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.

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

Mathematics

Section Id :	477203417
Section Number :	1
Mandatory or Optional :	Mandatory
Number of Questions :	50
Section Marks :	50
Enable Mark as Answered Mark for Review and Clear Response :	Yes

Question Number : 1 Question Id : 47720321233 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

$$3x - y + 4z = 3$$
$$x + 2y - 3z = -2$$
$$6x + 5y + kz = -3$$ is

Options :

1. ✖ 0

2. ✔ 1

3. ✖ 2

4. ✖ *infinitely many*

Question Number : 2 Question Id : 47720321234 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 : 47720321235 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 : 47720321236 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 : 47720321237 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 : 47720321238 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 : 47720321239 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 : 47720321240 Display Question Number : Yes Is Question Mandatory : No

If x and y are two distinct real numbers, then, the number of values of θ 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 : 47720321241 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 : 47720321242 Display Question Number : Yes Is Question Mandatory : No

For all real numbers θ, 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 : 47720321243 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 : 47720321244 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. ✖ $\left[\frac{1}{\sqrt{2}},1\right]$

4. ✖ $\left[0,\frac{1}{\sqrt{2}}\right]$

Question Number : 13 Question Id : 47720321245 Display Question Number : Yes Is Question Mandatory : No

Consider a triangle ΔABC, with sides of length a,b and c, and angles A,B and C. If a,b,c and the area of the triangle ΔABC 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 : 47720321246 Display Question Number : Yes Is Question Mandatory : No

Consider a triangle ΔABC, with sides of length a,b and c, and angles A,B and C. If $3a=b+c$, then the value of $\cot\frac{B}{2}.\cot\frac{C}{2}$ is

Options :

1. ✖ 0

2. ✖ $\frac{1}{2}$

3. ✖ $\sqrt{3}$

4. ✔ 2

Question Number : 15 Question Id : 47720321247 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. ✖ π

Question Number : 16 Question Id : 47720321248 Display Question Number : Yes Is Question Mandatory : No

Consider a triangle ΔABC with angles A,B and C. If $\cos A + \cos B + \cos C = \frac{3}{2}$, then the triangle ΔABC 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 : 47720321249 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 : 47720321250 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 : 47720321251 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 : 47720321252 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 : 47720321253 Display Question Number : Yes Is Question Mandatory : No

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

Options :

1. ✔ a parabola

2. ✖ an ellipse

3. ✖ a hyperbola

4. ✖ a circle

Question Number : 22 Question Id : 47720321254 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 : 47720321255 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 : 47720321256 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 : 47720321257 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 : 47720321258 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 : 47720321259 Display Question Number : Yes Is Question Mandatory : No

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

Options :

1. ✖ -1

2. ✔ 0

3. ✖ $\sqrt{3}$

4. ✖ $\frac{\pi}{2}$

Question Number : 28 Question Id : 47720321260 Display Question Number : Yes Is Question Mandatory : No

Let $\mathbb{R}$ be the set of all real numbers. Let $f : \mathbb{R} \to \mathbb{R}$ 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 : 47720321261 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 : 47720321262 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 : 47720321263 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 : 47720321264 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 : 47720321265 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 : 47720321266 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 : 47720321267 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 : 47720321268 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 : 47720321269 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 : 47720321270 Display Question Number : Yes Is Question Mandatory : No

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

Options :

1. ✖ 0

2. ✔

$\frac{\pi}{2}$

3. ✖ π

4. ✖ 2π

Question Number : 39 Question Id : 47720321271 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 : 47720321272 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 : 47720321273 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. ✖ π

Question Number : 42 Question Id : 47720321274 Display Question Number : Yes Is Question Mandatory : No

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

Options :

1. ✔ 0

2. ✖ $\frac{\pi}{2}$

3. ✖ π

4. ✖ 2π

Question Number : 43 Question Id : 47720321275 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 : 47720321276 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 : 47720321277 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 : 47720321278 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 : 47720321279 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 : 47720321280 Display Question Number : Yes Is Question

Mandatory : No

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

Options :

1. ✖ $y\,\mathrm{cosec}\,x = x^2 - \frac{\pi^2}{4}$

2. ✖ $y\,\mathrm{cosec}\,x = 2x^2 - \frac{\pi^2}{2}$

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

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

Question Number : 49 Question Id : 47720321281 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 : 47720321282 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

Section Id :	477203418
Section Number :	2
Mandatory or Optional :	Mandatory
Number of Questions :	25
Section Marks :	25
Enable Mark as Answered Mark for Review and	Yes

Clear Response :

Question Number : 51 Question Id : 47720321283 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 : 47720321284 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^2

Question Number : 53 Question Id : 47720321285 Display Question Number : Yes Is Question Mandatory : No

A vector A is along positive x-axis. If B is another vector such that AxB 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 : 47720321286 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. ✔ 30^0

2. ✖ 45^0

3. ✖ 60^0

4. ✖ 90^0

Question Number : 55 Question Id : 47720321287 Display Question Number : Yes Is Question

Mandatory : No

The work done by a force is defined as W=**F**.**S**. In a certain situation **F** and **S** are not zero but the work done is zero when

Options :

