

# Andhra Pradesh State Council of Higher Education

## Notations :

- 1.Options shown in green color and with ✓ icon are correct.
- 2.Options shown in red color and with ✗ icon are incorrect.

<b>Question Paper Name :</b>	Mining Engineering 19th Sep 2021 Shift2
<b>Duration :</b>	180
<b>Total Marks :</b>	200
<b>Display Marks:</b>	No
<b>Calculator :</b>	None
<b>Magnifying Glass Required? :</b>	No
<b>Ruler Required? :</b>	No
<b>Eraser Required? :</b>	No
<b>Scratch Pad Required? :</b>	No
<b>Rough Sketch/Notepad Required? :</b>	No
<b>Protractor Required? :</b>	No
<b>Show Watermark on Console? :</b>	Yes
<b>Highlighter :</b>	No
<b>Auto Save on Console? ( SA type of questions will be always auto saved ) :</b>	Yes
<b>Is this Group for Examiner? :</b>	No

## Mathematics

**Section Id :** 477203421

<b>Section Number :</b>	1
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	50
<b>Section Marks :</b>	50
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes

**Question Number : 1 Question Id : 47720321433 Display Question Number : Yes Is Question Mandatory : No**

If  $k \neq -5$  is a real number, then, the number of solutions to the following system of equations

$$\begin{aligned} 3x - y + 4z &= 3 \\ x + 2y - 3z &= -2 \\ 6x + 5y + kz &= -3 \end{aligned} \quad \text{is}$$

**Options :**

1. ✘ 0
2. ✔ 1
3. ✘ 2
4. ✘ *infinitely many*

**Question Number : 2 Question Id : 47720321434 Display Question Number : Yes Is Question Mandatory : No**

$$\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 4+3p+2q \\ 3 & 6+3p & 10+6p+3q \end{vmatrix} =$$

Options :

1. ✘ 0

2. ✔ 1

3. ✘ 2

4. ✘ 3

Question Number : 3 Question Id : 47720321435 Display Question Number : Yes Is Question Mandatory : No

Let  $|A|$  denote the determinant of the matrix  $A$ . If  $A$  is a square matrix of order 3, and  $|4A| = r|A|$ , then the value of  $r$  is

Options :

1. ✘ 0

2. ✘ 4

3. ✘ 16

4. ✔ 64

Question Number : 4 Question Id : 47720321436 Display Question Number : Yes Is Question Mandatory : No

If  $\begin{vmatrix} y & y \\ 1 & y \end{vmatrix} = \begin{vmatrix} 3 & 4 \\ 1 & 2 \end{vmatrix}$ , then the value of  $y$  is

Options :

1. ✘ 0

2. ✘ 1

3. ✔ 2

4. ✘ 3

Question Number : 5 Question Id : 47720321437 Display Question Number : Yes Is Question Mandatory : No

Let  $\begin{vmatrix} 2 & 3+i & -1 \\ 3-i & 0 & -1+i \\ -1 & -1-i & 1 \end{vmatrix} = a + ib$ , where  $a$  and  $b$  are real numbers. Then the value of  $b$  is

Options :

1. ✔ 0

2. ✘ 1

3. ✘ 3

4. ✘ 4

Question Number : 6 Question Id : 47720321438 Display Question Number : Yes Is Question Mandatory : No

If  $\frac{y^2-5y+1}{(y+1)(y+2)(y+3)} = \frac{a}{y+1} + \frac{b}{(y+1)(y+2)} + \frac{c}{(y+1)(y+2)(y+3)}$ , then,

Options :

1. ✘  $a = 1, b = 10, c = 25$



2. ✓  $a = 1, b = -10, c = 25$

3. ✗  $a = 5, b = 10, c = 25$

4. ✗  $a = 5, b = -10, c = 25$

Question Number : 7 Question Id : 47720321439 Display Question Number : Yes Is Question Mandatory : No

$$\frac{2x+3}{(x^2+1)(x+4)} =$$

Options :

1. ✗  $\frac{5}{17(x+4)} + \frac{5x+14}{17(x^2+1)}$

2. ✗  $\frac{-5}{17(x+4)} - \frac{5x+14}{17(x^2+1)}$

3. ✓  $\frac{-5}{17(x+4)} + \frac{5x+14}{17(x^2+1)}$

4. ✗  $\frac{-5}{17(x+4)} + \frac{5x-14}{17(x^2+1)}$

Question Number : 8 Question Id : 47720321440 Display Question Number : Yes Is Question Mandatory : No

If  $x$  and  $y$  are two distinct real numbers, then, the number of values of  $\theta$  in  $[0, 2\pi]$  for which  $\operatorname{cosec} \theta = \frac{x^2 - y^2}{x^2 + y^2}$  is

**Options :**

1. ✓ 0

2. ✗ 1

3. ✗ 2

4. ✗ 3

**Question Number : 9 Question Id : 47720321441 Display Question Number : Yes Is Question Mandatory : No**

If  $\cos(\alpha - \beta) + \cos(\beta - \gamma) + \cos(\gamma - \alpha) = -\frac{3}{2}$ , then  $\cos \alpha + \cos \beta + \cos \gamma =$

**Options :**

1. ✗  $-\frac{3}{2}$

2. ✗  $-1$

3. ✓ 0

4. ✗ 1

**Question Number : 10 Question Id : 47720321442 Display Question Number : Yes Is Question Mandatory : No**

For all real numbers  $\theta$ , the value of  $\sin^2 \theta + \cos^4 \theta$  is greater than or equal to

**Options :**

1. ✓  $\frac{3}{4}$

2. ✗  $1$

3. ✗  $\frac{5}{4}$

4. ✗  $2$

**Question Number : 11 Question Id : 47720321443 Display Question Number : Yes Is Question**

**Mandatory : No**

Let  $x$  be a real number such that  $\tan\left(\frac{\pi}{4} + x\right) + \tan\left(\frac{\pi}{4} - x\right) = 2$ . Then  $x$  is of the form  $x = n\pi + a$ , where  $n \in \mathbb{Z}$ , and  $a =$

**Options :**

1. ✓  $0$

2. ✗  $\frac{\pi}{3}$

3. ✗  $\frac{\pi}{4}$

4. ✗  $\frac{\pi}{6}$

**Question Number : 12 Question Id : 47720321444 Display Question Number : Yes Is Question**

**Mandatory : No**

If  $(\sin^{-1} x) > (\cos^{-1} x)$ , then  $x$  belongs to the interval

Options :

1. ✘  $[0, \frac{1}{\sqrt{2}})$

2. ✔  $(\frac{1}{\sqrt{2}}, 1]$

3. ✘  $[\frac{1}{\sqrt{2}}, 1]$

4. ✘  $[0, \frac{1}{\sqrt{2}}]$

Question Number : 13 Question Id : 47720321445 Display Question Number : Yes Is Question Mandatory : No

Consider a triangle  $\Delta ABC$ , with sides of length  $a, b$  and  $c$ , and angles  $A, B$  and  $C$ . If  $a, b, c$  and the area of the triangle  $\Delta ABC$  are all rational, then

Options :

1. ✘  $\tan \frac{B}{2}$  is rational and  $\tan \frac{C}{2}$  is irrational.

2. ✘  $\tan \frac{B}{2}$  is irrational and  $\tan \frac{C}{2}$  is rational.

3. ✔  $\tan \frac{B}{2}$  and  $\tan \frac{C}{2}$  are both rational.

4. ✘  $\tan \frac{B}{2}$  and  $\tan \frac{C}{2}$  are both irrational.



Question Number : 14 Question Id : 47720321446 Display Question Number : Yes Is Question

Mandatory : No

Consider a triangle  $\Delta ABC$ , with sides of length  $a, b$  and  $c$ , and angles  $A, B$  and  $C$ . If

$3a=b+c$ , then the value of  $\cot \frac{B}{2} \cdot \cot \frac{C}{2}$  is

Options :

1. ✘ 0

2. ✘  $\frac{1}{2}$

3. ✘  $\sqrt{3}$

4. ✔ 2

Question Number : 15 Question Id : 47720321447 Display Question Number : Yes Is Question

Mandatory : No

$$2 \tan^{-1} \left( \frac{3}{4} \right) - \tan^{-1} \left( \frac{17}{31} \right) =$$

Options :

1. ✘ 0

2. ✔  $\frac{\pi}{4}$

3. ✘  $\frac{\pi}{2}$

4. ✘  $\pi$

**Question Number : 16 Question Id : 47720321448 Display Question Number : Yes Is Question Mandatory : No**

Consider a triangle  $\Delta ABC$  with angles  $A, B$  and  $C$ . If  $\cos A + \cos B + \cos C = \frac{3}{2}$ , then the triangle  $\Delta ABC$  is

**Options :**

1. ✔ equilateral.

2. ✘ isosceles, and right-angled.

3. ✘ isosceles, with one of the angles equal to  $\frac{\pi}{6}$ .

