachloroethene

**Correct Answer :-**

- Chloroethene

**18) The chemical used for accelerating Vulcanization is**

**[Question ID = 24016]**

1. ZnO
2. SiO<sub>2</sub>
3. Sulphur
4. Zinc stearate

**Correct Answer :-**

- Sulphur

**19) Which one of the following type of forces are present in Nylon-6,6 [Question ID = 24017]**

1. Electrostatic forces of attraction
2. Hydrogen bonding
3. Three dimensional network of bonds
4. Metallic bonding

**Correct Answer :-**

- Hydrogen bonding

**20) Which one of the following is a primary pollutant**

**[Question ID = 24018]**

1. **CO**
2. **PAN**
3. **Aldehyde**

4.  $\text{H}_2\text{SO}_4$

**Correct Answer :-**

- **CO**

**21) Ozone layer of upper atmosphere is being destroyed by**

**[Question ID = 24019]**

Photochemical oxidants like  $\text{O}_2$  and  $\text{CO}_2$

- 1.
2. **Chloro fluorocarbon**
3. **Smog**

4.  $\text{SO}_2$

**Correct Answer :-**

- **Chloro fluorocarbon**

**22) Eutrophication causes reduction in [Question ID = 24020]**

1. Dissolved salts
2. Dissolved hydrogen
3. Dissolved oxygen
4. Dissolved solids

**Correct Answer :-**

- Dissolved oxygen

**23) Which one of the chemical substance is maximum in natural gas [Question ID = 24021]**

1.  $\text{CH}_4$

2.  $\text{C}_2\text{H}_6$

3.  $\text{H}_2$

4.  $\text{CO} + \text{CO}_2$

**Correct Answer :-**

•  $\text{CH}_4$

**24) Which one of the following metals could provide cathodic protection to iron [Question ID = 24022]**

1. Cu and Ni
2. Zn and Cu
3. Al and Zn
4. Al, Zn and Ni

**Correct Answer :-**

• Al and Zn

**25) Rusting of iron is catalysed by which of the following**

**[Question ID = 24023]**

1. Fe

2. Zn

3.  $\text{O}_2$

4.  $\text{H}^+$

**Correct Answer :-**

•  $\text{H}^+$

Topic:- MET\_Set2

1)

**When a particle is settling in a fluid under Newtonian conditions, then the time taken by the particle to attain its terminal velocity is proportional to [Question ID = 34423]**

1. (Particle diameter)<sup>0.5</sup>
2. Particle diameter
3. (particle diameter)<sup>2</sup>
4. (Particle diameter)<sup>-0.5</sup>

**Correct Answer :-**

- (Particle diameter)<sup>0.5</sup>

**2) If the liberation of valuable mineral is in the coarse size range, the concentration method is [Question ID = 34424]**

1. heavy media separation
2. flotation
3. sizing classification
4. electrostatic separation

**Correct Answer :-**

- heavy media separation

**3) In the differential flotation of Pb-Zn ore, the reagent used to depress sphalerite is [Question ID = 34425]**

1. pine oil
2. lime
3. sodium cyanide
4. zinc sulphate

**Correct Answer :-**

- zinc sulphate

**4) Separation of materials into products based on the difference in their flow velocities through fluids is termed as [Question ID = 34426]**

