ESE 2026
Prelims Solutions

General Studies & Engineering Aptitude

SET-D

Exam held on 08-02-2026

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General Studies & Engg. Aptitude

Paper Analysis of ESE 2026 Preliminary Examination

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UPSC ESE Prelims 2026 : Paper I

General Studies & Engg. Aptitude

Solutions *by* MADE EASY faculties

1. What is the missing (?) value ?

		7	4	1		
	8	1	7	2	3	
1	4	3	8	5	2	1
	2	1	4	1	4	
		7	?	3		

(a) 6 (b) 4
(c) 5 (d) 2

Ans. **(c)**

$$\frac{7+1}{2} = 4$$

$$\frac{(8+1)+(2+3)}{2} = 7$$

$$\frac{(1+4+3)+(5+2+1)}{2} = 8$$

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

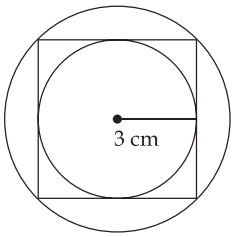
$$\frac{7+3}{2} = 5$$

End of Solution

2. Consider a square of side 6 cm, a circle is inscribed inside the square. Another circle circumscribes the square. The ratio of the areas of the inscribed circle to the circumscribed circle is

(a) $1:\frac{\pi}{4}$ (b) $1 : \pi$
(c) 1 : 15 (d) 1 : 2

Ans. **(d)**



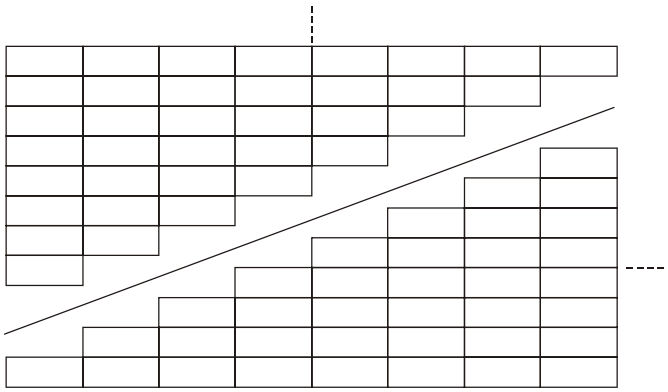
radius of inscribed circle = 3 cm

radius of circumscribed circle = $\frac{6\sqrt{2}}{2} = 3\sqrt{2}$

Ratio of areas of the inscribed circle to the circumscribed circle = $\frac{1}{(\sqrt{2})^2} = \frac{1}{2}$

End of Solution

3. What does this diagram demonstrate?



(a) $1^2 + 2^2 + 3^2 + \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$

(b) $1 + 2 + 3 + \ldots + n = \frac{n(n+1)}{2}$

(c) $2^2 + 4^2 + 6^2 + \ldots + (2n^2) = \frac{2n(n+1)(2n+1)}{3}$

(d) None of the above

Ans. **(b)**

The diagram shows two identical staircase shapes with blocks increasing as 1, 2, 3, ... n when combined, thery form a rectangle with area $n(n + 1)$. Therefore, the sum of the first n natural numeber is $\frac{n(n+1)}{2}$.

There is some ambiguity in this question option (a) or option (b) may also be possible.

End of Solution

4. What is the missing (?) letter?

A	EGK	C
?		P
U		R
Q		V
B	OJF	D

(a) H (b) Z
(c) L (d) Y

Ans. **(b)**

$$\frac{E+K}{2}-1=G$$

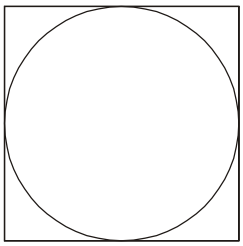
$$\frac{O+F}{2}-0.5=J$$

$$\frac{P+V}{2}-1=R$$

$$\frac{Z+Q}{2}-0.5=U$$

End of Solution

5. Following figure represents a circle inside a square. What does the diagram establish?



(a) $\pi < 4$ (b) $\pi > 3$
(c) $\pi > 2$ (d) $\pi \geq 2\sqrt{2}$

Ans. **(a)**

$$(2r)^2 > \pi r^2$$
$$4r^2 > \pi r^2$$
$$4 > \pi$$

End of Solution

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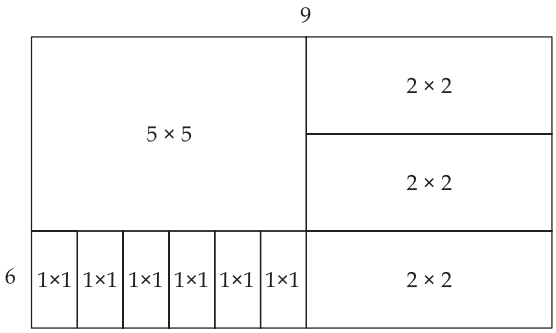
6. A rectangular area of side 9 and 6 units is to be covered by square tiles of sides 1, 2 and 5 units. The minimum number of tiles needed for this is

(a) 13 (b) 11
(c) 12 (d) 15

Ans. (c)

One 5 × 5, six 2 × 2
and five 1 × 1 required

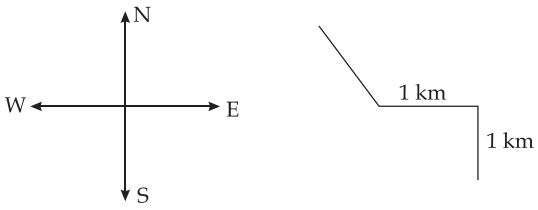


End of Solution

7. Nandini walks a distance of 1 km towards North. She then turns left and walks 1 km. Finally she turns right at an angle of 45° and starts walking. In which direction she is moving finally ?