4. ✘ scalene

**Question Number : 17 Question Id : 47720321449 Display Question Number : Yes Is Question Mandatory : No**

The value of  $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3}\right) + \cos^2 \left(x - \frac{\pi}{3}\right)$  is

**Options :**

1. ✘ 1

2. ✔  $\frac{3}{2}$

3. ✘ 2

4. ✘  $\frac{5}{2}$

Question Number : 18 Question Id : 47720321450 Display Question Number : Yes Is Question Mandatory : No

The value of  $\left(\frac{\sqrt{3}+i}{\sqrt{3}-i}\right)^3$  is

Options :

1. ✘  $-2\sqrt{2}$

2. ✔  $-1$

3. ✘  $0$

4. ✘  $2\sqrt{2}$

Question Number : 19 Question Id : 47720321451 Display Question Number : Yes Is Question Mandatory : No

If  $x + iy = \frac{a+ib}{a-ib}$ , then  $x^2 + y^2 =$

Options :

1. ✘  $0$

2. ✔  $1$

3. ✘  $2$

4. ✘ 4

**Question Number : 20 Question Id : 47720321452 Display Question Number : Yes Is Question Mandatory : No**

If a circle of radius 5 touches the circle  $x^2 + y^2 - 2x - 4y = 20$  at the point  $(5,5)$ , then, its center is

**Options :**

1. ✘  $(8,8)$

2. ✘  $(8,9)$

3. ✔  $(9,8)$

4. ✘  $(9,9)$

**Question Number : 21 Question Id : 47720321453 Display Question Number : Yes Is Question Mandatory : No**

The equation  $9x^2 - 24xy + 16y^2 - 20x - 15y = 60$  represents

**Options :**

1. ✔ a parabola

2. ✘ an ellipse

3. ✘ a hyperbola

4. ✘ a circle



Question Number : 22 Question Id : 47720321454 Display Question Number : Yes Is Question

Mandatory : No

Let  $(x_j, y_j), j=1,2,3,4$ , be points of intersection of the parabola  $y^2 = 4ax$  and the circle  $x^2 + y^2 + 2gx + 2fy + c = 0$ .

Then  $y_1 + y_2 + y_3 + y_4 =$

Options :

1. ✘  $-2$

2. ✘  $-\frac{1}{2}$

3. ✔  $0$

4. ✘  $\frac{1}{2}$

Question Number : 23 Question Id : 47720321455 Display Question Number : Yes Is Question

Mandatory : No

The length of the major axis of the ellipse  $9x^2 + 5y^2 - 30y = 0$  is

Options :

1. ✘  $\sqrt{5}$

2. ✘  $3$

3. ✘  $2\sqrt{5}$

4. ✓ 6

**Question Number : 24 Question Id : 47720321456 Display Question Number : Yes Is Question Mandatory : No**

If  $S(-1, 1)$  is one of the foci of a hyperbola,  $x - y + 3 = 0$  is its directrix corresponding to  $S$  and 3 is its eccentricity, then, the equation of the hyperbola is

**Options :**

1. ✗  $7x^2 + 18xy + 7y^2 + 50x + 50y + 77 = 0$

2. ✗  $7x^2 + 18xy + 7y^2 + 50x - 50y + 77 = 0$

3. ✓  $7x^2 - 18xy + 7y^2 + 50x - 50y + 77 = 0$

4. ✗  $7x^2 - 18xy - 7y^2 - 50x + 50y + 77 = 0$

**Question Number : 25 Question Id : 47720321457 Display Question Number : Yes Is Question Mandatory : No**

The equation  $4(x - 2y + 1)^2 + 9(2x + y + 2)^2 = 25$  represents

**Options :**

1. ✗ a parabola

2. ✓ an ellipse

3. ✗ a hyperbola

4. ✘ a circle

Question Number : 26 Question Id : 47720321458 Display Question Number : Yes Is Question

Mandatory : No

Let  $f$  be a twice differentiable function such that  $f''(x) + f(x) = 0$ , and  $f'(x) = g(x)$ . If  $h(x) = [f(x)]^2 + [g(x)]^2$ , and  $h(10) = 20$ , then  $h(40) =$

Options :

1. ✔ 20

2. ✘ 40

3. ✘ 80

4. ✘ 160

Question Number : 27 Question Id : 47720321459 Display Question Number : Yes Is Question

Mandatory : No

$$\lim_{x \rightarrow \frac{\pi}{2}} \left( \frac{\cot x - \cos x}{\cos^2 x} \right) =$$

Options :

1. ✘ -1

2. ✔ 0



3. ✘  $\sqrt{3}$

4. ✘  $\frac{\pi}{2}$

**Question Number : 28 Question Id : 47720321460 Display Question Number : Yes Is Question Mandatory : No**

Let  $\mathbb{R}$  be the set of all real numbers. Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  satisfy the condition:

$|f(x) - f(y)| \leq |x-y|^{2021}$ , for all  $x, y \in \mathbb{R}$ . Then the value of  $f'(2022)$  is

**Options :**

1. ✔  $0$

2. ✘  $1$

3. ✘  $2021$

4. ✘  $2022$

**Question Number : 29 Question Id : 47720321461 Display Question Number : Yes Is Question Mandatory : No**

The number of real roots of the equation  $x + e^x = 0$  is

**Options :**

1. ✘  $0$

2. ✔  $1$



3. ✘ 2

4. ✘ Infinitely many

Question Number : 30 Question Id : 47720321462 Display Question Number : Yes Is Question Mandatory : No

If  $y = \text{Tan}^{-1} \left( \frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}} \right)$ , then  $\frac{dy}{dx} =$

Options :

1. ✘  $\cot^2 x$

2. ✘  $\sec^2 x$

3. ✔  $-\frac{1}{2}$

4. ✘  $\frac{1}{2}$

Question Number : 31 Question Id : 47720321463 Display Question Number : Yes Is Question Mandatory : No

The equation of the tangent to the curve  $x = \sin 3t, y = \cos 2t$ , at  $t = \frac{\pi}{4}$  is given by

Options :

1. ✘  $\sqrt{2}x - 3y - 2 = 0$

2. ✘  $\sqrt{2}x + 3y - 2 = 0$

3. ✔  $2\sqrt{2}x - 3y - 2 = 0$

4. ✘  $2\sqrt{2}x - 3y + 2 = 0$

**Question Number : 32 Question Id : 47720321464 Display Question Number : Yes Is Question Mandatory : No**

An open tank with a square base (with side  $x$ ) and vertical sides (with height  $y$ ) is to be constructed from a metal sheet so as to hold a given quantity of water. The cost of the material will be the least if

**Options :**

1. ✘  $x=y$

2. ✔  $x=2y$

3. ✘  $2x=y$

4. ✘  $4x=y$

**Question Number : 33 Question Id : 47720321465 Display Question Number : Yes Is Question Mandatory : No**

The function  $f(x) = x^3 - 12x^2 + 36x + 48$ , is decreasing in the interval

**Options :**

1. ✘  $(-\infty, 2)$

2. ✘  $(-\infty, 6)$

3. ✔  $(2, 6)$

4. ✘  $(6, \infty)$

**Question Number : 34 Question Id : 47720321466 Display Question Number : Yes Is Question Mandatory : No**

A shopkeeper can buy  $x$  items for Rs.  $\left(\frac{x}{5} + 500\right)$ . He can sell the  $x$  items at the rate Rs.  $\left(5 - \frac{x}{100}\right)$  per item. Then the number of items he should sell to make maximum profit is

**Options :**

1. ✔ 240

2. ✘ 360

3. ✘ 400

4. ✘ 500

**Question Number : 35 Question Id : 47720321467 Display Question Number : Yes Is Question Mandatory : No**

If  $z = ax^2 + 2hxy + by^2$ , then  $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} =$

Options :

1. ✘  $z$

2. ✘  $z^2$

3. ✘  $\frac{1}{2}z$

4. ✔  $2z$

Question Number : 36 Question Id : 47720321468 Display Question Number : Yes Is Question Mandatory : No

$$\int_{-1}^1 \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx =$$

Options :

1. ✘ 0

2. ✘ 1

3. ✘  $\frac{3}{2}$

4. ✔ 2

Question Number : 37 Question Id : 47720321469 Display Question Number : Yes Is Question Mandatory : No

The area of the region bounded by the curve  $y = x^2 + 4$ , the x-axis and the ordinates at  $x=1$  and  $x=5$  is



Options :

1. ✘  $\frac{147}{3}$

2. ✔  $\frac{172}{3}$

3. ✘  $\frac{187}{3}$

4. ✘  $\frac{227}{3}$

Question Number : 38 Question Id : 47720321470 Display Question Number : Yes Is Question Mandatory : No

$$\lim_{n \rightarrow \infty} \sum_{k=0}^{n-1} \frac{1}{\sqrt{n^2 - k^2}} =$$

Options :

1. ✘ 0

2. ✔  $\frac{\pi}{2}$

3. ✘  $\pi$

4. ✘  $2\pi$

Question Number : 39 Question Id : 47720321471 Display Question Number : Yes Is Question

**Mandatory : No**

$$\int_0^1 \frac{2x}{1+x^2} dx =$$

**Options :**

1. ✘ 1

2. ✘ 2

3. ✔  $\log 2$

4. ✘  $3 \log 2$

**Question Number : 40 Question Id : 47720321472 Display Question Number : Yes Is Question**

**Mandatory : No**

$$\int \frac{e^{ax} - e^{-ax}}{e^{ax} + e^{-ax}} dx =$$

(In the following,  $c$  is a constant.)