1. ✖ **F** and **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 45^0

Question Number : 56 Question Id : 47720321288 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 : 47720321289 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 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 : 47720321290 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 : 47720321291 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 : 47720321292 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 : 47720321293 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 : 47720321294 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 : 47720321295 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 : 47720321296 Display Question Number : Yes Is Question Mandatory : No

The total mechanical energy of a spring-mass system in simple harmonic motion is $E = 0.5\ m\omega^2A^2$. 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 : 47720321297 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 : 47720321298 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 : 47720321299 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 : 47720321300 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 : 47720321301 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 : 47720321302 Display Question Number : Yes Is Question Mandatory : No

Work done by 0.1 mole of a gas at 27^0C 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 : 47720321303 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 1^0C, its initial temperature is

Options :

1. ✔ 250 K

2. ✖ 150 K

3. ✖ 100 K

4. ✖ 50 K

Question Number : 72 Question Id : 47720321304 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 : 47720321305 Display Question Number : Yes Is Question Mandatory : No

A Carnot's engine operates with source at 127^0C and sink at 27^0 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 : 47720321306 Display Question Number : Yes Is Question Mandatory : No

The optical fibre consisting of a central core is cladded 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 : 47720321307 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

Section Id :	477203419
Section Number :	3
Mandatory or Optional :	Mandatory
Number of Questions :	25
Section Marks :	25

Enable Mark as Answered Mark for Review and Clear Response : Yes

Question Number : 76 Question Id : 47720321308 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 : 47720321309 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 : 47720321310 Display Question Number : Yes Is Question Mandatory : No

Radius of 3rd Bohr orbit of hydrogen atom is ------

Options :

1. ✖ $6.529A^0$

2. ✔ $4.761A^0$

3. ✖ $2.116A^0$

4. ✖ $8.464A^0$

Question Number : 79 Question Id : 47720321311 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 : 47720321312 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 : 47720321313 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 : 47720321314 Display Question Number : Yes Is Question Mandatory : No

The molecular weight of $KMnO_4$ is "M". In a reaction $KMnO_4$ is reduced to K_2MnO_4. The equivalent weight of $KMnO_4$ is

Options :

1. ✔ M

2. ✖ M/2

3. ✖ M/3

4. ✖ M/4

Question Number : 83 Question Id : 47720321315 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 : 47720321316 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. ✖ H_3O^+ concentration increases

Question Number : 85 Question Id : 47720321317 Display Question Number : Yes Is Question Mandatory : No

Which of the following is not a buffer solution?

Options :

1. ✖ (CH_3COOH/CH_3COONa)

2. ✔ (HCl/NaCl)

3. ✖ (HCOOH/HCOONa)

4. ✖ (NH_4OH/NH_4Cl)

Question Number : 86 Question Id : 47720321318 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 : 47720321319 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 : 47720321320 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_2

3. ✔ O_2

4. ✖ SO_3

Question Number : 89 Question Id : 47720321321 Display Question Number : Yes Is Question Mandatory : No

The EMF of the cell Ni/Ni^{2+} (0.01M)/ Cl^-(0.01M)/Cl_2, 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 : 47720321322 Display Question Number : Yes Is Question Mandatory : No

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

Options :

1. ✔ $1\ mg/L = 1\ ppm = 0.07^0Cl = 0.1^0Fr$

2. ✖ $1\ mg/L = 0.1\ ppm = 0.7^0Cl = 0.1^0Fr$

3. ✖ $1\ mg/L = 1\ ppm = 0.7^0Cl = 0.01^0Fr$

4. ✖ $1\ mg/L = 1\ ppm = 0.7^0Cl = 1^0Fr$

Question Number : 91 Question Id : 47720321323 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 :

1. ✖ $Fe_2SO_4(NH_4)_2SO_4.7H_20$

2. ✔ $K_2SO_4 . Al_2(SO_4)_3 . 24H_2O$

3. ✖ $CuSO_4.5H_2O$

4. ✖ $Na_2SO_4.6H_2O$

Question Number : 92 Question Id : 47720321324 Display Question Number : Yes Is Question Mandatory : No

The general chemical formula of zeolite is

Options :

1. ✔ $Na_2O .Al_2O_3 .x\ SiO_2 .y\ H_2O$

2. ✖ $Al_2O_3.H_2O$

3. ✖ $CaSO_4.2H_2O$

4. ✖ $MgSO_4.5H_2O$

Question Number : 93 Question Id : 47720321325 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 : 47720321326 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 : 47720321327 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 : 47720321328 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 : 47720321329 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 : 47720321330 Display Question Number : Yes Is Question Mandatory : No

The boiling range of petrol fraction is found to be

Options :

1. ✖ 120^0C-180^0C

2. ✖ 250^0C-320^0C

3. ✔ 40^0C-120^0C

4. ✖ 180^0C-250^0C

Question Number : 99 Question Id : 47720321331 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 : 47720321332 Display Question Number : Yes Is Question Mandatory : No

White lung cancer is caused by

Options :

1. ✖ Asbestos

2. ✔ Textiles

3. ✖ Paper

4. ✖ Silica

Metallurgical Engineering

Section Id :	477203420
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 : 47720321333 Display Question Number : Yes Is Question Mandatory : No