(a) South-West (b) North-West
(c) North-East (d) South-East

Ans. (b)



End of Solution

8. Read the following information and answer the question that follows:

1. Six scientists A, B, C, D, E and F of the disciplines, Chemistry, Botany, Zoology, Physics, Mathematics and Geology but not necessarily in this order, want to demonstrate an integrated experiment based on inter-disciplinary approach.
2. Each day only one scientist will perform the part of his discipline.
3. The experiment will start on Monday and end on Sunday. One day will be the rest day, which otherwise is a part of the experiment.
4. Chemistry will be on the very next day of Geology.
5. A, who is a Mathematician, can perform either on a second day or the last day but should not be immediately preceded by Botany.

6. C will demonstrate on the third day and Physics will be on the fifth day.
7. E, who is a Zoologist, performs on the second day.
8. B performs on Monday and the day after F's performance will be the rest day.

Which one of the following is the correct sequence of scientists performing?

(a) DBCAFE (b) BEDCFA
(c) BECDFA (d) CBEFDA

Ans. (c)

Mon	B
Tue	E
Wed	C
Thu	D
Fri	F
Sat	Rest
Sun	A

End of Solution

9. The following question is based on the alphabet series:

ABCDEFGHIJKLMNOPQRSTUVWXYZ

If every alternate letter starting from B of the given alphabet is written in small letters, rest all are written in capital letters, how will the month of September' be written ?

(a) SEpteMbeR (b) SEptEMbEr
(c) SEptembER (d) sePTemBeR

Ans. (b)

A b C d E f G h I j K l M n O P Q r S t U v W x Y z

End of Solution

10. The question below has some statement / argument / report / passage, followed by a few alternative answer choices marked A, B, C and D, of which only one would be the best possible answer. Read the passage/ statement / argument carefully and choose the best possible answer from the alternatives given.

In an examination system of an institution, 100 students have been graded (from A-D in descending order) on the basis of the marks they received in the three terminal examinations, in which the pass-marks were 50%. Examiners arc instructed to follow the following criteria :

1. All students who scored between 90% and 100% in any two examinations could receive an A.
2. Students who came in the top overall were to be awarded an A.
3. Notwithstanding I and II, if any student failed a paper, the highest he or she could get was a B.
4. The top 20 students in the whole year, when the overall examination percentages were averaged, could receive an A.

On the basis of above criteria, which of the following would definitely not be permissible?
(a) Bikash, who got 95% in Chemistry and 92% in Biology, received a B
(b) Suparna, who stood first in Physics and got 96% in Mathematics, received a B
(c) Amitava failed in English, but because he ranked 9th overall out of 100 students was awarded an A grade
(d) Bandana was given an A because she came 20th though she had failed to get above 90% in any of the three examinations

Ans. (c)

End of Solution

11. What is the expectation of the number of failures preceding the first success in an infinite series of independent trials with constant probability p of success in each trial?

(a) $\frac{q}{p^2}$ (b) $\frac{q}{p}$

(c) $\frac{q}{1+p}$ (d) $\frac{1}{1-q}$

Ans. (b)

x = no. of failure, before first success
p = probability of success
q = probability of failure
$p, (1-p)p, (1-p)^2 p, (1-p)^3 p, \ldots\ldots$
$p(x = r) = (1-p)^r p \qquad r = 0, 1, 2, 3, \ldots\ldots$

$$E(x) = \sum x p(x)$$

$$= \sum_{r=0}^{\infty} r.(1-p)^r p$$

$$= \sum_{r=0}^{\infty} r.q^r p$$

$$= p\sum_{r=0}^{\infty} r q^r$$

$$= p[q + 2q^2 + 3q^3 + \ldots\ldots]$$
$$= pq[1 + 2q + 3q^2 + 4q^3 + \ldots\ldots]$$
$$= pq(1-q)^{-2}$$

$$= \frac{p-q}{(1-q)^2} = \frac{pq}{(1-q)^2} = \frac{pq}{p^2} = \frac{q}{p}$$

End of Solution

12. A deck of n numbered cards is thoroughly shuffled and the cards are inserted into n numbered cells one by one. If the card number i falls in the cell i, we count it as a match, otherwise not, then what is the variance of total number of such matches ?