**Options :**

1. ✔  $\frac{1}{a} \log |e^{ax} + e^{-ax}| + c$

2. ✘  $\frac{1}{a} \log |e^{ax} - e^{-ax}| + c$

3. ✘  $\frac{1}{2a} \log |e^{ax} + e^{-ax}| + c$

4. ✘

$$\frac{1}{2a} \log |e^{ax} - e^{-ax}| + c$$

Question Number : 41 Question Id : 47720321473 Display Question Number : Yes Is Question

Mandatory : No

$$\int_0^{\pi} \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx =$$

Options :

1. ✘  $-\pi$

2. ✘ 0

3. ✔  $\frac{\pi}{2}$

4. ✘  $\pi$

Question Number : 42 Question Id : 47720321474 Display Question Number : Yes Is Question

Mandatory : No

$$\int_{-\pi}^{\pi} \sin^5 x dx =$$

Options :

1. ✔ 0

2. ✘  $\frac{\pi}{2}$

3. ✘  $\pi$

4. ✘  $2\pi$

**Question Number : 43 Question Id : 47720321475 Display Question Number : Yes Is Question Mandatory : No**

The area of the region bounded by  $y=|x+3|$ , the x-axis and the lines  $x = -6$  and  $x = 0$  is

**Options :**

1. ✘ *3 square units*

2. ✔ *9 square units*

3. ✘ *12 square units*

4. ✘ *18 square units*

**Question Number : 44 Question Id : 47720321476 Display Question Number : Yes Is Question Mandatory : No**

The degree of the differential equation  $7x \left(\frac{dy}{dx}\right)^2 - \frac{d^2y}{dx^2} + 10y = \log x$  is

**Options :**

1. ✔ 1

2. ✘ 2

3. ✘



3

4. ✘ 4

**Question Number : 45 Question Id : 47720321477 Display Question Number : Yes Is Question Mandatory : No**

The solution of the differential equation  $\frac{dy}{dx} = y \tan x$ , given that  $y=1$  when  $x=0$ , is given by

**Options :**

1. ✘  $y = \cos x$

2. ✘  $y = \cos 2x$

3. ✔  $y = \sec x$

4. ✘  $y = \sec 2x$

**Question Number : 46 Question Id : 47720321478 Display Question Number : Yes Is Question Mandatory : No**

The solution to the differential equation  $(3x^2 + y) \frac{dx}{dy} = x$ , ( $x > 0$ ), such that  $y=1$  if  $x=1$  is

**Options :**

1. ✘  $y = 2x^2 - x$

2. ✔  $y = 3x^2 - 2x$

3. ✘  $y = 4x^2 - 3x$

4. ✘  $y = 5x^2 - 4x$

**Question Number : 47 Question Id : 47720321479 Display Question Number : Yes Is Question Mandatory : No**

The differential equation of the family of parabolas having vertex at the origin and axis along the positive y-axis is

**Options :**

1. ✘  $xy' = 2$

2. ✔  $xy' = 2y$

3. ✘  $xy' = -2y$

4. ✘  $xy' = 2y^2$

**Question Number : 48 Question Id : 47720321480 Display Question Number : Yes Is Question Mandatory : No**

The solution of the differential equation  $\frac{dy}{dx} + y \cot x = 4x \operatorname{cosec} x$ , ( $x \neq 0$ ), given that  $y=0$  when  $x = \frac{\pi}{2}$  is

**Options :**

1. ✘  $y \operatorname{cosec} x = x^2 - \frac{\pi^2}{4}$

2. ✘

$$y \operatorname{cosec} x = 2x^2 - \frac{\pi^2}{2}$$

3. ✘  $y \sin x = x^2 - \frac{\pi^2}{4}$

$$y \sin x = 2x^2 - \frac{\pi^2}{2}$$

4. ✔

**Question Number : 49 Question Id : 47720321481 Display Question Number : Yes Is Question Mandatory : No**

The general solution of the differential equation  $\log_e \left( \frac{dy}{dx} \right) = ax + by$  is given by

**Options :**

1. ✘  $ae^{ax} + be^{-by} + C = 0$

2. ✘  $ae^{ax} - be^{-by} + C = 0$

3. ✔  $\frac{1}{a}e^{ax} + \frac{1}{b}e^{-by} + C = 0$

4. ✘  $\frac{1}{a}e^{ax} - \frac{1}{b}e^{-by} + C = 0$

**Question Number : 50 Question Id : 47720321482 Display Question Number : Yes Is Question Mandatory : No**

The particular integral of the differential equation  $(D^2 + D - 2)y = \sin x$  is given by

**Options :**

1. ✘  $-\frac{1}{10} (\cos x + \sin x)$

2. ✔  $-\frac{1}{10} (\cos x + 3 \sin x)$

3. ✘  $-\frac{1}{10} (\cos 3x + \sin 3x)$

4. ✘  $-\frac{1}{10} (3 \cos x + \sin x)$

## Physics

<b>Section Id :</b>	477203422
<b>Section Number :</b>	2
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	25
<b>Section Marks :</b>	25
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes

**Question Number : 51 Question Id : 47720321483 Display Question Number : Yes Is Question Mandatory : No**

The dimensional formula for gravitational constant, G is

**Options :**

1. ✘  $M^1L^3T^{-2}$



2. ✓  $M^{-1}L^3T^{-2}$

3. ✗  $M^0L^3T^{-2}$

4. ✗  $M^2L^3T^{-2}$

**Question Number : 52 Question Id : 47720321484 Display Question Number : Yes Is Question Mandatory : No**

Which of the following quantities have not been expressed in proper units?

**Options :**

1. ✗ electric field = Newton/Coulomb

2. ✗ surface tension = Newton/meter

3. ✓ energy = kg m/s

4. ✗ pressure = Newton/m<sup>2</sup>

**Question Number : 53 Question Id : 47720321485 Display Question Number : Yes Is Question Mandatory : No**

A vector A is along positive x-axis. If B is another vector such that  $A \times B$  is zero, then B could be

**Options :**

1. ✗  $4\hat{j}$

2. ✓  $-4\hat{i}$

3. ✗  $-(\hat{i} + \hat{j})$

4. ✗  $(\hat{j} + \hat{k})$

**Question Number : 54 Question Id : 47720321486 Display Question Number : Yes Is Question Mandatory : No**

The scalar product of two vectors is  $2\sqrt{3}$  and the magnitude of their vector product is 2.  
The angle between them is

**Options :**

1. ✓  $30^\circ$

2. ✗  $45^\circ$

3. ✗  $60^\circ$

4. ✗  $90^\circ$

**Question Number : 55 Question Id : 47720321487 Display Question Number : Yes Is Question Mandatory : No**

The work done by a force is defined as  $W = \mathbf{F} \cdot \mathbf{S}$ . In a certain situation  $\mathbf{F}$  and  $\mathbf{S}$  are not zero but the work done is zero when

**Options :**

1. ✗  $\mathbf{F}$  and  $\mathbf{S}$  are in the same direction

2. ✗

F and S are in opposite direction

3. ✓ F and S are at right angles

4. ✗ F and S are at  $45^\circ$

**Question Number : 56 Question Id : 47720321488 Display Question Number : Yes Is Question Mandatory : No**

A body starts from rest and travels a distance  $x$  in first two seconds and a distance  $y$  in next two seconds. The relation between  $x$  and  $y$  is

**Options :**

1. ✗  $y = 4x$

2. ✗  $y = x$

3. ✓  $y = 3x$

4. ✗  $y = 2x$

**Question Number : 57 Question Id : 47720321489 Display Question Number : Yes Is Question Mandatory : No**

A projectile is projected with initial velocity  $(6\hat{i} + 8\hat{j})$  m/s. If  $g = 10 \text{ m/s}^2$  then horizontal range is

**Options :**

1. ✗ 4.8 m

2. ✓



9.6 m

3. ✘ 19.2 m

4. ✘ 14.0 m

**Question Number : 58 Question Id : 47720321490 Display Question Number : Yes Is Question Mandatory : No**

The maximum range of a projectile fired with some initial velocity is found to be 1000 m/s, in the absence of wind and air resistance. The maximum height reached by this projectile is

**Options :**

1. ✔ 250 m

2. ✘ 500 m

3. ✘ 1000 m

4. ✘ 2000 m

**Question Number : 59 Question Id : 47720321491 Display Question Number : Yes Is Question Mandatory : No**

The force of friction between two bodies is

**Options :**

1. ✔ parallel to the contact surface



2. ✘ perpendicular to the contact surface
3. ✘ inclined at  $30^0$  to the contact surface
4. ✘ inclined at  $60^0$  to the contact surface

**Question Number : 60 Question Id : 47720321492 Display Question Number : Yes Is Question Mandatory : No**

A body is sliding down an inclined plane under its own weight at constant speed. If the inclination of the plane to the horizontal is  $30^0$ , the angle of friction is

**Options :**

1. ✔  $30^0$
2. ✘  $60^0$
3. ✘  $45^0$
4. ✘  $90^0$

**Question Number : 61 Question Id : 47720321493 Display Question Number : Yes Is Question Mandatory : No**

A block of mass 5 kg is resting on a smooth surface. At what angle, a force of 20 N be acted on the body so that it will acquire a kinetic energy of 40 J after moving 4m

**Options :**

1. ✘  $30^0$

2. ✘  $45^0$

3. ✔  $60^0$

4. ✘  $120^0$

**Question Number : 62 Question Id : 47720321494 Display Question Number : Yes Is Question Mandatory : No**

Two men with the weights in the ratio 4:3 run up a staircase in time, in the ratio 12:11. The ratio of power of the first to that of second is