1. clarification
2. classification
3. elutriation
4. sedimentation

**Correct Answer :-**

- classification

**5) 'Xanthates' are used in froth floatation process as a/an [Question ID = 34427]**

1. conditioner
2. frother
3. collector
4. activator

**Correct Answer :-**

- collector

**6) Cage mill is a type of \_\_\_\_\_ [Question ID = 34428]**

1. roll mill
2. impact mill
3. disc mill
4. vibratory mill

**Correct Answer :-**

- impact mill

**7) Grizzly is used for \_\_\_\_\_ [Question ID = 34429]**

1. crushing
2. grinding
3. screening
4. electrostatic separator

**Correct Answer :-**

- screening

**8) The gangue material discarded after ore dressing operation is also called \_\_\_\_\_ [Question ID = 34430]**

1. tailing
2. flux
3. concentrate
4. run of mine ore

**Correct Answer :-**

- tailing

**9) The concentration of gold ores is mostly accomplished by \_\_\_\_\_ [Question ID = 34431]**

1. tabling
2. jigging
3. flotation
4. elutriation

**Correct Answer :-**

- tabling

**10) \_\_\_\_\_ coal has the highest fixed carbon content out of the following? [Question ID = 34432]**

1. bituminous



2. lignite
3. anthracite
4. semi-bituminous

**Correct Answer :-**

- anthracite

**11) Construction of thermocouple is based on the principle of [Question ID = 34433]**

1. Peltier effect
2. Seebeck effect
3. Thomson effect
4. Wein-displacement law

**Correct Answer :-**

- Seebeck effect

**12) Bomb calorimeter is used to determine \_\_\_\_\_ of coal [Question ID = 34434]**

1. moisture content
2. volatile matter
3. calorific value
4. Ash content

**Correct Answer :-**

- calorific value

**13) Water gas is produced with the interaction of hot coke with \_\_\_\_\_ [Question ID = 34435]**

1. steam
2. air
3. air and steam
4. oxygen and steam

**Correct Answer :-**

- steam

**14) Stored \_\_\_\_\_ is liable to spontaneous ignition**

**[Question ID = 34436]**

1. diesel oil
2. coal
3. producer gas
4. gasoline

**Correct Answer :-**

- coal

**15) Blue gas is the other name of \_\_\_\_\_ [Question ID = 34437]**

1. producer gas
2. coal gas
3. blast furnace gas
4. water gas

**Correct Answer :-**

- water gas

**16) Refractorries are not used for the lining of \_\_\_\_\_ [Question ID = 34438]**

1. ingot moulds
2. ladles
3. hot metal mixers
4. soaking pits

**Correct Answer :-**

- ingot moulds

**17) Fossil fuels are \_\_\_\_\_**

**[Question ID = 34439]**

1. hydrocarbons
2. inorganic hydroxides
3. organic aldehydes
4. inorganic salts

**Correct Answer :-**

- hydrocarbons

**18) The percentage of nitrogen in \_\_\_\_\_ is 50% to 55%**

**[Question ID = 34440]**

1. coke oven gas
2. water gas
3. super gas
4. producer gas

**Correct Answer :-**

- producer gas

**19)**

**The equation which describes the variation of equilibrium constant with temperature [Question ID = 34441]**

1. Vant'Hoff
2. Gibbs-Helmholtz
3. Gibbs –Duhem
4. Kirchhoff

**Correct Answer :-**

- Vant'Hoff

**20) The equilibrium percent solubility of diatomic gases in ambient atmosphere is [Question ID = 34442]**

1. k.partial pressure of the gas
2.  $k. (\text{partial pressure of the gas})^2$
3.  $k. (\text{partial pressure of the gas})^{-1}$
4.  $k. (\text{partial pressure of the gas})^{0.5}$

**Correct Answer :-**

- $k. (\text{partial pressure of the gas})^{0.5}$

**21) Internal energy (E) represents \_\_\_\_\_ of all atoms in a system [Question ID = 34443]**

1. total kinetic energy
2. potential Energy
3. total kinetic and potential energy
4. thermal and kinetic energy

**Correct Answer :-**

- total kinetic and potential energy

**22) An ideal solution is one, which obeys [Question ID = 34444]**

1. Raoult's law
2. Henry's law
3. Sivert's law
4. Gibb's Duhem law

**Correct Answer :-**

- Raoult's law

**23) When a reaction occurs at constant \_\_\_\_\_, no work is done by the system [Question ID = 34445]**

1. temperature
2. density
3. pressure
4. volume

**Correct Answer :-**

- volume

**24) Ellingham diagrams for the formation of metal oxides are plotted as [Question ID = 34446]**

$\Delta G^\circ$  versus  $1/T$

1.

$\Delta G^\circ$  versus  $1/T^2$

2.

$\Delta G^\circ$  versus  $1/T^0$

3.

$\Delta G^\circ$  versus  $T$

4.