(a) 1 (b) 0

(c) $\frac{1}{2}$ (d) $\frac{3}{4}$

Ans. **(a)**

Let x be the total number of matches

For each card i, define

$$x_i = \begin{cases} 1, & \text{If card } i \text{ is placed in cell } i \\ 0 & \text{Otherwise} \end{cases}$$

Then, $x = x_1 + x_2 + \ldots\ldots\ldots x_n$

Expectation: probability that a card matches its cell = $\frac{1}{n}$

$$E(x_i) = \frac{1}{n}$$

$$E(x) = n \times \frac{1}{n} = 1$$

Variance:

$$\text{Var}(x_i) = \frac{1}{n}\left(1 - \frac{1}{n}\right) = \frac{n-1}{n^2}$$

For $i \neq j$

$$\text{cov}\ (x_i, x_j) = \frac{1}{n(n-1)} - \frac{1}{n^2}$$

Now, $\text{Var}(x) = \Sigma\text{Var}(x_i) + 2\ \Sigma\text{cov}(x_i, x_j)$

$$\text{Var}(x) = \frac{n(n-1)}{n^2} + \frac{2n(n-1)}{2}\left(\frac{1}{n(n-1)} - \frac{1}{n^2}\right)$$

$$\text{Var}(x) = \frac{n-1}{n} + \frac{1}{n} = 1$$

End of Solution

13. Let X_1 and X_2 be two independent random variables having variances k and 4 respectively. If the variance of $Y = 3X_2 - X_1$ is 49, then what is the value of k?

(a) 7 (b) 13

(c) 9 (d) 11

Ans. (b)

$$\begin{aligned}\text{Var}(x_1) &= k\\ \text{Var}(x_2) &= 4\\ \text{Var}(y) &= 3x_2 - x_1 \text{ is } 49\\ \text{Var}(x) &= \text{var}[(3x_2) - x_1)]\\ &= (3^2)\,\text{Var}(x_2) + (-1)^2\,\text{Var}\,(x_1)\\ 49 &= 9 \times 4 + 1 \times k\\ 49 &= 36 + k\\ k &= 13\end{aligned}$$

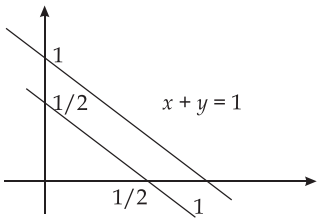
End of Solution

14. What is the value of $P\left(X+Y<\frac{1}{2}\right)$ for the joint probability density function of X and Y $f(x, y) = 3(x + y);\ 0 \le x \le 1,\ 0 \le y \le 1;\ 0 \le x + y \le 1$?

(a) $\frac{1}{16}$ (b) $\frac{1}{8}$

(c) $\frac{1}{12}$ (d) $\frac{1}{7}$

Ans. (b)



$$P(E) = \iint_R f_{xy}(x,y)\,dy\,dx$$

$$= \int_0^{1/2}\int_0^{1/2} 3(x+y)\,dy\,dx = \frac{1}{8}$$

End of Solution

15. What is the value of $\int_0^6 \frac{1}{1+3x+x^2}dx$ by applying Simpson's 3/8th rule by taking $h = 1$?

(a) 0.8145 (b) 0.0295
(c) 0.5215 (d) 0.6315

Ans. (a)

$$\int_0^6 \frac{1}{1+3x+x^2}dx$$

x	0	1	2	3	4	5	6
$f(x)$	1	$\frac{1}{5}$	$\frac{1}{11}$	$\frac{1}{19}$	$\frac{1}{29}$	$\frac{1}{41}$	$\frac{1}{55}$
	y_0	y_1	y_2	y_3	y_4	y_5	y_6

By Simpson's 3/8 rule

$$\int_0^6 f(x)dx = \frac{3h}{8}[(y_0+y_6)+3(y_1+y_2+y_4+y_5)+2(y_3)]$$

$$= \frac{3\times 1}{8}\left[\left(1+\frac{1}{55}\right)+3\left(\frac{1}{5}+\frac{1}{11}+\frac{1}{29}+\frac{1}{41}\right)+2\left(\frac{1}{19}\right)\right]$$

$$= \frac{3}{8}[1.0181+1.049+0.1052] = 0.81464$$

End of Solution

16. If y_x is a polynomial for which fifth difference is constant and $y_1 + y_7 = -496$, $y_2 + y_6 = 334$, $y_3 + y_5 = 962$, then what is the value of y_4?

(a) 571.25 (b) 536.75
(c) 596.50 (d) 597.25

Ans. (c)

y_x polynomial of whose fifth difference is constant.

Symmetric number $\Rightarrow$ is given

$$S_k = y_k + y_{8-k}$$
$$S_1 = y_1 + y_7 = -496 = a$$
$$S_2 = y_2 + y_6 = 334 = 1$$
$$S_3 = y_3 + y_5 = 962 = c$$

$$S_4 = 2y_4$$

$S_1 = a$	$b - a$	$c - 2b + a$	$d - 3c + 3b - a$	$7c - 4d - 4b + a$
$S_2 = b$	$c - b$	$d - 2c + b$	$4c - 3d - b$	$2b - 8c + 6d$
$S_3 = c$	$d - c$	$2c - 2d$	$b - 4c + 3d$	$a - 4b - 7c - 4d$
$S_4 = d$	$c - d$	$b - 2c + d$	$a - 3b + 3c - d$	
$S_5 = c$	$b - c$	$a - 2b + c$		
$S_6 = b$	$a - b$			
$S_7 = a$				

$$\Delta_1^4 = \Delta_2^4$$
$$7c - 4d - 4b + a = 2b - 8c + 6d$$
$$a = -496$$
$$b = 334$$
$$c = 962$$
$$10d = a - 6b - 15c$$
$$d = 1193$$
$$y_4 = \frac{1193}{2} = 596.5$$

End of Solution

17. An unbiased coin is thrown n times. It is desired that the relative frequency of the appearance of heads should lie between 0.49 and 0.51. What is the smallest approximate value of n that will ensure this result with 90% confidence (z = 1.645)?