**Options :**

1. ✘  $\frac{4}{3}$

2. ✘  $\frac{12}{11}$

3. ✘  $\frac{48}{33}$

4. ✔  $\frac{11}{9}$

**Question Number : 63 Question Id : 47720321495 Display Question Number : Yes Is Question Mandatory : No**

Energy harnessed from flowing water is called-----energy

**Options :**

1. ✘ Solar

2. ✔ Hydel

3. ✘ Tidal

4. ✘ Geothermal

**Question Number : 64 Question Id : 47720321496 Display Question Number : Yes Is Question**

**Mandatory : No**

The total mechanical energy of a spring-mass system in simple harmonic motion is  $E = 0.5 m\omega^2 A^2$ . If the oscillating particle is replaced by another particle of double the mass while the amplitude  $A$  remains the same. The new mechanical energy is

**Options :**

1. ✘  $2E$

2. ✘  $0.5 E$

3. ✘  $\sqrt{2} E$

4. ✔  $E$

**Question Number : 65 Question Id : 47720321497 Display Question Number : Yes Is Question**

**Mandatory : No**



Sound of frequency 1000 Hz from a stationary source is reflected from an object approaching the source at 30 m/s back to a stationary observer located at the source. The speed of sound in air is 330 m/s. The frequency of the sound heard by the observer is

**Options :**

1. ✓ 1200 Hz
2. ✗ 1000 Hz
3. ✗ 1090 Hz
4. ✗ 1100 Hz

**Question Number : 66 Question Id : 47720321498 Display Question Number : Yes Is Question Mandatory : No**

The frequency of a pendulum if it is taken from the earth's surface to deep into a mine

**Options :**

1. ✗ increases
2. ✓ decreases
3. ✗ first increases then decreases
4. ✗ remains unchanged



Question Number : 67 Question Id : 47720321499 Display Question Number : Yes Is Question Mandatory : No

Two waves of lengths 50 cm and 51 cm produced 12 beats per second. The velocity of sound is

Options :

1. ✘ 340 m/s
2. ✘ 2. 331 m/s
3. ✔ 306 m/s
4. ✘ 360 m/s

Question Number : 68 Question Id : 47720321500 Display Question Number : Yes Is Question Mandatory : No

According to reverberation time the final intensity is around

Options :

1. ✘ one-hundredth of the initial intensity
2. ✘ one-tenth of the initial intensity
3. ✘ one-thousandth of the initial intensity
4. ✔ one-millionth of the initial intensity

Question Number : 69 Question Id : 47720321501 Display Question Number : Yes Is Question

**Mandatory : No**

An ideal gas has volume  $V$  at pressure  $P$  and temperature  $T$ . Mass of each molecule is  $m$ . The density of the gas is

**Options :**

1. ✘  $mKT$

2. ✘  $\frac{P}{KT}$

3. ✘  $\frac{P}{KTV}$

4. ✔  $\frac{Pm}{KT}$

**Question Number : 70 Question Id : 47720321502 Display Question Number : Yes Is Question**

**Mandatory : No**

Work done by 0.1 mole of a gas at  $27^{\circ}\text{C}$  to double its volume at constant pressure is  
( $R=2$  cal/mol/K)

**Options :**

1. ✘ 54 cal

2. ✘ 600 cal

3. ✔ 60 cal

4. ✘ 546 cal

Question Number : 71 Question Id : 47720321503 Display Question Number : Yes Is Question

Mandatory : No

If the pressure of a gas contained in a closed vessel is increased by 0.4%, when heated by  $1^{\circ}\text{C}$ , its initial temperature is

Options :

1. ✓ 250 K

2. ✗ 150 K

3. ✗ 100 K

4. ✗ 50 K

Question Number : 72 Question Id : 47720321504 Display Question Number : Yes Is Question

Mandatory : No

A monoatomic ideal gas, initially at temperature  $T_1$  is enclosed in a cylinder fitted with a frictionless piston. The gas is allowed to expand adiabatically to a temperature  $T_2$  by releasing the piston suddenly. If  $L_1$  and  $L_2$  are the lengths of the gas column, before and after expansion respectively,  $T_1/T_2$  is given by

Options :

1. ✗  $\left(\frac{L_1}{L_2}\right)^{2/3}$

2. ✓  $\left(\frac{L_2}{L_1}\right)^{2/3}$

3. ✗  $\frac{L_1}{L_2}$



4. ✘  $\frac{L_2}{L_1}$

**Question Number : 73 Question Id : 47720321505 Display Question Number : Yes Is Question Mandatory : No**

A Carnot's engine operates with source at  $127^{\circ}\text{C}$  and sink at  $27^{\circ}\text{C}$ . If the source supplies 40 kJ of heat energy, the work done by the engine is

**Options :**

1. ✘ 30 kJ

2. ✔ 10 kJ

3. ✘ 4 kJ

4. ✘ 1 kJ

**Question Number : 74 Question Id : 47720321506 Display Question Number : Yes Is Question Mandatory : No**

The optical fibre consisting of a central core is clad by material of

**Options :**

1. ✔ slightly lower refractive index

2. ✘ slightly higher refractive index

3. ✘



equal refractive index

4. ✘ very high refractive index

**Question Number : 75 Question Id : 47720321507 Display Question Number : Yes Is Question Mandatory : No**

The susceptibility of the superconductor is

**Options :**

1. ✘ positive and small

2. ✘ negative and small

3. ✘ positive and unity

4. ✔ negative and unity

## Chemistry

<b>Section Id :</b>	477203423
<b>Section Number :</b>	3
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	25
<b>Section Marks :</b>	25
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes

Question Number : 76 Question Id : 47720321508 Display Question Number : Yes Is Question Mandatory : No

The nucleus of tritium consists of -----

Options :

1. ✘ 1 proton + 1 neutron
2. ✘ 1 proton + 3 neutrons
3. ✘ 1 proton + zero neutron
4. ✔ 1 proton + 2 neutrons

Question Number : 77 Question Id : 47720321509 Display Question Number : Yes Is Question Mandatory : No

Which of the following electronic configuration is not possible?

Options :

1. ✘  $1s^2 2s^2 2p^6$
2. ✔  $1s^2 2s^2 2p^7$
3. ✘  $1s^2 2s^2$
4. ✘  $1s^2 2s^2 2p^5$

Question Number : 78 Question Id : 47720321510 Display Question Number : Yes Is Question

Mandatory : No

Radius of 3<sup>rd</sup> Bohr orbit of hydrogen atom is -----

Options :

1. ✘  $6.529\text{A}^0$

2. ✔  $4.761\text{A}^0$

3. ✘  $2.116\text{A}^0$

4. ✘  $8.464\text{A}^0$

Question Number : 79 Question Id : 47720321511 Display Question Number : Yes Is Question

Mandatory : No

Covalent compounds are generally soluble in -----

Options :

1. ✔ Non-polar solvents

2. ✘ Polar solvents

3. ✘ Concentrated acids

4. ✘ All solvents



Question Number : 80 Question Id : 47720321512 Display Question Number : Yes Is Question

Mandatory : No

Six electrons are mutually shared in -----

Options :

1. ✘  $F_2$

2. ✘  $Cl_2$

3. ✘  $O_2$

4. ✔  $N_2$

Question Number : 81 Question Id : 47720321513 Display Question Number : Yes Is Question

Mandatory : No

To half the molarity of a solution, the following should be adopted.

Options :

1. ✘ Weight of the solute to be doubled

2. ✘ Weight of the solvent to be doubled

3. ✘ Volume of the solvent to be doubled

4. ✔ Volume of the solution to be doubled

Question Number : 82 Question Id : 47720321514 Display Question Number : Yes Is Question

Mandatory : No



The molecular weight of  $\text{KMnO}_4$  is "M". In a reaction  $\text{KMnO}_4$  is reduced to  $\text{K}_2\text{MnO}_4$ . The equivalent weight of  $\text{KMnO}_4$  is

**Options :**

1. ✓ M

2. ✗ M/2

3. ✗ M/3

4. ✗ M/4

**Question Number : 83 Question Id : 47720321515 Display Question Number : Yes Is Question Mandatory : No**

Calculate the weight of NaOH present in 500 ml of 0.5 N Solution

**Options :**

1. ✗ 5 g

2. ✓ 10 g

3. ✗ 12 g

4. ✗ 15 g

**Question Number : 84 Question Id : 47720321516 Display Question Number : Yes Is Question Mandatory : No**

On addition of NaOH to water

**Options :**

1. ✘ Ionic product will increase
2. ✘ Ionic product will decrease
3. ✔ No change in ionic product of water
4. ✘  $\text{H}_3\text{O}^+$  concentration increases

Question Number : 85 Question Id : 47720321517 Display Question Number : Yes Is Question Mandatory : No

Which of the following is not a buffer solution?

Options :

1. ✘  $(\text{CH}_3\text{COOH}/\text{CH}_3\text{COONa})$
2. ✔  $(\text{HCl}/\text{NaCl})$
3. ✘  $(\text{HCOOH}/\text{HCOONa})$
4. ✘  $(\text{NH}_4\text{OH}/\text{NH}_4\text{Cl})$

Question Number : 86 Question Id : 47720321518 Display Question Number : Yes Is Question Mandatory : No

Which of the following is a good conductor of electricity?

Options :

1. ✘ Diamond

2. ✓ Graphite

3. ✗ Solid NaCl

4. ✗ Wood

**Question Number : 87 Question Id : 47720321519 Display Question Number : Yes Is Question Mandatory : No**

Which of the following (1M) conducts more electricity?