An ore is a naturally occurring aggregate or a combination of ....., from which one or more ..... or ..... may be extracted

Options :

1. ✖ Minerals, metals, compound

2. ✖ Metals, compounds, minerals

3. ✔ Minerals, metals, minerals

4. ✖ Metals, minerals, compounds

Question Number : 102 Question Id : 47720321334 Display Question Number : Yes Is Question Mandatory : No

Grizzly are commercial ore dressing units which work on the principle of:

Options :

1. ✖ Surface area

2. ✔ Size difference

3. ✖ Specific Gravity

4. ✖ Affinity for oxygen

Question Number : 103 Question Id : 47720321335 Display Question Number : Yes Is Question Mandatory : No

Sea-nodules are rich in:

Options :

1. ✖ Mn only

2. ✖ Ni only

3. ✔ Mn and Ni

4. ✖ Mg

Question Number : 104 Question Id : 47720321336 Display Question Number : Yes Is Question Mandatory : No

The primary mineral of zinc is:

Options :

1. ✖ Monazite

2. ✔ Sphalerite

3. ✖ Rhodonite

4. ✖ Brucite

Question Number : 105 Question Id : 47720321337 Display Question Number : Yes Is Question Mandatory : No

For processing of lean ores of commercially pure metals, which of the following route is ideally suitable:

Options :

1. ✖ Pyrometallurgy

2. ✔ Hydrometallurgy

3. ✖ Electrometallurgy

4. ✖ Hydrometallurgy and Electrometallurgy

Question Number : 106 Question Id : 47720321338 Display Question Number : Yes Is Question Mandatory : No

Which of the following elements is not primarily a heat producing element in a fuel ?

Options :

1. ✖ Carbon

2. ✖ Silicon

3. ✔ Iron

4. ✖ Phosphorous

Question Number : 107 Question Id : 47720321339 Display Question Number : Yes Is Question Mandatory : No

The temperature to analyse VCM in coal should be:

Options :

1. ✖ 110 °C

2. ✔ 950 °C

3. ✖ 400 °C

4. ✖ 800 °C

Question Number : 108 Question Id : 47720321340 Display Question Number : Yes Is Question Mandatory : No

The maximum tolerable limit of sulfur in a good metallurgical coke is:

Options :

1. ✖ 4 %

2. ✖ < 3%

3. ✔ 0.5 – 3%

4. ✖ 2.1 %

Question Number : 109 Question Id : 47720321341 Display Question Number : Yes Is Question Mandatory : No

The fuel with highest calorific value is:

Options :

1. ✖ Briquette

2. ✔ Natural gas

3. ✖ Petroleum

4. ✖ Wood

Question Number : 110 Question Id : 47720321342 Display Question Number : Yes Is Question Mandatory : No

A neutral refractory:

Options :

1. ✖ Dinas brick

2. ✖ Alumina bricks

3. ✔ Chromite bricks

4. ✖ Magnesia bricks

Question Number : 111 Question Id : 47720321343 Display Question Number : Yes Is Question Mandatory : No

An ideal instrument to measure temperature above 1200 °C in a Metallurgical process:

Options :

1. ✖ Mercury thermometer

2. ✔ Thermolectric pyrometer

3. ✖ Gas thermometer

4. ✖ Resistance thermometer

Question Number : 112 Question Id : 47720321344 Display Question Number : Yes Is Question Mandatory : No

A system which can not exchange matter but energy with its surroundings is:

Options :

1. ✖ Isolated system

2. ✔ Closed system

3. ✖ Open system

4. ✖ Isobaric system

Question Number : 113 Question Id : 47720321345 Display Question Number : Yes Is Question Mandatory : No

$\Delta H^0_{298} = -400\ kCal$ for alumina corresponds to:

Options :

1. ✔ Standard heat of formation

2. ✖ Heat of conservation

3. ✖ Reaction heat generated

4. ✖ Entropy of formation

Question Number : 114 Question Id : 47720321346 Display Question Number : Yes Is Question Mandatory : No

At equilibrium the entropy of a closed system is:

Options :

1. ✔ Maximum

2. ✖ Significant

3. ✖ Minimum

4. ✖ Constant

Question Number : 115 Question Id : 47720321347 Display Question Number : Yes Is Question Mandatory : No

The specific heat capacity of water at 25 °C is:

Options :

1. ✔ 4184 $J.kg^{-1}K^{-1}$

2. ✖ 4814 $J.kg^{-1}K^{-1}$

3. ✖ 418.4 $J.kg^{-1}K^{-1}$

4. ✖ 481.4 $J.kg^{-1}K^{-1}$

Question Number : 116 Question Id : 47720321348 Display Question Number : Yes Is Question Mandatory : No

Which of the following statement is true:

Options :

1. ✔ Gibbs free energy does not have absolute value

2. ✖ In a vapor phase, fugacity is equal to partial pressure

3. ✖ For an ideal Raoultian behavior activity co-efficient is greater than 1

4. ✖ For an ideal Henerian behavior activity co-efficient is greater than 1

Question Number : 117 Question Id : 47720321349 Display Question Number : Yes Is Question Mandatory : No