(a) 5648 (b) 6765
(c) 4989 (d) 8785

Ans. **(b)**

$$P = \frac{1}{2},\ Q = \frac{1}{2}$$

$$\mu \pm Z_{\alpha/2}\sqrt{\frac{PQ}{n}}$$

$$\mu - Z_{\alpha/2}\sqrt{\frac{PQ}{n}} = 0.49$$

$$\mu + Z_{\alpha/2}\sqrt{\frac{PQ}{n}} = 0.51$$

$$\mu = 0.5$$

$$z_{\alpha/2}\sqrt{\frac{PQ}{n}} = 0.01$$

$$n = 6765$$

End of Solution

18. The value of integral $\int_0^{\sqrt{2}} \int_{-\sqrt{4-2y^2}}^{\sqrt{4-2y^2}} y\,dx\,dy$ is

(a) $\frac{3}{8}$ (b) $\frac{8}{3}$

(c) $\frac{5}{8}$ (d) $\frac{8}{5}$

Ans. (b)

$$\int_{y=0}^{y=\sqrt{2}} \int_{x=-\sqrt{4-2y^2}}^{x=\sqrt{4-2y^2}} y\,dx\,dy$$

$$= \int_{y=0}^{y=\sqrt{2}} y[x]_{-\sqrt{4-2y^2}}^{\sqrt{4-2y^2}}\,dy$$

$$= \int_0^{\sqrt{2}} y \times 2\sqrt{4-2y^2}\,dy$$

$4 - 2y^2 = t^2$
$-4ydy = 2tdt$
$-2ydy = tdt$
$y = 0 \Rightarrow t = 2$
$y = \sqrt{2} \Rightarrow t = 0$

$$= \int_0^2 t.tdt = \int_0^2 t^2 dt = \left[\frac{t^3}{3}\right]_0^2 = \frac{8}{3}$$

End of Solution

19. What is the value of $\int_{0}^{a}\int_{\frac{y^2}{a}}^{y} \frac{y}{(a-x)\sqrt{ax-y^2}}\,dx\,dy$ by changing the order of integration?

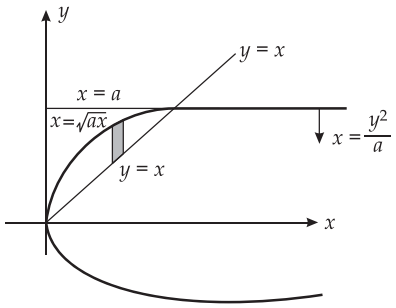
(a) $\frac{3\pi a}{2}$ (b) $\frac{5\pi a}{4}$

(c) $\frac{\pi a}{2}$ (d) $\frac{\pi a}{4}$

Ans. (c)

$$\int_{0}^{a}\int_{\frac{y^2}{a}}^{y} \frac{y}{(a-x)\sqrt{ax-y^2}}\,dx\,dy$$

$$\int_{y=0}^{y=a}\int_{x=\frac{y^2}{a}}^{x=y} \frac{y}{(a-x)\sqrt{ax-y^2}}\,dx\,dy$$



$y = 0$
$y = a$
$x = y$
$x = \frac{y^2}{a}$
} Plot in single graph

Changing order of integration

$$\int_{x=0}^{x=a}\int_{y=x}^{y=\sqrt{ax}} \frac{y}{(a-x)\sqrt{ax-y^2}}\,dy\,dx$$

$$= \int_{x=0}^{x=a}\int_{y=x}^{y=\sqrt{ax}} \frac{y}{ax-y^2}\,dy\,\frac{1}{(a-x)}\,dx$$

$ax - y^2 = t^2$ (Taking x as contant)

$-2ydy = 2tdt$

$ydy = -tdt$

$y = x$

$\Rightarrow \quad t = \sqrt{ax-x^2}$

$y = \sqrt{ax}$

$\Rightarrow \quad t = 0$

$$\int_{x=0}^{x=a}\int_{t=\sqrt{ax-x^2}}^{t=0} \frac{-t\,dt}{t}\,\frac{1}{a-x}\,dx$$

$$\int_{x=0}^{x=a} + \frac{\sqrt{ax - x^2}}{a - x} dx$$

$$= \int_{x=0}^{a} \frac{\sqrt{x(a-x)}}{a-x} dx$$

$x = a \sin^2 \theta$ $\qquad$ $x = 0 \Rightarrow \theta = 0$

$dx = 2a \sin\theta \cdot \cos\theta \, d\theta$ $\qquad$ $x = a \Rightarrow \theta = \frac{\pi}{2}$

$$= \int_0^{\pi/2} \frac{\sqrt{a\sin^2\theta}}{a - a\sin^2\theta} . 2a.\sin\theta.\cos\theta d\theta = \int_0^{\pi/2} \tan\theta . 2a.\sin\theta.\cos\theta d\theta$$

$$= \int_0^{\pi/2} 2a.\sin^2\theta.d\theta = 2a.\frac{1}{2} \times \frac{\pi}{2} = \frac{\pi a}{2}$$

End of Solution

20. What is the value of $\int_0^a \int_0^{\sqrt{a^2-y^2}} y^2 \sqrt{x^2 + y^2} \, dy \, dx$ by changing into polar coordinates?