**Options :**

1. ✗ Acetic acid

2. ✗ Boric acid

3. ✗ Phosphorous acid

4. ✓ Sulphuric acid

**Question Number : 88 Question Id : 47720321520 Display Question Number : Yes Is Question Mandatory : No**

In electrolysis of dilute  $H_2SO_4$ , which of the following is liberated at anode in presence of inert electrode?

**Options :**

1. ✗  $H_2$



2. ✘ SO<sub>2</sub>

3. ✔ O<sub>2</sub>

4. ✘ SO<sub>3</sub>

**Question Number : 89 Question Id : 47720321521 Display Question Number : Yes Is Question Mandatory : No**

The EMF of the cell Ni/Ni<sup>2+</sup> (0.01M)/ Cl<sup>-</sup>(0.01M)/Cl<sub>2</sub>, Pt is ---V if the SRP of nickel and chlorine electrodes are -0.25V and +1.36V respectively

**Options :**

1. ✘ + 1.61

2. ✘ - 1.61

3. ✔ + 1.79

4. ✘ - 1.79

**Question Number : 90 Question Id : 47720321522 Display Question Number : Yes Is Question Mandatory : No**

Which of the following is correct relation used to measures the hardness of water?

**Options :**

1. ✔ 1 mg/L = 1 ppm = 0.07<sup>0</sup>Cl = 0.1<sup>0</sup>Fr



2. ✘  $1 \text{ mg/L} = 0.1 \text{ ppm} = 0.7^{\circ}\text{Cl} = 0.1^{\circ}\text{Fr}$

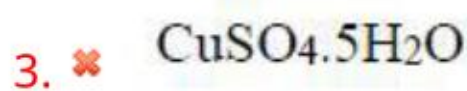
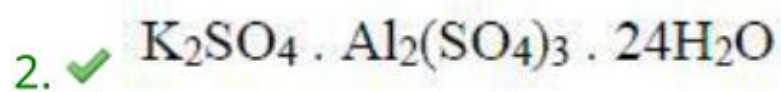
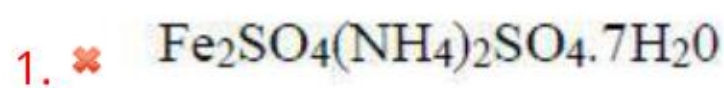
3. ✘  $1 \text{ mg/L} = 1 \text{ ppm} = 0.7^{\circ}\text{Cl} = 0.01^{\circ}\text{Fr}$

4. ✘  $1 \text{ mg/L} = 1 \text{ ppm} = 0.7^{\circ}\text{Cl} = 1^{\circ}\text{Fr}$

**Question Number : 91 Question Id : 47720321523 Display Question Number : Yes Is Question Mandatory : No**

Which of the following is used as effective coagulant in the municipal water treatment to remove fine suspended and colloidal impurities?

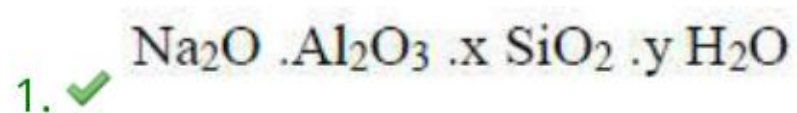
**Options :**



**Question Number : 92 Question Id : 47720321524 Display Question Number : Yes Is Question Mandatory : No**

The general chemical formula of zeolite is

**Options :**



2. ✘  $\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$

3. ✘  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

4. ✘  $\text{MgSO}_4 \cdot 5\text{H}_2\text{O}$

**Question Number : 93 Question Id : 47720321525 Display Question Number : Yes Is Question Mandatory : No**

----- is resulted when electrochemical corrosion happened in acidic environment.

**Options :**

1. ✘ Evolution of oxygen

2. ✘ Absorption of oxygen

3. ✔ Evolution of hydrogen

4. ✘ Absorption of hydrogen

**Question Number : 94 Question Id : 47720321526 Display Question Number : Yes Is Question Mandatory : No**

Impure metal corrodes faster than pure metal due to

**Options :**

1. ✔ Heterogeneity

2. ✘ Homogeneity
3. ✘ Non-galvanic cell
4. ✘ localize corrosion

**Question Number : 95 Question Id : 47720321527 Display Question Number : Yes Is Question Mandatory : No**

The number of repeating units in a polymer is called

**Options :**

1. ✘ Functionality
2. ✘ Tacticity
3. ✔ degree of polymerization
4. ✘ Specificity

**Question Number : 96 Question Id : 47720321528 Display Question Number : Yes Is Question Mandatory : No**

The process of vulcanisation makes rubber -----

**Options :**

1. ✘ Soft
2. ✔ Hard



3. ✘ Elastic

4. ✘ Swells oils

**Question Number : 97 Question Id : 47720321529 Display Question Number : Yes Is Question Mandatory : No**

Which of the following is thermosetting plastic

**Options :**

1. ✘ PVC

2. ✘ Polystyrene

3. ✘ Teflon

4. ✔ Bakelite

**Question Number : 98 Question Id : 47720321530 Display Question Number : Yes Is Question Mandatory : No**

The boiling range of petrol fraction is found to be

**Options :**

1. ✘  $120^{\circ}\text{C}-180^{\circ}\text{C}$

2. ✘  $250^{\circ}\text{C}-320^{\circ}\text{C}$

3. ✔  $40^{\circ}\text{C}-120^{\circ}\text{C}$



4. ✘ 180<sup>0</sup>C-250<sup>0</sup>C

**Question Number : 99 Question Id : 47720321531 Display Question Number : Yes Is Question Mandatory : No**

Which of the following is not a common component of photochemical smog?

**Options :**

1. ✘ Ozone

2. ✘ Acrolein

3. ✘ Peroxyacetyl nitrate

4. ✔ Chlorofluorocarbons

**Question Number : 100 Question Id : 47720321532 Display Question Number : Yes Is Question Mandatory : No**

White lung cancer is caused by

**Options :**

1. ✘ Asbestos

2. ✔ Textiles

3. ✘ Paper

4. ✘ Silica

## Mining Engineering

Section Id :	477203424
Section Number :	4
Mandatory or Optional :	Mandatory
Number of Questions :	100
Section Marks :	100
Enable Mark as Answered Mark for Review and Clear Response :	Yes

Question Number : 101 Question Id : 47720321533 Display Question Number : Yes Is Question Mandatory : No

Which of the following is the correct order with respect to the core sizes?

Options :

1. ✓ NX>BX>AX>EX
2. ✗ AX>BX>EX>NX
3. ✗ AX>BX>NX>EX
4. ✗ EX>AX>BX>NX

Question Number : 102 Question Id : 47720321534 Display Question Number : Yes Is Question Mandatory : No

The energy transfer is smooth and more efficient in which of the following feed mechanism?

Options :

1. ✘ Air legs
2. ✘ Screw feed
3. ✔ Hydraulic feed
4. ✘ Chain feed

**Question Number : 103 Question Id : 47720321535 Display Question Number : Yes Is Question Mandatory : No**

To deal with misfire, how many metres away a relieving hole shall be drilled in an underground working face?

**Options :**

1. ✘ 0.2
2. ✔ 0.3
3. ✘ 0.5
4. ✘ 0.8

**Question Number : 104 Question Id : 47720321536 Display Question Number : Yes Is Question Mandatory : No**

Ignition temperature methane is:

**Options :**



1. ✘ 100-1250°C

2. ✘ 423-1000°C

3. ✘ 675-975°C

4. ✔ 923-1023°C

**Question Number : 105 Question Id : 47720321537 Display Question Number : Yes Is Question Mandatory : No**

In which of the following district, coal seams are occurring in Telangana state?

**Options :**

1. ✘ Hyderabad

2. ✘ Ranga Reddy

3. ✘ Mahbubnagar

4. ✔ Karimnagar

**Question Number : 106 Question Id : 47720321538 Display Question Number : Yes Is Question Mandatory : No**

Fir damp is composed of which of the following?

**Options :**



1. ✓ CH<sub>4</sub>

2. ✗ CO

3. ✗ CO<sub>2</sub>

4. ✗ N<sub>2</sub>

Question Number : 107 Question Id : 47720321539 Display Question Number : Yes Is Question Mandatory : No

In an explosive formulation this is an oxidizing agent:

Options :

1. ✗ Charcoal

2. ✓ Aluminium nitrate

3. ✗ Aluminium

4. ✗ Magnesium carbonate

Question Number : 108 Question Id : 47720321540 Display Question Number : Yes Is Question Mandatory : No

Which of the following is a base explosive?

Options :

1. ✘ Gun powder
2. ✘ Nacl
3. ✘ Pottasium nitrate
4. ✔ TNT

Question Number : 109 Question Id : 47720321541 Display Question Number : Yes Is Question Mandatory : No

Drift mining is generally adopted in:

Options :

1. ✘ For the underground mining
2. ✘ For coal mining
3. ✔ In the exploitation of placers
4. ✘ In the exploitation of copper ores

Question Number : 110 Question Id : 47720321542 Display Question Number : Yes Is Question Mandatory : No

The width of the ore body which can be economically mined is:

Options :

1. ✘ Assay width
2. ✘ Actual width
3. ✔ Stopping width
4. ✘ Grady width

**Question Number : 111 Question Id : 47720321543 Display Question Number : Yes Is Question Mandatory : No**

Exploration means:

**Options :**

1. ✘ Search for ore
2. ✘ Opening up of deposit
3. ✘ Stripping or sinking shaft
4. ✔ Defining extent and value of ore body

**Question Number : 112 Question Id : 47720321544 Display Question Number : Yes Is Question Mandatory : No**

Manholes in a mine haulage are to be provided at an interval of not more than:

**Options :**



1. ✘ 05 m

2. ✔ 10 m

3. ✘ 15 m

4. ✘ 20 m

**Question Number : 113 Question Id : 47720321545 Display Question Number : Yes Is Question Mandatory : No**

Spacing of blast holes should be how many times the burden of holes in opencast mining?