The degree of freedom at triple point in a phase diagram:

Options :

1. ✖ 3

2. ✖ 2

3. ✖ 1

4. ✔ 0

Question Number : 118 Question Id : 47720321350 Display Question Number : Yes Is Question Mandatory : No

In Ellingham diagram of oxides, the downward slope CO signifies

Options :

1. ✖ Decrease in entropy

2. ✖ Can reduce all the oxides at all temperatures

3. ✖ Effective reducing agent above 717 °C

4. ✔ The most efficient reducing agent for oxides

Question Number : 119 Question Id : 47720321351 Display Question Number : Yes Is Question Mandatory : No

Enthalpy is expressed as:

Options :

1. ✔ $H = E - PV$

2. ✖ $H - E = PV$

3. ✖ $H = F - TS$

4. ✖ $H + F = TS$

Question Number : 120 Question Id : 47720321352 Display Question Number : Yes Is Question Mandatory : No

The atomic diameter of a FCC crystal with lattice parameter a is:

Options :

1. ✔ $a\sqrt{2}/2$

2. ✖ $a\sqrt{2}/4$

3. ✖ $a\sqrt{3}/4$

4. ✖ $a/2$

Question Number : 121 Question Id : 47720321353 Display Question Number : Yes Is Question Mandatory : No

The number of atoms along the body diagonal of the diamond cubic unit cell is

Options :

1. ✖ 1

2. ✔ 2

3. ✖ 3

4. ✖ 4

Question Number : 122 Question Id : 47720321354 Display Question Number : Yes Is Question Mandatory : No

In deciding the solid solubility (Hume-Ruthery rule), the difference between the atomic diameter of the solute and solvent should not be more than

Options :

1. ✖ 50%

2. ✔ 15%

3. ✖ 2%

4. ✖ 0%

Question Number : 123 Question Id : 47720321355 Display Question Number : Yes Is Question Mandatory : No

Relative amount of phases in a region in a phase diagram can be estimated by:

Options :

1. ✖ Phase rule

2. ✖ Tie-line rule

3. ✖ Humerothery rule

4. ✔ Lever rule

Question Number : 124 Question Id : 47720321356 Display Question Number : Yes Is Question Mandatory : No

The reaction of generation of one solid and liquid phase from a solid phase on heating is known as:

Options :

1. ✖ Eutectic

2. ✖ Eutectoid

3. ✖ Peritectoid

4. ✔ Peritectic

Question Number : 125 Question Id : 47720321357 Display Question Number : Yes Is Question Mandatory : No

The fraction of pearlite in a 0.55% C steel is:

Options :

1. ✖ 0.55

2. ✖ 0.31

3. ✖ 0

4. ✔ 0.69

Question Number : 126 Question Id : 47720321358 Display Question Number : Yes Is Question

Mandatory : No

The unit of flux J is:

Options :

1. ✔ $\text{atoms m}^{-2}\text{ s}^{-1}$

2. ✖ $\text{atoms m}^{2}\text{ s}^{-1}$

3. ✖ $\text{moles m}^{2}\text{ s}^{-1}$

4. ✖ $\text{moles m}^{-3}\text{ s}^{-1}$

Question Number : 127 Question Id : 47720321359 Display Question Number : Yes Is Question Mandatory : No

Which of the following elements has the highest diffusion coefficient in steel at 1000 °C?

Options :

1. ✖ Mn

2. ✖ W

3. ✖ Ni

4. ✔ C

Question Number : 128 Question Id : 47720321360 Display Question Number : Yes Is Question Mandatory : No

The condition for fine grain size during solidification would be:

Options :

1. ✖ Slow cooling

2. ✖ Increasing surface energy

3. ✖ Decreasing nucleation rate

4. ✔ Fast cooling

Question Number : 129 Question Id : 47720321361 Display Question Number : Yes Is Question Mandatory : No

Bainite has:

Options :

1. ✖ Same morphology as austenite

2. ✔ A non-lamellar morphology of ferrite and cementite

3. ✖ The coarsest morphology in the Fe-C diagram

4. ✖ The hardest phase

Question Number : 130 Question Id : 47720321362 Display Question Number : Yes Is Question Mandatory : No

Materials with metallic bonds in its atoms are necessarily

Options :

1. ✔ Ductile under stress

2. ✖ Hard

3. ✖ Gases at RT

4. ✖ Low in electrical conductivity

Question Number : 131 Question Id : 47720321363 Display Question Number : Yes Is Question Mandatory : No

Which of the following phase is obtained as the end product in steel, after completion of austempering process?

Options :

1. ✖ Austenite

2. ✔ Bainite

3. ✖ Martensite

4. ✖ Pearlite

Question Number : 132 Question Id : 47720321364 Display Question Number : Yes Is Question Mandatory : No

Identify the wrong statement pertaining to heat treatment of steel.