**Correct Answer :-**

$\Delta G^\circ$  versus  $T$

•

**25) The free energy change for a chemical reaction is [Question ID = 34447]**

1.  $RT \ln K$
2.  $R \ln K$
3.  $-RT \ln K$
4.  $-R \ln K$

**Correct Answer :-**

- $-RT \ln K$

**26) The entropy \_\_\_\_\_ when a spontaneous change occurs in an isolated system [Question ID = 34448]**

1. decreases
2. unchanged
3. equal to zero
4. increases

**Correct Answer :-**

- increases

**27) A system is defined as a part of universe \_\_\_\_\_ [Question ID = 34449]**

1. selected for consideration
2. consisting of solid phase only
3. consisting of liquid phase only

4. consisting of gaseous phase only

**Correct Answer :-**

- selected for consideration

**28) In blast furnace iron making conditions for desiliconisation are [Question ID = 34450]**

1. low temperature and basic slag
2. high temperature and basic slag
3. low temperature and acidic slag
4. high temperature and acidic slag

**Correct Answer :-**

- low temperature and basic slag

**29) In MIDREX process the reducing agent is [Question ID = 34451]**

1. CO

2.  $H_2$

3.  $CO + H_2$

4. coal

**Correct Answer :-**

•  $CO + H_2$

**30) Rimmed steels are used for [Question ID = 34452]**

1. structurals
2. wires
3. Flats
4. rods

**Correct Answer :-**

- Flats

**31) Thickness of skin formed during the solidification of steel is equal to**

**[Question ID = 34453]**

1. constant. Time

2.  $\text{constant} \cdot \sqrt{\text{Time}}$

3.  $\text{constant} \cdot (\text{Time})^2$

constant. (Time)<sup>-1</sup>

4.

**Correct Answer :-**

• constant. √Time

**32) Efficiency of blast furnace operation is assessed in terms of [Question ID = 34454]**

1. productivity
2. driving rate
3. coke consumption
4. productivity and coke consumption rate

**Correct Answer :-**

- productivity and coke consumption rate

**33) Steels containing approximately 0.3% C are generally [Question ID = 34455]**

1. killed
2. semi-killed
3. capped
4. rimmed

**Correct Answer :-**

- killed

**34) Solution loss reaction occurs in [Question ID = 34456]**

1. LD converter
2. Blast furnace
3. coke oven
4. Regenerators

**Correct Answer :-**

- Blast furnace

**35) LD converter is lined with [Question ID = 34457]**

1. dolomite
2. fire clay
3. Alumina
4. silica

**Correct Answer :-**

- dolomite

**36) Teeming of metal into mould in vacuum causes [Question ID = 34458]**

1. Inverse segregation in ingots
2. gas free ingots

3. sulphur inclusions in ingots
4. brittleness in ingots

**Correct Answer :-**

- gas free ingots

**37) Reducing agent used in Pidgeon process is [Question ID = 34459]**

1. carbon
2. hydrogen
3. Fe-Si
4. calcium

**Correct Answer :-**

- Fe-Si

**38) Imperial smelting process is used for the production of [Question ID = 34460]**

1. Cu
2. Zn
3. Mg
4. Ni

**Correct Answer :-**

- Zn

**39) In the refining of lead, Parkes process is used for [Question ID = 34461]**

1. desilverising
2. dezincing
3. decopperising
4. softening

**Correct Answer :-**

- desilverising

**40) In Bayer's process, sodium aluminate is formed, the chemical formula is \_\_\_\_\_ [Question ID = 34462]**

1.  $\text{NaAlO}_4$
2.  $\text{NaAlO}_2$
3.  $\text{Na}_2\text{AlO}_2$
4.  $\text{Na}_3\text{AlO}_2$

**Correct Answer :-**



**41) The principal advantage of flash smelting in copper extraction is [Question ID = 34463]**

1. precise process control
2. versatility
3. energy conservation
4. low copper losses in slag

**Correct Answer :-**

- energy conservation

**42) Refining of zinc is carried out by [Question ID = 34464]**

1. Liquation
2. fractional distillation
3. electrolytic refining
4. both liquation and fractional distillation

**Correct Answer :-**

- both liquation and fractional distillation

**43) Electro metallurgy is involved in extraction of [Question ID = 34465]**

1. Iron
2. aluminum
3. zinc
4. tin

**Correct Answer :-**

- aluminum

**44) Ti is produced by reducing \_\_\_\_\_ with magnesium [Question ID = 34466]**

1.  $\text{TiO}_2$
2.  $\text{TiCl}_4$
3.  $\text{TiF}_4$
4. illemenite

**Correct Answer :-**

- $\text{TiCl}_4$



45) Carbonyl process is used for the refining of \_\_\_\_\_ [Question ID = 34467]