**Options :**

1. ✘ 1.2

2. ✘ 1.4

3. ✔ 1.5

4. ✘ 1.6

**Question Number : 114 Question Id : 47720321546 Display Question Number : Yes Is Question Mandatory : No**

Outer surficial layer of the earth crust is called:

**Options :**

1. ✘ Mantle

2. ✓ Sial

3. ✗ Core

4. ✗ Crust

**Question Number : 115 Question Id : 47720321547 Display Question Number : Yes Is Question Mandatory : No**

Most authentic method for age determination of earth is:

**Options :**

1. ✗ Salinity of ocean

2. ✗ Rate of sedimentation

3. ✓ Radio active age dating method

4. ✗ Rate of cooling of earth

**Question Number : 116 Question Id : 47720321548 Display Question Number : Yes Is Question Mandatory : No**

On the basis of different age determination, the age of earth is estimated about:

**Options :**

1. ✗ 5000 years

2. ✓ 4600 million years

3. ✗ 1000 years

4. ✗ 100 million years

**Question Number : 117 Question Id : 47720321549 Display Question Number : Yes Is Question Mandatory : No**

A part of any stream or rock that is exposed at the surface is known as:

**Options :**

1. ✓ Outcrop

2. ✗ Fault

3. ✗ Fold

4. ✗ Dyke

**Question Number : 118 Question Id : 47720321550 Display Question Number : Yes Is Question Mandatory : No**

Which fold has got two hinges?

**Options :**

1. ✗ Fan fold



2. ✘ Box fold
3. ✘ Chevron fold
4. ✔ Isoclinal fold

**Question Number : 119 Question Id : 47720321551 Display Question Number : Yes Is Question Mandatory : No**

When the strike of the fault is parallel to strike of the rock beds, the faults are called:

**Options :**

1. ✘ Strike slip fault
2. ✘ Dip slip fault
3. ✔ Strike fault
4. ✘ Diagonal fault

**Question Number : 120 Question Id : 47720321552 Display Question Number : Yes Is Question Mandatory : No**

Rocks that are formed by cooling of molten material (called magma) at or relatively near the earth's surface is called:

**Options :**

1. ✘ Sedimentary rocks

2. ✓ Igneous rocks

Metamorphic rocks

3. ✘

4. ✘ Crystalline

**Question Number : 121 Question Id : 47720321553 Display Question Number : Yes Is Question Mandatory : No**

The geological age of Gondwana rocks is believed to be during:

**Options :**

1. ✓ Carboniferous to Jurassic

2. ✘ Archaeans to Cambrians

3. ✘ Cambrian to Silurian

4. ✘ Cretaceous to Pliocene

**Question Number : 122 Question Id : 47720321554 Display Question Number : Yes Is Question Mandatory : No**

The study of fossils and their proper utilization in elucidating the past history of earth is called:

**Options :**

1. ✓ Palaeontology

2. ✘ Minerology

3. ✘ Structural geology

4. ✘ Petrology

Question Number : 123 Question Id : 47720321555 Display Question Number : Yes Is Question Mandatory : No

Which mineral is an iron ore?

Options :

1. ✘ Bauxite

2. ✔ Haematite

3. ✘ Malachite

4. ✘ Galena

Question Number : 124 Question Id : 47720321556 Display Question Number : Yes Is Question Mandatory : No

Bauxite is related to which of the following:

Options :

1. ✔ Aluminium



2. ✘ Manganese

3. ✘ Lead

4. ✘ Tin

**Question Number : 125 Question Id : 47720321557 Display Question Number : Yes Is Question Mandatory : No**

Coal seams are normally found in:

**Options :**

1. ✘ Metamorphic rocks

2. ✘ Igneous rocks

3. ✔ Sedimentary rocks

4. ✘ Crystalline

**Question Number : 126 Question Id : 47720321558 Display Question Number : Yes Is Question Mandatory : No**

While using shuttle cars and joy loader in inclined coal seams, the shape of the pillar shall be:

**Options :**

1. ✔ Rhombus

2. ✘ Rectangle

3. ✘ Circular

4. ✘ Square

**Question Number : 127 Question Id : 47720321559 Display Question Number : Yes Is Question Mandatory : No**

Which of the following factor has to be considered for deciding the size of the panel?

**Options :**

1. ✘ Depth of the seam

2. ✘ Thickness of the seam

3. ✘ Output required

4. ✔ Incubation period

**Question Number : 128 Question Id : 47720321560 Display Question Number : Yes Is Question Mandatory : No**

Which of the following machine is not used in Longwall mining?

**Options :**

1. ✘ Shearer
2. ✘ Armoured flexible conveyor
3. ✔ SDL
4. ✘ Plough

**Question Number : 129 Question Id : 47720321561 Display Question Number : Yes Is Question Mandatory : No**

Which of the following is related to longwall advancing?

**Options :**

1. ✘ Stook
2. ✘ Robbing
3. ✔ Stable
4. ✘ Splitting

**Question Number : 130 Question Id : 47720321562 Display Question Number : Yes Is Question Mandatory : No**

Over 90% of underground coal production in India is from which of the following method?

**Options :**



Long wall method

1. ✘

Bord and pillar method

2. ✔

Hydraulic mining method

3. ✘

Blasting gallery method

4. ✘

Question Number : 131 Question Id : 47720321563 Display Question Number : Yes Is Question

Mandatory : No

The type of reserve which is considered to calculate life of mine is

Options :

Commercial reserve

1. ✔

Geological reserve

2. ✘

Workable reserve

3. ✘

Inherent reserve

4. ✘

Question Number : 132 Question Id : 47720321564 Display Question Number : Yes Is Question

Mandatory : No

Road inside a coal seam is called:

**Options :**

1. ✘ Travelling road
2. ✘ Haulage road
3. ✘ Drift
4. ✔ Gallery

**Question Number : 133 Question Id : 47720321565 Display Question Number : Yes Is Question Mandatory : No**

Over-riding of pillars and maximum risk of premature collapse is with:

**Options :**

1. ✘ Short wall method
2. ✘ Long wall
3. ✔ Bord and pillar
4. ✘ Sub-level caving

**Question Number : 134 Question Id : 47720321566 Display Question Number : Yes Is Question Mandatory : No**

In Blasting Gallery Method, which of the following drilling pattern is adopted?

**Options :**

1. ✘ Burn cut pattern
2. ✔ Ring hole pattern
3. ✘ Wedge cut pattern
4. ✘ Coromant cut pattern

**Question Number : 135 Question Id : 47720321567 Display Question Number : Yes Is Question Mandatory : No**

Between two panels, what is the minimum size of barrier?

**Options :**

1. ✘ Equal to width of gallery size
2. ✘ Equal to dimension of panel
3. ✔ Equal to face dimension
4. ✘ Equal to pillar size

**Question Number : 136 Question Id : 47720321568 Display Question Number : Yes Is Question Mandatory : No**



The pillar left to support the upper level is called?

**Options :**

1. ✘ Sill pillar
2. ✔ Crown pillar
3. ✘ Rib pillar
4. ✘ Protective pillar

**Question Number : 137 Question Id : 47720321569 Display Question Number : Yes Is Question Mandatory : No**

The method of stoping suitable for thick ore body , strong ore stable handing and foot wall steeply dipping ore is

**Options :**

1. ✘ Open stoping
2. ✘ Shrinkage stoping
3. ✘ Cut and fill stoping
4. ✔ Sublevel stoping

**Question Number : 138 Question Id : 47720321570 Display Question Number : Yes Is Question Mandatory : No**

The maximum thickness of the ore body that can be worked with room and pillar method is?

**Options :**

1. ✘ 2m

2. ✘ 6m

3. ✘ 10m

4. ✔ 12m

**Question Number : 139 Question Id : 47720321571 Display Question Number : Yes Is Question Mandatory : No**

The method of stoping successfully applied to all dips from horizontal to vertical is?