Options :

1. ✖ Martempering process is designed to overcome limitations of quenching

2. ✔ Pearlite is obtained as the final phase in martempering process

3. ✖ Water is used as quenching medium in Jominy end quench test

4. ✖ Martensite is the end product in steel after austempering

Question Number : 133 Question Id : 47720321365 Display Question Number : Yes Is Question Mandatory : No

TTT diagram is also known as:

Options :

1. ✔ Bain's curve

2. ✖ S-N curve

3. ✖ Evans curve

4. ✖ Kellog's diagram

Question Number : 134 Question Id : 47720321366 Display Question Number : Yes Is Question Mandatory : No

% C in medium carbon steels range from:

Options :

1. ✖ 0.1 – 0.2

2. ✖ 0.2 – 0.25

3. ✔ 0.3 – 0.6

4. ✖ 0.7 – 0.8

Question Number : 135 Question Id : 47720321367 Display Question Number : Yes Is Question Mandatory : No

A given component cracked after heat treatment. What can be the possible reason?

Options :

1. ✖ Prolonged heating

2. ✖ Slow cooling in air

3. ✖ Improper cleaning

4. ✔ Sudden cooling in brine solution

Question Number : 136 Question Id : 47720321368 Display Question Number : Yes Is Question Mandatory : No

The austenitizing temperature (for full annealing) for hypo-eutectoid steel is in the range of:

Options :

1. ✔ 723 – 910 °C

2. ✖ 910 – 1130 °C

3. ✖ 467 – 723 °C

4. ✖ 668 – 800 °C

Question Number : 137 Question Id : 47720321369 Display Question Number : Yes Is Question

Mandatory : No

Quench hardening of a steel would produce a hardness depending upon:

Options :

1. ✖ Rate of heating

2. ✔ Quenching temperature

3. ✖ Quenching pressure

4. ✖ Water

Question Number : 138 Question Id : 47720321370 Display Question Number : Yes Is Question Mandatory : No

Which type of stainless steel has the highest corrosion resistance?

Options :

1. ✖ Martensite

2. ✖ Ferrite

3. ✔ Austenite

4. ✖ Dual phase steel

Question Number : 139 Question Id : 47720321371 Display Question Number : Yes Is Question Mandatory : No

Manganese addition to steel:

Options :

1. ✖ Promotes grain coarsening

2. ✔ Counters effect of sulphur

3. ✖ Increases corrosion resistance

4. ✖ Increases ductility

Question Number : 140 Question Id : 47720321372 Display Question Number : Yes Is Question Mandatory : No

The medium used in pack carburising of steel:

Options :

1. ✔ Activated charcoal

2. ✖ Hydrocarbon gas

3. ✖ Fused salt

4. ✖ Mixture of gas and charcoal

Question Number : 141 Question Id : 47720321373 Display Question Number : Yes Is Question Mandatory : No

The season cracking in yellow α brasses can be avoided by:

Options :

1. ✖ Full annealing

2. ✖

Tempering

3. ✔ Stress relief annealing

4. ✖ Age hardening

Question Number : 142 Question Id : 47720321374 Display Question Number : Yes Is Question Mandatory : No

Quenching medium with the least severity effect:

Options :

1. ✖ Brine

2. ✖ Soluble oil

3. ✖ Liquid salts

4. ✔ Air

Question Number : 143 Question Id : 47720321375 Display Question Number : Yes Is Question Mandatory : No

The majority and widest iron bearing mineral is:

Options :

1. ✔ Hematite

2. ✖ Limonite

3. ✖ Magnetite

4. ✖ Siderite

Question Number : 144 Question Id : 47720321376 Display Question Number : Yes Is Question Mandatory : No

The main role of flux addition during BF iron making is:

Options :

1. ✖ To increase the softening point of gangue

2. ✔ To increase the chemical potential of impurities in pure metal

3. ✖ To increase the viscosity of slag

4. ✖ Alloy formation

Question Number : 145 Question Id : 47720321377 Display Question Number : Yes Is Question Mandatory : No

An example of dry BF gas cleaning equipment

Options :

1. ✖ Venturi scrubber

2. ✖ Scrubber

3. ✖ Hydrocyclone

4. ✔ Dust catcher

Question Number : 146 Question Id : 47720321378 Display Question Number : Yes Is Question Mandatory : No

The deciding factor of Mn content in pig iron:

Options :

1. ✖ Slag viscosity

2. ✖ CaO content of the burden

3. ✖ Operating pressure temperature

4. ✔ Slag basicity

Question Number : 147 Question Id : 47720321379 Display Question Number : Yes Is Question Mandatory : No

Which is closest to the pure form of iron?

Options :

1. ✖ Cast iron

2. ✖ Pig iron

3. ✔ Wrought iron

4. ✖ Steel

Question Number : 148 Question Id : 47720321380 Display Question Number : Yes Is Question Mandatory : No

The product of a commercial direct reduction process is:

Options :

1. ✖ Liquid iron

2. ✖ Iron saturated with carbon

3. ✖ Pig iron

4. ✔ Sponge iron

Question Number : 149 Question Id : 47720321381 Display Question Number : Yes Is Question Mandatory : No

Which of the following is not an irregularity in a BF operation?