(a) $\frac{\pi a^3}{20}$ $\qquad$ (b) $\frac{3\pi a^5}{20}$

(c) $\frac{3\pi a^3}{20}$ $\qquad$ (d) $\frac{\pi a^5}{20}$

Ans. (d)

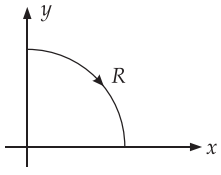
$$\int_{y=0}^{y=a} \int_{x=0}^{x=\sqrt{a^2-y^2}} y^2 \sqrt{x^2 + y^2} \, dy \, dx$$

$x = r \cos\theta$ $\qquad$ $y = r \sin\theta$

$$\tau\left(\frac{x,y}{r,\theta}\right) = r$$

$0 < x < \sqrt{a^2 + y^2}$
$0 << y < a$

Circle in 1st quadrant i.e.



$$\Rightarrow \int_{\theta=0}^{\theta=\pi/2} \int_{r=0}^{r=a} (r\sin\theta)^2 \sqrt{r^2} \, r \, dr d\theta$$

$$= \int_0^{\pi/2}\int_{r=0}^{r=a} r^2.\sin^2\theta.r.r\,dr d\theta$$

$$= \int_0^{\pi/2}\int_{r=0}^{r=a} r^4.\sin^2\theta\,d\theta$$

$$= \left[\frac{r^5}{5}\right]_0^a \frac{1}{2}\times\frac{\pi}{2} = \frac{a^5}{5}\times\frac{\pi}{4} = \frac{\pi a^5}{20}$$

End of Solution

21. A statement is given followed by three courses of action numbered 1, 2 and 3. Analyze the statement and decide which of the three courses of action logically follows and answer according to the alternative answers given along with the question.
Statement: The army has been alerted in the district following floods triggered by incessant rains.
Courses of action:
1. Relief to flood affected people should be arranged.
2. Supply of food articles should be arranged.
3. Adequate medical facilities should be arranged.

(a) Only 1 follows (b) Only 2 follows
(c) Only 1 and 3 follow (d) All follow

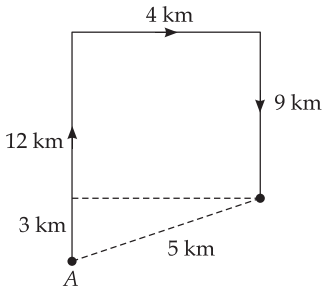
Ans. (d)

End of Solution

22. Ramesh starts walking from point 'A'. He walks 12 km towards North from there he turns right and walks 4 km, then he again turns right and walks 9 km. How far and which direction is he from his starting point?

(a) 13 km East (b) 13 km South
(c) 5 km North (d) 5 km North-East

Ans. (d)



5 km North-East

End of Solution

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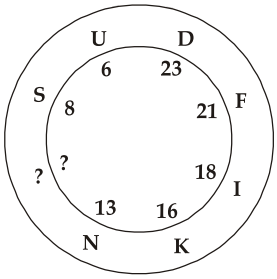
23. Indicate what will be the letter/ numerical in the missing portion:



(a) R/9 (b) P/11
(c) Q/13 (d) P/16

Ans. **(b)**

$6 + 2 = 8$ $D + 2 = F$
$8 + 3 = 11$ $F + 3 = I$
$11 + 2 = 13$ $I + 2 = K$
$13 + 3 = 16$ $K + 3 = N$
$16 + 2 = 18$ $N + 2 = P$
$18 + 3 = 21$
$21 + 2 = 23$

End of Solution

24. The question below you will find, instead of two pairs of words with more or less similar relationships between the first two words and the last two words, only first and fourth words are given and the second and the third words are replaced by numbers 1 and 2, for each of which four alternatives marked *E*, *F*, *G*, *H* and *P*, *Q*, *R*, *S*, respectively. Study the alternatives carefully and choose the best answer.
Onomatology : 1 : : 2 : Language
1. (E) Names (F) Races (G) Reality (H) Insects
2. (P) Occultism (Q) Semantics (R) Conchology (S) Ontology
(a) FS (b) EQ
(c) GP (d) HR

Ans. **(b)**

End of Solution

25. A solid figure is given followed by a problem. Each surface of the solid figure (marked with 1, 2, 3, 4, 5, 6, etc.) corresponds to certain specific surface of the given problem. Your task will be to find out how it corresponds.