**Options :**

1. ✘ Rill stoping

2. ✔ Breast stoping

3. ✘ Overhand stoping

4. ✘ Underhand stoping

**Question Number : 140 Question Id : 47720321572 Display Question Number : Yes Is Question Mandatory : No**

The method which employs horizontal openings is:

Options :

1. ✘ shrinkage stoping
2. ✘ sublevel stoping
3. ✔ room and pillar mining
4. ✘ cut and fill stoping

Question Number : 141 Question Id : 47720321573 Display Question Number : Yes Is Question Mandatory : No

In VCR method of mining the charge length to diameter ratio is restricted to:

Options :

1. ✘ 2:1
2. ✘ 4:1
3. ✘ 8:1
4. ✔ 6:1

Question Number : 142 Question Id : 47720321574 Display Question Number : Yes Is Question Mandatory : No



When the core sample from the ore and wall is tested low, we adopt:

**Options :**

1. ✘ Shrinkage stoping
2. ✘ Block caving
3. ✘ Sub level stoping
4. ✔ Cut and fill stoping

**Question Number : 143 Question Id : 47720321575 Display Question Number : Yes Is Question Mandatory : No**

Vertical crater retreat method is a modified version of:

**Options :**

1. ✔ Sublevel
2. ✘ Cut and fill
3. ✘ Block caving
4. ✘ Stope

**Question Number : 144 Question Id : 47720321576 Display Question Number : Yes Is Question Mandatory : No**

The draw point spacing in caving method is dependent on:

**Options :**

1. ✘ Mechanization used
2. ✘ Length of the stope
3. ✘ Area of the influence of draw point
4. ✔ Size of the ore broken

**Question Number : 145 Question Id : 47720321577 Display Question Number : Yes Is Question**

**Mandatory : No**

Soutirage mining is also known as:

**Options :**

1. ✘ Sublevel stoping
2. ✔ Integral caving
3. ✘ Block caving
4. ✘ Blasting gallery

**Question Number : 146 Question Id : 47720321578 Display Question Number : Yes Is Question**

**Mandatory : No**

Which diagram explain the Limits of explosibility of methane ?

Options :

1. ✘ Grahams
2. ✘ Le chetelier
3. ✔ Coward
4. ✘ Palvalov

Question Number : 147 Question Id : 47720321579 Display Question Number : Yes Is Question Mandatory : No

Permissible concentration of CO gas in Indian underground mine is:

Options :

1. ✔ 50 ppm
2. ✘ 50.25 ppm
3. ✘ 500 ppm
4. ✘ 550 ppm

Question Number : 148 Question Id : 47720321580 Display Question Number : Yes Is Question Mandatory : No



Which one of the following compositions of methane in air is most explosive in nature?

**Options :**

1. ✘ 8.5% by volume
2. ✔ 9.5% by volume
3. ✘ 10.5% by volume
4. ✘ 11.5% by volume

**Question Number : 149 Question Id : 47720321581 Display Question Number : Yes Is Question Mandatory : No**

Black damp is a mixture of:

**Options :**

1. ✘ Carbon monoxide and excess nitrogen
2. ✘ Carbon dioxide and carbon monoxide
3. ✘ Carbon dioxide and hydrogen sulphide
4. ✔ Carbon dioxide and excess nitrogen

Question Number : 150 Question Id : 47720321582 Display Question Number : Yes Is Question Mandatory : No

The limits of inflammability of fire damp in air are:

Options :

1. ✓ 5.4% and 14.8%
2. ✗ 4.5% and 15.4%
3. ✗ 3.8% and 14.8%
4. ✗ 4.5% and 12.8%

Question Number : 151 Question Id : 47720321583 Display Question Number : Yes Is Question Mandatory : No

MSA D-6 Methanometer works on the principle of:

Options :

1. ✓ Wheatstone bridge circuit
2. ✗ Length of flame
3. ✗ Refractive index of methane
4. ✗ Analysing cell containing  $\text{MnO}_2 + \text{CuO}$

Question Number : 152 Question Id : 47720321584 Display Question Number : Yes Is Question

Mandatory : No

Which of the following instrument is used to measure the cooling power of mine air?

Options :

1. ✘ Manometer
2. ✘ Velometer
3. ✔ Kata Thermometer
4. ✘ Pitot tube

Question Number : 153 Question Id : 47720321585 Display Question Number : Yes Is Question

Mandatory : No

Class B fires involves:

Options :

1. ✘ Gaseous fuels like LPG gas, butane etc.
2. ✘ Melting iron
3. ✘ Live electrical equipments
4. ✔ Inflammable liquids like diesel, petrol etc.



Question Number : 154 Question Id : 47720321586 Display Question Number : Yes Is Question

Mandatory : No

In a gas mask, cotton wool removes:

Options :

1. ✘ Water vapour
2. ✘ Ammonia
3. ✔ Dust and smoke
4. ✘ Hydrogen sulphide

Question Number : 155 Question Id : 47720321587 Display Question Number : Yes Is Question

Mandatory : No

In a self-contained breathing apparatus, which valve allows the escape of any oxygen in excess of the wearers requirement?

Options :

1. ✘ Inhalation valve
2. ✔ Relief valve
3. ✘ Exhalation valve
4. ✘ Main valve

Question Number : 156 Question Id : 47720321588 Display Question Number : Yes Is Question

Mandatory : No

The air travel from the rise side of a district to the lower levels along the working places is referred as:

Options :

1. ✘ Ascensional ventilation
2. ✔ Descensional ventilation
3. ✘ Artificial ventilation
4. ✘ Reverse ventilation

Question Number : 157 Question Id : 47720321589 Display Question Number : Yes Is Question

Mandatory : No

Modern flame safety lamp can withstand an air velocity of.....

Options :

1. ✘ 10 m/s
2. ✘ 11.5 m/s
3. ✘ 12.5 m/s
4. ✔ 14 m/s

Question Number : 158 Question Id : 47720321590 Display Question Number : Yes Is Question

Mandatory : No

If the CO/CO<sub>2</sub> deficiency ratio in a mine is 2.25%, it indicates:

**Options :**

1. ✓ Existence of spontaneous heating
2. ✗ Active fire
3. ✗ Heating in advanced stage
4. ✗ Normal to the coal mine

**Question Number : 159 Question Id : 47720321591 Display Question Number : Yes Is Question Mandatory : No**

For an explosion proof stopping, D.G.M.S recommended a minimum brick wall-thickness of:

**Options :**

1. ✗ 1.0 m
2. ✗ 1.5 m
3. ✗ 2.5 m
4. ✓ 3.0 m

**Question Number : 160 Question Id : 47720321592 Display Question Number : Yes Is Question Mandatory : No**



Foam type fire extinguishers are not used for fighting:

**Options :**

1. ✘ Oil fire
2. ✘ Timber fire
3. ✔ Electrical fire
4. ✘ Melting iron

**Question Number : 161 Question Id : 47720321593 Display Question Number : Yes Is Question Mandatory : No**

A line which checks the accuracy of the frame work and enables the surveyor to locate the interior details which are far away from the main chain line is called as:

**Options :**

1. ✘ Check line
2. ✘ Perpendicular line
3. ✔ Tie line
4. ✘ Offset

**Question Number : 162 Question Id : 47720321594 Display Question Number : Yes Is Question**

**Mandatory : No**

When the instrument is correctly levelled, the height of plane of collimation is synonymous with:

**Options :**

1. ✓ Height of instrument
2. ✗ Plus sight
3. ✗ Turning point
4. ✗ Intermediate sight

**Question Number : 163 Question Id : 47720321595 Display Question Number : Yes Is Question**

**Mandatory : No**

Which of the following system is used to working out the reduced levels of points from the staff readings taken in field?

**Options :**

1. ✗ Bench marking
2. ✓ Rise and fall system
3. ✗ Ranging system
4. ✗ Reconnaissance

Question Number : 164 Question Id : 47720321596 Display Question Number : Yes Is Question

Mandatory : No

The horizontal angle between the true median and a line is:

Options :

1. ✘ Magnetic meridian
2. ✘ Arbitrary meridian
3. ✔ Azimuth
4. ✘ Whole circle angle

Question Number : 165 Question Id : 47720321597 Display Question Number : Yes Is Question

Mandatory : No

By which rule, the total error in latitude and departure is distributed in proportion to length of sides:

Options :

1. ✔ Bowditch rule
2. ✘ Transit rule
3. ✘ Centesimal rule
4. ✘ Reversal point rule



Question Number : 166 Question Id : 47720321598 Display Question Number : Yes Is Question

Mandatory : No

Fixed hair rule and modified hair rule methods are the classifications of which method of tachometry:

Options :

1. ✘ Inclined sights
2. ✘ Tangential method
3. ✘ Vernier scaling method
4. ✔ Stadia method

Question Number : 167 Question Id : 47720321599 Display Question Number : Yes Is Question

Mandatory : No

Which is the instrument used in finding the area of plots, especially when the boundaries are irregular or curved ?

Options :

1. ✘ Compass
2. ✘ Coniometer
3. ✘ Theodolite
4. ✔ planimeter

Question Number : 168 Question Id : 47720321600 Display Question Number : Yes Is Question

Mandatory : No

In weissbach triangle method of correlation, the number of shafts used for correlation are:

Options :

1. ✘ Two

2. ✔ one

3. ✘ Three

4. ✘ Four

Question Number : 169 Question Id : 47720321601 Display Question Number : Yes Is Question

Mandatory : No

The main principle of surveying is to work from:

Options :

1. ✘ Part to whole

2. ✔ Whole to part

3. ✘ Higher to lower level

4. ✘ Lower to higher level

Question Number : 170 Question Id : 47720321602 Display Question Number : Yes Is Question

Mandatory : No

The upper plate of theodolite is fixed to:

Options :

1. ✓ inner spindle
2. ✘ Levelling head
3. ✘ outer spindle
4. ✘ Tripod

Question Number : 171 Question Id : 47720321603 Display Question Number : Yes Is Question

Mandatory : No

The parallax can be removed by:

Options :

1. ✘ Focusing the eyepiece
2. ✘ Focusing the objective
3. ✘ By centring and levelling
4. ✓ Focusing both the eyepiece and objective



Question Number : 172 Question Id : 47720321604 Display Question Number : Yes Is Question

Mandatory : No

A deflection angle is:

Options :

1. ✘ Always between 90 and 180 degrees
2. ✔ Difference between included angle and 180 degrees
3. ✘ Less than 90 degrees
4. ✘ Difference between 360 degree and included angle

Question Number : 173 Question Id : 47720321605 Display Question Number : Yes Is Question

Mandatory : No

While taking a back sight, the screw used is:

Options :

1. ✘ Upper tangent
2. ✘ Upper clamp
3. ✘ Vertical clamp

Lower clamp

4. ✓

**Question Number : 174 Question Id : 47720321606 Display Question Number : Yes Is Question Mandatory : No**

The horizontal angle between two lines is generally measured:

**Options :**

1. ✓ Clockwise from the backward station

2. ✗ Counter-clockwise from the forward station

3. ✗ Counter-clockwise from the back station

4. ✗ Clockwise from the forward station

**Question Number : 175 Question Id : 47720321607 Display Question Number : Yes Is Question Mandatory : No**

Which of the following sentence is incorrect?