Options :

1. ✖ Hanging

2. ✖ Breakout

3. ✖ Slipping

4. ✔ Tapping

Question Number : 150 Question Id : 47720321382 Display Question Number : Yes Is Question Mandatory : No

The process which can be used to produce alloy steel:

Options :

1. ✖ L D process

2. ✔ Electric arc process

3. ✖ Open hearth process

4. ✖ Acid Bessemer process

Question Number : 151 Question Id : 47720321383 Display Question Number : Yes Is Question Mandatory : No

The process for direct smelting to produce iron:

Options :

1. ✔ COREX

2. ✖ Vacuum arc degassing

3. ✖ BF process

4. ✖ LD process

Question Number : 152 Question Id : 47720321384 Display Question Number : Yes Is Question Mandatory : No

The reactor mechanism during LD steel making process:

Options :

1. ✖ Fluidized bed reactor

2. ✖ Retort

3. ✔ Pneumatic reactor

4. ✖ Travelling grate reactor

Question Number : 153 Question Id : 47720321385 Display Question Number : Yes Is Question Mandatory : No

The approximate thickness (in mm) of the skin of casting formed at the initial stage continuous casting process is:

Options :

1. ✖ 1 – 5

2. ✔ 10 – 25

3. ✖ 75 – 150

4. ✖ 25 – 75

Question Number : 154 Question Id : 47720321386 Display Question Number : Yes Is Question Mandatory : No

Reasons for casting defects like diagonal cracks and blows:

Options :

1. ✖ Oscillation of mould

2. ✖ High moisture

3. ✔ Mechanical and thermal stress

4. ✖ High heating rate

Question Number : 155 Question Id : 47720321387 Display Question Number : Yes Is Question Mandatory : No

India is the third largest global producer of:

Options :

1. ✖ Copper

2. ✖ Thorium

3. ✔ Aluminium

4. ✖ Zinc

Question Number : 156 Question Id : 47720321388 Display Question Number : Yes Is Question Mandatory : No

The temperature of operation during Pidgeon operation is:

Options :

1. ✖ 800 – 700 °C

2. ✖ 900 – 1000 °C

3. ✖ 1000 – 1100 °C

4. ✔ 1100 – 1200 °C

Question Number : 157 Question Id : 47720321389 Display Question Number : Yes Is Question Mandatory : No

The bauxite deposits in Kashmir is not suitable for Al production, due to:

Options :

1. ✖ Anode effects

2. ✖ High TiO_2 content

3. ✖ Generation of anode slime

4. ✔ Forms red mud

Question Number : 158 Question Id : 47720321390 Display Question Number : Yes Is Question Mandatory : No

The maximum % of dissolution of Al_2O_3 in $3NaF.AlF_3$

Options :

1. ✖ 5

2. ✔ 15

3. ✖ 0.5

4. ✖ 51

Question Number : 159 Question Id : 47720321391 Display Question Number : Yes Is Question Mandatory : No

The admissible % of Cu in a commercial grade ore is:

Options :

1. ✖ 32 – 35

2. ✔ 0.5 – 2

3. ✖ 70 – 75

4. ✖ 55 – 56

Question Number : 160 Question Id : 47720321392 Display Question Number : Yes Is Question Mandatory : No

Identify the correct statement:

Options :

1. ✔ The purpose of roasting Cu sulfide ore is to partially oxidize iron sulfide present in the ore

2. ✖ Cu smelting process takes place in a blast furnace

3. ✖ For high grade copper sulfide ore roasting is also required

4. ✖ The byproduct of Cu extraction process is lead

Question Number : 161 Question Id : 47720321393 Display Question Number : Yes Is Question Mandatory : No

The composition of Fayalite is:

Options :

1. ✖ $Feo.SiO_2$

2. ✔ $2Feo.SiO_2$

3. ✖ $2Feo.2SiO_2$

4. ✖ $Feo.2SiO_2$

Question Number : 162 Question Id : 47720321394 Display Question Number : Yes Is Question Mandatory : No

Imperial smelting BF is used for pyro-metallurgical extraction of:

Options :

1. ✔ Zinc

2. ✖ Cu

3. ✖ Al

4. ✖ Th

Question Number : 163 Question Id : 47720321395 Display Question Number : Yes Is Question Mandatory : No

$TiCl_4(l) + 2Mg(l) \xrightarrow{800\,^{\circ}C} Ti(C) + 2MgCl_2(l)$ is known as

Options :

1. ✖ Hunter's process

2. ✖ Sorel Process

3. ✔ Kroll's process

4. ✖ Bayer's process

Question Number : 164 Question Id : 47720321396 Display Question Number : Yes Is Question Mandatory : No

Monazite is a mineral of :

Options :

1. ✖ Uranium only

2. ✖ Titanium only

3. ✔ Uranium and Thorium

4. ✖ Magnesium

Question Number : 165 Question Id : 47720321397 Display Question Number : Yes Is Question Mandatory : No

Which of the following is true for creep?

Options :

1. ✔ The slope of the strain-time graph increases with temperature and stress

2. ✖ The slope of strain-time graph decreases with stress

3. ✖ The slope of strain-time graph decreases with temperature

4. ✖ The slope of strain-time graph does not depend on temperature or stress

Question Number : 166 Question Id : 47720321398 Display Question Number : Yes Is Question Mandatory : No

Which of the following is responsible for fatigue failure?