1. Cu
2. Si
3. Ni
4. Zn

**Correct Answer :-**

- Ni

46) The atomic radius of an FCC crystal (having lattice parameter a) is \_\_\_\_\_ [Question ID = 34468]

1.  $a\sqrt{2}/2$
2.  $a/2\sqrt{2}$
3.  $a\sqrt{3}/4$
4.  $a/2$

**Correct Answer :-**

- $a/2\sqrt{2}$

47) What is the atomic packing factor of BCC? [Question ID = 34469]

1. 0.74
2. 0.72
3. 0.68
4. 0.82

**Correct Answer :-**

- 0.68

48) Stacking sequence in FCC is \_\_\_\_\_ [Question ID = 34470]

1. ...ABABABAB...
2. ...ABCABCABC...
3. ...ABABCBCBC...
4. ...ACCBCABCABC...

**Correct Answer :-**

- ...ABCABCABC...

49) The octahedron has [Question ID = 34471]

1. 4 edges

2. 8 edges
3. 12 edges
4. 16 edges

**Correct Answer :-**

- 12 edges

**50) In Hume-Rothery rules for extensive solid solubility, the atomic diameter of the solute and the solvent atoms should not differ by more than [Question ID = 34472]**

1. 50%
2. 15%
3. 2%
4. 0%

**Correct Answer :-**

- 15%

**51) Gibbs phase rule is [Question ID = 34473]**

1.  $F = C + P + 2$
2.  $F = C - P + 2$
3.  $F = C + P - 2$
4.  $F = C - P - 2$

**Correct Answer :-**

- $F = C - P + 2$

**52) Pearlite is a mixture of \_\_\_\_\_ [Question ID = 34474]**

1. alpha iron and cementite
2. gamma iron and cementite
3. ferrite and austenite
4. ledebrite and austenite

**Correct Answer :-**

- alpha iron and cementite

**53) If one solid phase splits into two solid phases on cooling, the reaction is [Question ID = 34475]**

1. eutectic
2. peritectic
3. eutectoid
4. peritectoid

**Correct Answer :-**

- eutectoid

**54) Lead melts at 327<sup>0</sup>C. It is hot rolled at**

**[Question ID = 34476]**

-273°C

1.

200°C

2.

-200°C

3.

4. room temperature

**Correct Answer :-**

- room temperature

**55) During overageing, hardness [Question ID = 34477]**

1. decreases
2. increases
3. is constant
4. increases abruptly

**Correct Answer :-**

- decreases

**56) Number of slip systems in FCC are [Question ID = 34478]**

1. 4
2. 6
3. 8
4. 12

**Correct Answer :-**

- 12

**57) Bragg equation for X-ray diffraction through a metal crystal structure is given by [Question ID = 34479]**

$n\lambda = 2d \cos \theta$

1.

$n\lambda = 2d \sin \theta$

2.

$nd = 2\lambda \sin \theta$

3.

$\lambda d = 2n \cos \theta$

4.

**Correct Answer :-**

$$n\lambda = 2d \sin \theta$$

•

**58) Which of the following is a low melting point metal? [Question ID = 34480]**

1. stainless steel
2. wrought iron
3. tin
4. copper

**Correct Answer :-**

- tin

**59) The preferred slip plane for FCC is [Question ID = 34481]**

1. (111)
2. (110)
3. (100)
4. (000)

**Correct Answer :-**

- (111)

**60) In an ideal HCP packing, the c/a ratio is [Question ID = 34482]**

1. 1.225
2. 1.414
3. 1.633
4. 1.732

**Correct Answer :-**

- 1.633

**61) The resolution of an optical microscope is of the order of [Question ID = 34483]**

1. 1 nm
2.  $1 \mu\text{m}$
3. 1 mm

4. 1 cm

**Correct Answer :-**

- 1  $\mu\text{m}$

62) Gamma iron occurs in the temperature of \_\_\_\_\_ °C

**[Question ID = 34484]**

1. 0 – 770
2. 770 – 910
3. 910 – 1400
4. 1400 - 1539

**Correct Answer :-**

- 910 – 1400

63) Crystal structure of ferrite is \_\_\_\_\_ **[Question ID = 34485]**

1. SC
2. BCC
3. FCC
4. HCP

**Correct Answer :-**

- BCC

64) If a material suffers permanent deformation due to application of stress/load, it is called **[Question ID = 34486]**