**Options :**

1. ✗ The axes of the plate level is perpendicular to the vertical axis

2. ✗ The axis of the altitude level is parallel to the line of collimation when it is horizontal and the vertical circle reads zero

The line of collimation is parallel to the horizontal axis

3. ✓

The horizontal axis is perpendicular to the vertical axis

4. ✗

**Question Number : 176 Question Id : 47720321608 Display Question Number : Yes Is Question Mandatory : No**

Which one of the following haulages is preferred for undulating roadways:

**Options :**

Direct rope haulage

1. ✓

Endless 'haulage

2. ✗

Tail rope haulage

3. ✗

Main and tail rope haulage

4. ✗

**Question Number : 177 Question Id : 47720321609 Display Question Number : Yes Is Question Mandatory : No**

As per mining regulation, for every shaft exceeding 100 m depth and during hoisting men' the speed should not exceed:

**Options :**

0.5 m/s

1. ✗



2. ✓ 1 m/s

3. ✗ 1.5 m/s

4. ✗ 5 m/s

Question Number : 178 Question Id : 47720321610 Display Question Number : Yes Is Question Mandatory : No

Recapping a winding rope is done to:

Options :

1. ✗ Increase the flexural strength of the rope

2. ✗ Increase the flexibility of the rope.

3. ✓ Remove a portion of the rope subjected to deterioration

4. ✗ Prevent the rope from excessive rusting.

Question Number : 179 Question Id : 47720321611 Display Question Number : Yes Is Question Mandatory : No

Clifton pulley is used in:

Options :

1. ✘ Direct rope haulage
2. ✘ Endless haulage
3. ✘ Main and tail haulage
4. ✔ Gravity haulage

**Question Number : 180 Question Id : 47720321612 Display Question Number : Yes Is Question Mandatory : No**

Flame trap or flame arrestor is used with:

**Options :**

1. ✘ Conveyor
2. ✘ Direct haulage
3. ✔ Diesel locomotive
4. ✘ Shaker conveyor

**Question Number : 181 Question Id : 47720321613 Display Question Number : Yes Is Question Mandatory : No**

Jaw clutch is provided with:

**Options :**

1. ✘ Tail rope haulage
2. ✔ Direct rope haulage
3. ✘ Endless rope haulage
4. ✘ Gravity haulage

**Question Number : 182 Question Id : 47720321614 Display Question Number : Yes Is Question**

**Mandatory : No**

Factor of safety required for drum winding to be used for man riding:

**Options :**

1. ✘ 4
2. ✘ 6
3. ✘ 8
4. ✔ 10

**Question Number : 183 Question Id : 47720321615 Display Question Number : Yes Is Question**

**Mandatory : No**



With DERD shearer the cut coal is thrown on the armoured face conveyor by:

**Options :**

1. ✘ Centrifugal face
2. ✘ By the movement of the machine
3. ✘ By the gummer
4. ✔ Deflected by the plough

**Question Number : 184 Question Id : 47720321616 Display Question Number : Yes Is Question Mandatory : No**

By varying the pitch of the blades, the pressure generated by axial flow fan .....

**Options :**

1. ✘ Remains same
2. ✘ Decreases
3. ✔ Increases
4. ✘ Decreases to zero

Question Number : 185 Question Id : 47720321617 Display Question Number : Yes Is Question

Mandatory : No

The space factor for stranded rope is:

Options :

1. ✘ 30 to 40 %

2. ✔ 40 to 50 %

3. ✘ 50 to 60 %

4. ✘ 65 to 75 %

Question Number : 186 Question Id : 47720321618 Display Question Number : Yes Is Question

Mandatory : No

The correct place for tensioning arrangement in endless rope haulage is:

Options :

1. ✘ At the top of the incline

2. ✘ At the bottom of the incline

3. ✘ Any point on the level roadway

At the point where slack rope is most likely to occur

4. ✓

Question Number : 187 Question Id : 47720321619 Display Question Number : Yes Is Question

Mandatory : No

Which of the following is correct regarding limiting fleet angle to  $1.5^\circ$ ?

Options :

To reduce wear of the winding rope

1. ✓

To reduce side travel on the pulley

2. ✘

To allow maximum persons to travel

3. ✘

Allowing the use of lesser diameter winding rope

4. ✘

Question Number : 188 Question Id : 47720321620 Display Question Number : Yes Is Question

Mandatory : No

A continuous miner is a:

Options :

Cutting-cum-loading equipment.

1. ✓

Cutting equipment

2. ✘



3. ✘ Loading equipment.

4. ✘ Transporting equipment

**Question Number : 189 Question Id : 47720321621 Display Question Number : Yes Is Question Mandatory : No**

The equipment which is not used in Bord and Pillar system of working is:

**Options :**

1. ✘ side discharge loader.

2. ✘ load haul dumper.

3. ✘ scraper

4. ✔ coal plough

**Question Number : 190 Question Id : 47720321622 Display Question Number : Yes Is Question Mandatory : No**

Which one of the following powered roof supports does not contain a canopy?

**Options :**

1. ✔ Chock support

2. ✘

Shield support

3. ✘ Pure shield support

4. ✘ Chock shield support

**Question Number : 191 Question Id : 47720321623 Display Question Number : Yes Is Question Mandatory : No**

How many litres of water (minimum) per day per person shall be provided to workers by Owner/Agent/ Manager, as per The Mines Rules, 1956?

**Options :**

1. ✘ 1

2. ✔ 2

3. ✘ 3

4. ✘ 4

**Question Number : 192 Question Id : 47720321624 Display Question Number : Yes Is Question Mandatory : No**

Which of the following option is correct regarding quality assurance (QA) and quality control (QC)

**Options :**

1. ✔

QC is an integral part of QA

2. ✘ QA is an integral part of QC

3. ✘ QA and QC are independent to each other

4. ✘ QC may or may not depend on QA

**Question Number : 193 Question Id : 47720321625 Display Question Number : Yes Is Question Mandatory : No**

Which Act provides for appointment of conciliation officers and adjudication authorities?

**Options :**

1. ✘ The Factories Act, 1948

2. ✔ The Industrial Disputes Act, 1947

3. ✘ The Trades Unions Act, 1926

4. ✘ The Mines Act, 1952

**Question Number : 194 Question Id : 47720321626 Display Question Number : Yes Is Question Mandatory : No**



Which one of the following is correct regarding minimum standard of illumination in lux for haul roads, for dumper trucks in an opencast mine?

Note: H-horizontal

**Options :**

1. ✓ 10 H

2. ✗ 15 H

3. ✗ 20 H

4. ✗ 25 H

**Question Number : 195 Question Id : 47720321627 Display Question Number : Yes Is Question Mandatory : No**

With permission of Chief Inspector, number of hours of work (including interval for rest) in any one day for above ground shall not exceed:

**Options :**

1. ✗ 12

2. ✓ 14

3. ✗ 15

4. ✗ 16

**Question Number : 196 Question Id : 47720321628 Display Question Number : Yes Is Question**

**Mandatory : No**

The register required for the details of overtime to be maintained in:

**Options :**

1. ✓ Form I
2. ✗ Form J
3. ✗ Form K
4. ✗ Form L

**Question Number : 197 Question Id : 47720321629 Display Question Number : Yes Is Question**

**Mandatory : No**

The owner/agent/manager shall appoint a suitably qualified person as a welfare officer, wherein ordinarily persons employed are:

**Options :**

1. ✗ 600 or more
2. ✓ 500 or more
3. ✗ 200 or more
4. ✗ 100 or more

**Question Number : 198 Question Id : 47720321630 Display Question Number : Yes Is Question**

**Mandatory : No**

Every mine manager of an underground mine shall be assisted by a safety officer to promote safety and safe practices in the mine when the output exceeds per month?

**Options :**

1. ✘ 1000 tons
2. ✘ 3000 tons
3. ✘ 8000 tons
4. ✔ 5000 tons

**Question Number : 199 Question Id : 47720321631 Display Question Number : Yes Is Question Mandatory : No**

The renewal period for wage agreement in years for workers in coal mines presently is:

**Options :**

1. ✘ 3
2. ✘ 4
3. ✔ 5
4. ✘ 6



Question Number : 200 Question Id : 47720321632 Display Question Number : Yes Is Question Mandatory : No

How many years of practical experience Superintendent of Rescue Station should have in below ground mines?

Options :

1. ✘ 1 year
2. ✘ 3 years
3. ✘ 4 years
4. ✔ 5 years