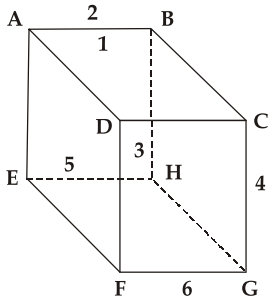


Figure 1

1 refers to the surface A B H E
2 refers to the surface A B C D
3 refers to the surface C D F G
4 refers to the surface B C G H
5 refers to the surface A D F E
6 refers to the surface E F G H

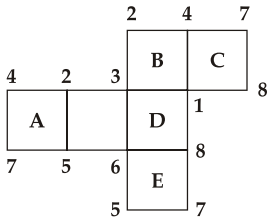


Figure 2

If surfaces *B* and *D* in figure-1 correspond to surfaces 1 and 3 respectively in key figure 2, then the points marked as 5 in figure 1 correspond to which point in the key figure-2?

(a) E (b) F
(c) G (d) D

Ans. (*)

End of Solution

26. What is the name of the national digital framework launched at India Maritime Week 2025 to make Indian ports data-driven and AI-enabled?

(a) SmartPort Bharat (b) Sagarmitra
(c) Digi Bandar (d) PortNet India

Ans. (c)

Launched during India Maritime Week 2025, "Digi Bandar" is a national digital framework designed to transform Indian ports into data-driven hubs. It integrates AI and IoT to streamline logistics, reduce turnaround times, and align with the "Maritime Amrit Kaal Vision 2047."

End of Solution

27. According to the Reserve Bank of India's report, which two countries together accounted for over one-third of the total FDI in India?

(a) United States and Singapore
(b) Mauritius and United Kingdom
(c) Singapore and Netherlands
(d) Japan and Germany

Ans. (a)

According to the RBI's Foreign Liabilities and Assets (FLA) Census 2024-25, the USA (20%) and Singapore (14.3%) remain the top contributors, together accounting for over one-third of India's total Foreign Direct Investment (FDI) stock.

End of Solution

28. Which organization is responsible for implementing the National Beekeeping & Honey Mission (NBHM)?

(a) National Horticulture Board (NHB)
(b) National Bee Board (NBB)
(c) National Cooperative Development Corporation (NCDC)
(d) Agricultural and Processed Food Products Export Development Authority (APEDA)

Ans. (b)

The National Bee Board (NBB) is the nodal agency for this Central Sector Scheme. Part of the "Sweet Revolution," the mission focuses on scientific beekeeping to increase farmer income and crop productivity through pollination.

End of Solution

29. Laokhowa Wildlife Sanctuary is located in which state?

(a) Sikkim
(b) Arunachal Pradesh
(c) Assam
(d) Manipur

Ans. (c)

Located on the southern bank of the Brahmaputra River in the Nagaon district of Assam, this sanctuary is an integral part of the Laokhowa-Burachapori ecosystem. It acts as a vital corridor for rhinos and tigers moving between Kaziranga and Orang National Parks.

End of Solution

30. Which state is home to India's first Silicon Carbide (SiC) semiconductor manufacturing plant?

(a) Odisha
(b) Jharkhand
(c) Bihar
(d) Haryana

Ans. (a)

India's first Silicon Carbide (SiC) manufacturing facility is being set up in Bhubaneswar, Odisha.

End of Solution

31. Who suggested pre-conventional, conventional and post conventional levels of moral development?

(a) Kohlberg
(b) A. I. Melden
(c) John Locke
(d) Gilligan

Ans. (a)

Lawrence Kohlberg expanded on Piaget's work to identify three levels of moral reasoning: Pre-conventional (obedience/punishment), Conventional (social order), and Post-conventional (universal ethics).

End of Solution

32. Which one of the following inquiries seeks to identify and justify the morally-desirable norms or standards that should guide individuals and group?

(a) Normative inquiry
(b) Conceptual inquiry
(c) Factual inquiry
(d) Descriptive inquiry

Ans. (a)

Normative inquiry (or Normative Ethics) is the study of ethical action. It investigates the set of questions that arise when considering how one ought to act, morally speaking, and seeks to justify the standards for right and wrong.

End of Solution

33. Duty ethics theory was proposed by

(a) John Stuart Mill
(b) Richard Brandt
(c) Jeremy Bentham
(d) Immanuel Kant

Ans. (d)

Immanuel Kant is the primary proponent of Deontology (Duty Ethics). He argued that the morality of an action should be based on whether that action itself is right or wrong under a series of rules (the Categorical Imperative), rather than based on the consequences.

End of Solution

34. Who framed the ethical code for builders in 1758?

(a) A. I. Melden
(b) Aristotle
(c) C. W. D. Ross
(d) Hammurabi

Ans. (d)

End of Solution

35. Cost-benefit analysis is an application of

(a) Duty ethics
(b) Utilitarianism
(c) Human ethics
(d) Virtue ethics

Ans. (b)

Utilitarianism advocates for "the greatest good for the greatest number." Cost-benefit analysis is a practical application of this, as it weighs the total positive outcomes against the total negative outcomes of a decision.