Options :

1. ✖ A minimum tensile stress of sufficiently high value

2. ✔ A sufficiently large number of cycles of applied stress

3. ✖ An uniform variation in applied stress

4. ✖ No compression component

Question Number : 167 Question Id : 47720321399 Display Question Number : Yes Is Question Mandatory : No

Which of the hardness tester is the best to obtain bulk hardness of a particulate reinforced metal matrix composite?

Options :

1. ✖ Rockwell hardness tester

2. ✔ Brinell hardness tester

3. ✖ Vickers micro hardness tester

4. ✖ Micro-hardness tester

Question Number : 168 Question Id : 47720321400 Display Question Number : Yes Is Question Mandatory : No

Which one of the following cannot be determined from tensile test data?

Options :

1. ✖ Stiffness

2. ✖ Ductility

3. ✖ Toughness

4. ✔ Malleability

Question Number : 169 Question Id : 47720321401 Display Question Number : Yes Is Question Mandatory : No

In Izod test, the specimen is kept as

Options :

1. ✖ Simply supported beam

2. ✖ Overhanging beam

3. ✔

Cantilever beam

4. ✖ Fixed ended beam

Question Number : 170 Question Id : 47720321402 Display Question Number : Yes Is Question Mandatory : No

What principle defines eddy current inspection (ECI)

Options :

1. ✖ Lenz law

2. ✖ Faraday's law

3. ✖ Biot-Savart law

4. ✔ Electromagnetic induction principle

Question Number : 171 Question Id : 47720321403 Display Question Number : Yes Is Question Mandatory : No

In radiography test, which of the following samples can be tested?

Options :

1. ✖ Metal billets

2. ✖ Metallic foams

3. ✔ Metal sheets

4. ✖

Question Number : 172 Question Id : 47720321404 Display Question Number : Yes Is Question Mandatory : No

What is the drawback of ultrasonic testing?

Options :

1. ✖ Low depth

2. ✖ Shape restriction

3. ✖ Higher errors

4. ✔ High sensitivity

Question Number : 173 Question Id : 47720321405 Display Question Number : Yes Is Question Mandatory : No

Which one is not an example of interstitial impurity?

Options :

1. ✖ N in Fe

2. ✖ H in Pd

3. ✔ Cu in Al

4. ✖ C in Fe

Question Number : 174 Question Id : 47720321406 Display Question Number : Yes Is Question Mandatory : No

What term is used for the defect produced by array of dislocations that produces a small difference in orientation between the adjoining lattice?

Options :

1. ✖ Free surface

2. ✖ Twist boundary

3. ✖ Tilt boundary

4. ✔ Low angle grain boundary

Question Number : 175 Question Id : 47720321407 Display Question Number : Yes Is Question Mandatory : No

During cold deformation, work hardening occurs because of

Options :

1. ✖ Slip plane decreases

2. ✔ Dislocation interaction

3. ✖ Dislocation solute interaction

4. ✖ Dislocation movement

Question Number : 176 Question Id : 47720321408 Display Question Number : Yes Is Question Mandatory : No

Which one of the following does not introduce imperfection in metals?

Options :

1. ✖ Deformation

2. ✔ Annealing

3. ✖ Quenching

4. ✖ Alloying

Question Number : 177 Question Id : 47720321409 Display Question Number : Yes Is Question Mandatory : No

Which one of the following defects is not beneficial in thermo-mechanical treatment?

Options :

1. ✖ Segregation

2. ✖ Vacancy

3. ✖ Edge dislocation

4. ✔ Porosity

Question Number : 178 Question Id : 47720321410 Display Question Number : Yes Is Question Mandatory : No

A Burgers vector represents the extent of

Options :

1. ✔

Slip

2. ✖ Elastic deformation

3. ✖ Hardness

4. ✖ Twinning

Question Number : 179 Question Id : 47720321411 Display Question Number : Yes Is Question Mandatory : No

Alligatoring defect occurs during

Options :

1. ✖ Extrusion of hot billet

2. ✖ Wire drawing of soft rods

3. ✔ Rolling of unhomogenized slab

4. ✖ Forging of dissimilar metals

Question Number : 180 Question Id : 47720321412 Display Question Number : Yes Is Question Mandatory : No

Formation of metal powder to use in powder metallurgy by reducing some compound with CO or other molecules is known as?

Options :

1. ✖ Atomization

2. ✖ Crushing

3. ✔ Reduction

4. ✖ Electrolysis

Question Number : 181 Question Id : 47720321413 Display Question Number : Yes Is Question Mandatory : No

Sintering is done to _____

Options :

1. ✔ Increase final strength

2. ✖ initially increase and then to decrease the strength

3. ✖ Decrease final strength

4. ✖ initially decrease and then to increase the strength

Question Number : 182 Question Id : 47720321414 Display Question Number : Yes Is Question Mandatory : No

The process of infiltration in sintered products is to improve

Options :

1. ✔ Porosity

2. ✖ Surface finish

3. ✖

Dimensional accuracy

4. ✖ Coherent property

Question Number : 183 Question Id : 47720321415 Display Question Number : Yes Is Question Mandatory : No

Which of the following pattern allowances are dependent of each other?