1. elastic deformation
2. plastic deformation
3. rupture stress
4. ultimate stress

**Correct Answer :-**

- plastic deformation

65) Plastic deformation in metals is due to the presence of dislocation in crystals. This is a \_\_\_\_\_ defect **[Question ID = 34487]**

1. point defect
2. surface defect
3. line defect
4. volume defect

**Correct Answer :-**

- line defect

**66) Which of the following is not a structure sensitive property of a material [Question ID = 34488]**

1. ductility
2. tensile strength
3. density
4. yield strength

**Correct Answer :-**

- density

**67) The number cycles of stress which a metal can endure before failure is known as [Question ID = 34489]**

1. damping capacity
2. toughness
3. malleability
4. endurance limit

**Correct Answer :-**

- endurance limit

**68) Hook's law [Question ID = 34490]**

1. applies to the elastic deformation
2. applies beyond limit of proportional limit in stress-strain curve
3. states that stress is inversely proportional to strain upto elastic limit
4. applies to plastic deformation

**Correct Answer :-**

- applies to the elastic deformation

**69) Crystal structure of metals is studied by [Question ID = 34491]**

1. metallographic technique
2. X-ray technique
3. ultrasonic method
4. electron microscopy

**Correct Answer :-**

- X-ray technique

**70) Cold working of metals results in [Question ID = 34492]**

1. increase in strength
2. increase in ductility
3. decrease in hardness
4. decrease in strength

**Correct Answer :-**

- increase in strength

**71) Tempering of steel is done to make it [Question ID = 34493]**

1. Brittle
2. hard
3. rollable
4. soft

**Correct Answer :-**

- soft

**72) In edge dislocation, the direction of movement of atoms is [Question ID = 34494]**

1. parallel to the stress direction
2. perpendicular to the stress direction

at  $120^\circ$  to the stress direction

3.

at  $60^\circ$  to the stress direction

4.

**Correct Answer :-**

- parallel to the stress direction

**73) If the grain diameter increases, then yield strength of metal [Question ID = 34495]**

1. decreases
2. increases
3. remains constant
4. increases then decreases

**Correct Answer :-**

- decreases

**74) \_\_\_\_\_ is dimensionless quantity [Question ID = 34496]**

1. Stress
2. strain
3. true stress
4. Young's modulus of elasticity

**Correct Answer :-**

- strain

**75) At \_\_\_\_\_ temperature, the grains and the grain boundaries have equal strength [Question ID = 34497]**

1. Curie
2. equi-cohesive
3. recrystallisation
4. absolute zero

**Correct Answer :-**

- equi-cohesive

**76) Which of the following is not a destructive test? [Question ID = 34498]**

1. Radiography
2. Impact test
3. Tensile test
4. Fatigue test

**Correct Answer :-**

- Radiography

**77) Creep resistance of materials decreases due to [Question ID = 34499]**

1. small grain size
2. fine dispersoid size
3. low stacking fault energy
4. high melting point

**Correct Answer :-**

- small grain size

**78) The standard steel ball diameter used in BHN is [Question ID = 34500]**

1. 1mm
2. 2mm
3. 5mm
4. 10mm

**Correct Answer :-**

- 10mm

**79) In fracture toughness characterized by  $K_{IC}$ , I in the subscript indicates loading by**

**[Question ID = 34501]**

1. crack opening mode
2. forward shear mode
3. parallel shear mode
4. perpendicular shear mode

**Correct Answer :-**

- crack opening mode

**80) A property that cannot be obtained from a tensile test is [Question ID = 34502]**

1. Young's modulus



2. yield strength
3. ultimate tensile strength
4. endurance limit

**Correct Answer :-**

- endurance limit

**81) In a tensile test of a ductile material, necking starts at [Question ID = 34503]**

1. lower yield stress
2. upper yield stress
3. ultimate tensile strength
4. fracture stress