End of Solution

36. Consider the following statements regarding cancellation laws:
Let A, B, C be $n \times n$ matrices, then
1. if rank $A = n$ and $AB = AC$, then $B = C$.
2. if rank $A = n$, then $AB = 0$ implies $B = 0$. Hence if $AB = 0$, but $A \neq 0$ as well as $B \neq 0$, then rank $A < n$ and rank $B < n$.

Which of the above statements is/are correct?

(a) 1 only
(b) Both 1 and 2
(c) 2 only
(d) Neither 1 nor 2

Ans. (b)

End of Solution

37. Match the following lists:

List-I		List-II
P.	$\sin^2\theta \cot\theta \sec\theta$	1. $\cot\theta$
Q.	$\dfrac{\tan\theta+\sec\theta}{\sec\theta\left(1+\dfrac{\tan\theta}{\sec\theta}\right)}$	2. $\sec\theta - \tan\theta$
R.	$\dfrac{1+\cot\theta}{1+\tan\theta}$	3. $\sin\theta$
S.	$\sqrt{\dfrac{1-\sin\theta}{1+\sin\theta}}$	4. 1

Select the correct answer using the code given below:

	P	Q	R	S
(a)	3	1	4	2
(b)	1	3	2	4
(c)	3	4	1	2
(d)	4	3	2	1

Ans. (c)

End of Solution

38. The solution of differential equation $y' = \frac{xy^2 - \cos x \sin x}{y(1-x^2)}, y(0) = 2$ is

(a) $y^2 (1 + x^2) - \cos^2 x = 3$ (b) $y^2 (1 - x^2) + \cos^2 x = 5$
(c) $y^2 (1 - x^2) + \cos^2 x = 7$ (d) $y^2 (1 - x^2) - \cos^2 x = 3$

Ans. (d)

$$y' = \frac{xy^2 - \cos x \sin x}{y(1-x^2)}, y(0) = 2 \qquad y(0) = 2 \text{ is,}$$

$$\frac{dy}{dx} = \frac{xy^2}{y(1-x^2)} - \frac{\cos x \sin x}{y(1-x^2)}$$

$$\frac{dy}{dx} - \frac{x}{(1-x^2)} y = \frac{\cos x \sin x}{(1-x^2)y}$$

$$y\frac{dy}{dx} - \frac{x}{(1-x^2)} y^2 = -\frac{\cos x \sin x}{(1-x^2)}$$

$$y^2 = v$$

$$2y\frac{dy}{dx} = \frac{dv}{dx}$$

$$y\frac{dy}{dx} = \frac{1}{2}\frac{dv}{dx}$$

$$\frac{1}{2}\frac{dv}{dx} - \frac{x}{(1-x^2)} v = -\frac{\cos x \sin x}{(1-x^2)}$$

$$\frac{dv}{dx} - \left(\frac{2x}{1-x^2}\right) v = -\frac{2\cos x \sin x}{1-x^2} - \frac{\sin 2x}{(1-x^2)}$$

$$\text{I.E.} = e^{\int \frac{-2x}{1-x^2} dx} = e^{\ln(1-x^2)} = 1 - x^2$$

$$v(1 - x^2) = \int (1-x^2) - \frac{\sin 2x}{(1-x^2)} dx + C$$

$$y^2(1 - x^2) = \int -\sin 2x dx + C$$

$$y^2(1 - x^2) = \frac{\cos 2x}{2} + C$$

$$y^2(1-x^2) = \frac{2\cos^2 x - 1}{2} + C$$

$$y^2(1-x^2) = \cos^2 x - \frac{1}{2} + C$$

$\Rightarrow \quad y^2(1-x^2) = \cos^2 x + C$

at $x = 0$

$y = 0$

$4 = 1 + C$

$C = 3$

End of Solution

39. The solution of differential equation $y'' + 4y' + 3y = e^t; y(0) = 0, y'(0) = 2$ is

(a) $y(t) = \frac{e^t - 7e^{-3t}}{8} + \frac{3e^{-t}}{4}$ (b) $y(t) = \frac{e^t - 5e^{-3t}}{8} + \frac{3e^{-t}}{4}$

(c) $y(t) = \frac{e^t + 7e^{-3t}}{8} - \frac{3e^{-t}}{4}$ (d) $y(t) = \frac{e^t + 7e^{-3t}}{8} + \frac{3e^{-t}}{4}$

Ans. **(a)**

$$y'' + 4y' + 3y = e^t; y(0) = 0, y'(0) = 2$$

$$\left(D^2 + 4d + 3x\right) = e^t$$

A.E. $m^2 + 4m = 3 = 0$

$m = -1$

$m = -3$

$y_c = C_1 e^{-t} + C_2 e^{-3t}$

$$y_p = \frac{1}{D^2 + 4D + 3} e^t \qquad D = 1$$

$$= \frac{1}{1+4+3} e^t = \frac{e^t}{8}$$

$y = y_c + y_p$

$$y = C_1 e^{-t} + C_2 e^{-3t} + \frac{e^{-t}}{8}$$

at $t = 0,\ y = 0$

$$0 = C_1 + C_2 + \frac{1}{8}$$

$$C_1 + C_2 = \frac{-1}{8} \quad \text{...(i)}$$

$$y' = -C_1e^{-t} - 3e^{-3t} + \frac{e^{-t}}{8}$$

$t = 0,\ y^1 = 2$

$$2 = -C_1 - 3C_2 + \frac{1}{8}$$

$$C_1 + 3C_2 = -2 + \frac{1}{8}$$

$$C_1 + 3C_2 = -\frac{15}{8} \quad \text{...(ii)}$$

(i) and (ii)