Options :

1. ✖ Shrinkage and Machine finish allowance

2. ✖ Distortion and shaking allowance

3. ✖ Pattern allowance and shrinkage draft

4. ✔ Shaking allowance and pattern draft

Question Number : 184 Question Id : 47720321416 Display Question Number : Yes Is Question Mandatory : No

During heat treatment of aircraft component, swelling was observed. Which of the following cast defect is responsible for such behavior?

Options :

1. ✔ Blowholes

2. ✖ Shrinkage

3. ✖ Cracks

4. ✖ Segregation

Question Number : 185 Question Id : 47720321417 Display Question Number : Yes Is Question Mandatory : No

Which of the following metals cannot be casted by ceramic mould casting?

Options :

1. ✖ Aluminium

2. ✖ Tin

3. ✔ Magnesium

4. ✖ Steel

Question Number : 186 Question Id : 47720321418 Display Question Number : Yes Is Question Mandatory : No

A solid aluminium disc of one-meter diameter has to be casted. According to you which one of the following casting processes is most suitable?

Options :

1. ✖ Centrifuging casting

2. ✔ Semi Centrifugal Casting

3. ✖ True Centrifugal Casting

4. ✖ High pressure Die Casting

Question Number : 187 Question Id : 47720321419 Display Question Number : Yes Is Question Mandatory : No

Which one of the following moulding machines can be used to form mould of very complex shaped pattern?

Options :

1. ✖ Jolt Machine

2. ✖ Contoured squeeze

3. ✔ Diaphragm squeeze

4. ✖ Slingers

Question Number : 188 Question Id : 47720321420 Display Question Number : Yes Is Question Mandatory : No

Which of the following moulding properties is essential to eliminate blowholes?

Options :

1. ✖ Hot strength

2. ✔ Permeability

3. ✖ Surface finish

4. ✖ Degassing

Question Number : 189 Question Id : 47720321421 Display Question Number : Yes Is Question

Mandatory : No

Collapsibility is required to break

Options :

1. ✖ The pattern to create mould cavity

2. ✖ The mould to take the pattern out

3. ✔ The mould to take the casting out

4. ✖ The mould and pattern

Question Number : 190 Question Id : 47720321422 Display Question Number : Yes Is Question Mandatory : No

Which one of the following works as riser?

Options :

1. ✔ Hot top

2. ✖ Sleeves

3. ✖ Ingates

4. ✖ Runners

Question Number : 191 Question Id : 47720321423 Display Question Number : Yes Is Question Mandatory : No

Chock is used in gating system to

Options :

1. ✔ Control pressure of the melt

2. ✖ Distribute melt to mould cavity

3. ✖ Remove impurities in the melt

4. ✖ Pour melt into sprue

Question Number : 192 Question Id : 47720321424 Display Question Number : Yes Is Question Mandatory : No

In welding arc, heat generation is

Options :

1. ✖ Equal everywhere

2. ✖ At cathode

3. ✔ Maximum at anode

4. ✖ At mid-arc

Question Number : 193 Question Id : 47720321425 Display Question Number : Yes Is Question Mandatory : No

Which is not a welding defect?

Options :

1. ✖ Under act

2. ✖ Overlap

3. ✖ Spatter

4. ✔ Precipitation

Question Number : 194 Question Id : 47720321426 Display Question Number : Yes Is Question Mandatory : No

Which is not a solid state welding process?

Options :

1. ✖ Ultrasonic welding

2. ✔ Electron beam welding

3. ✖ Explosive welding

4. ✖ Friction welding

Question Number : 195 Question Id : 47720321427 Display Question Number : Yes Is Question Mandatory : No

Main advantage of gas welding process is that it

Options :

1. ✖ Provide high rate of heat input

2. ✔ Is cheap

3. ✖ Gives very strong joint in thicker materials

4. ✖ Provides narrow HAZ

Question Number : 196 Question Id : 47720321428 Display Question Number : Yes Is Question Mandatory : No

Which one is the most weldable among the following metals ?

Options :

1. ✖ Tool steel

2. ✔ Low carbon steel

3. ✖ Stainless steel

4. ✖ Aluminium

Question Number : 197 Question Id : 47720321429 Display Question Number : Yes Is Question Mandatory : No

What type of electrode is not used in TIG welding?

Options :

1. ✔ Al-W alloy

2. ✖ Thoriated W

3. ✖ W

4. ✖ Ceriated W

Question Number : 198 Question Id : 47720321430 Display Question Number : Yes Is Question Mandatory : No

Oxy-acetylene welding mostly employs _____ flame

Options :

1. ✖ Oxidizing

2. ✖ Reducing

3. ✔ Neutral

4. ✖ Carburizing

Question Number : 199 Question Id : 47720321431 Display Question Number : Yes Is Question Mandatory : No

Among the following welding techniques which is mostly used in automatic set up

Options :

1. ✖ Gas welding

2. ✖ TIG

3. ✖ Thermit

4. ✔ MIG

Question Number : 200 Question Id : 47720321432 Display Question Number : Yes Is Question Mandatory : No

Thermit welding is a form of _____ welding

Options :

1. ✖ Arc

2. ✔ Thermochemical

3. ✖ Gas

4. ✖ Resistance