**Correct Answer :-**

- ultimate tensile strength

**82) \_\_\_\_\_ of a material is designated by its Izod value [Question ID = 34504]**

1. impact resistance
2. tensile strength
3. creep strength
4. hardness

**Correct Answer :-**

- impact resistance

**83) Sub-zero treatment of steel is carried out for \_\_\_\_\_ [Question ID = 34505]**

1. converting austenite to bainite
2. converting austenite to martensite
3. converting austenite to pearlite
4. converting austenite to ferrite

**Correct Answer :-**

- converting austenite to martensite

**84) An important property of malleable cast iron in comparison to grey cast iron is the high [Question ID = 34506]**

1. compressive strength
2. carbon content
3. ductility
4. surface finish

**Correct Answer :-**

- ductility

**85) Increasing the percentage of cold work, the recrystallization temperature**

**[Question ID = 34507]**

1. increases
2. decreases
3. increases then decreases
4. remains constant

**Correct Answer :-**

- decreases

**86) Which of the following is not a casting defect? [Question ID = 34508]**

1. scab
2. ingate
3. hot tear
4. fin

**Correct Answer :-**

- ingate

**87) In which of the following welding processes, electrode gets consumed? [Question ID = 34509]**

1. TIG welding
2. resistance welding
3. thermit welding
4. arc welding

**Correct Answer :-**

- arc welding

**88) Which of the following is not a fusion welding process? [Question ID = 34510]**

1. arc welding
2. gas welding
3. resistance welding
4. friction stir welding

**Correct Answer :-**

- friction stir welding

**89) Volumetric shrinkage of grey cast iron is [Question ID = 34511]**

1. 6 – 10%
2. 3.5 – 4.5%
3. 2.5 – 3%
4. 1.9% to negative

**Correct Answer :-**

- 1.9% to negative

**90)**

**Carbon is present in the form of graphite flakes in the \_\_\_\_\_ cast iron [Question ID = 34512]**

1. grey
2. white
3. nodular
4. malleable

**Correct Answer :-**

- grey

**91) Draft allowance given to patterns is for [Question ID = 34513]**

1. compensating the liquid state shrinkage
2. easy removal of pattern from the mold cavity
3. providing support for the core placement
4. compensating the solidification shrinkage

**Correct Answer :-**

- easy removal of pattern from the mold cavity

**92) Risers are not required for casting of [Question ID = 34514]**

1. stainless steel
2. plain carbon steel
3. grey cast iron
4. white cast iron

**Correct Answer :-**

- grey cast iron

**93) The element responsible for the presence of free graphite in cast iron is [Question ID = 34515]**

1. sulphur
2. phosphorous
3. silicon
4. manganese

**Correct Answer :-**

- silicon

**94) Shell moulding employs a pattern made of [Question ID = 34516]**

1. plaster of paris
2. wood
3. metal
4. wax

**Correct Answer :-**

- metal

**95) Transition temperature of metals is concerned with its \_\_\_\_\_ properties [Question ID = 34517]**

1. creep
2. fatigue
3. impact
4. tensile

**Correct Answer :-**

- impact

**96) Flux in welding process acts as a [Question ID = 34518]**

1. catalyst
2. protective agent
3. filler material
4. heat generator

**Correct Answer :-**

- protective agent

**97) The most weldable material is [Question ID = 34519]**

1. stainless steel
2. plain carbon steel
3. aluminum
4. brass

**Correct Answer :-**

- plain carbon steel

**98) In MIG welding, metal is transformed in the form of [Question ID = 34520]**

1. molecules
2. molten drops
3. weld pool
4. a fine spray of metal

**Correct Answer :-**

- weld pool

**99) In arc welding, the arc length should be equal to---, where, d = electrode rod diameter [Question ID = 34521]**

1. d
2. 0.5 d
3. 2d
4. 2.5d

**Correct Answer :-**

- d

**100) Purpose of riser is to [Question ID = 34522]**

1. help feed the casting until all solidification takes place

2. act as a cooling device for molten metal
3. feed molten metal from pouring basin to gate
4. get defective castings

**Correct Answer :-**

- help feed the casting until all solidification takes place

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