$$C_1 + C_2 = -\frac{1}{8} \qquad C_1 = \frac{3}{4}$$

$$C_1 + 3C_2 = \frac{15}{8} \qquad C_2 = -\frac{7}{8}$$

$$y = \frac{3}{4}e^{-t} - \frac{7}{8}e^{-3t} + \frac{e^t}{8}$$

$$= \frac{e^t - 7e^{-3t}}{8} + \frac{3}{4}e^{-t}$$

End of Solution

40. Which one of the following statements is correct in the context of quadratic forms $V = x^TAx$, where
$x = [x_1, x_2, \ldots x_n]^T$?

(a) $V < 0$ for all vectors x except $x = 0$, if and only if all the eigenvalues of A are positive.

(b) $V \leq 0$ for all vectors x and $V = 0$ for at least one vector $x \neq 0$, if and only if all the eigenvalues of A are non-negative and at least one of the eigenvalues is zero.

(c) V is negative-definite if $-V$ is positive-definite, with a corresponding condition on the eigenvalues of A.

(d) V is negative-semi definite if $-V$ is positive-semi definite, with a corresponding condition on the eigenvalues of $-A$.

Ans. (c)

End of Solution

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41. What is the name of the initiative launched by India and Denmark in November 2025 to enhance bilateral ties?
(a) Indo-Danish Economic Forum
(b) India-Denmark Trade Partnership
(c) Indo-Danish Business Council
(d) India-Denmark Sustainability Initiative

Ans. (c)
Launched in November 2025 to commemorate 75 years of diplomatic ties, the Indo-Danish Business Council (IDBC) aims to accelerate collaboration in green energy, deep tech, and life sciences.

End of Solution

42. Which Ministry released the India AI Governance Guidelines in 2025?
(a) Ministry of Science and Technology
(b) Ministry of Electronics and Information Technology
(c) Ministry of Corporate Affairs
(d) Ministry of Education

Ans. (b)
Ministry of Electronics and Information Technology (MeitY) released India AI Governance Guidelines on November 5, 2025. The framework follows a "lightweight" regulatory approach focused on ethical AI, accountability, and the "Seven Sutras" of responsible AI deployment.

End of Solution

43. Which organization developed the Online National Drugs Licensing System (ONDLS) portal?
(a) Centre for Development of Advanced Computing (CDAC)
(b) National Health Authority (NHA)
(c) Indian Pharmacopoeia Commission (IPC)
(d) Drug Controller General of India (DCGI)

Ans. (a)
The ONDLS portal was developed by C-DAC to digitize and simplify the drug licensing process in India, ensuring transparency and ease of doing business for pharmaceutical manufacturers.

End of Solution

44. Which institution released the report titled “India’s Blue Economy: Strategy for Harnessing Deep-Sea and Offshore Fisheries”?
(a) Indian Council of Agricultural Research (ICAR)
(b) NITI Aayog
(c) Ministry of Earth Sciences
(d) Reserve Bank of India

Ans. (b)

NITI Aayog released the report "India's Blue Economy: Strategy for Harnessing Deep-Sea and Offshore Fisheries." It outlines strategies for sustainable marine resource use and improving India's share in global fish exports.

End of Solution

45. The NE-SPARKS programme has been launched to promote awareness about which field among students of the North Eastern Region of India?

(a) Renewable Energy
(b) Space Science and Technology
(c) Digital literacy
(d) Agriculture

Ans. (b)

The NE-SPARKS (North East Students Programme for Awareness, Reach, and Knowledge on Space) is a joint initiative of MDoNER and ISRO to inspire students from the North Eastern states to pursue careers in Space Science.

End of Solution

46. Which space organization launched the PUNCH Space Mission?

(a) Indian Space Research Organisation (ISRO)
(b) National Aeronautics and Space Administration (NASA)
(c) European Space Agency (ESA)
(d) China National Space Administration (CNSA)

Ans. (b)

PUNCH (Polarimeter to Unify the Corona and Heliosphere) is a NASA mission designed to study the solar wind and how the Sun's outer atmosphere becomes the heliosphere.

End of Solution

47. According to Environmental Accounting on forest 2025 report, which state showed the highest rise in Recorded Forest Area (RFA) share?

(a) Chhattisgarh
(b) Odisha
(c) Jharkhand
(d) Uttarakhand

Ans. (d)

The "Environmental Accounting on Forest 2025" report by MoSPI highlighted Uttarakhand as the state with the highest rise (6.3%) in its Recorded Forest Area share.

End of Solution

48. Where were the Fast Patrol Vessels (FPVs) ICGS Ajit and ICGS Aparajit launched?

(a) Cochin Shipyard Limited
(b) Mazagon Dock Shipbuilders
(c) Goa Shipyard Limited
(d) Hindustan Shipyard

Ans. (c)

ICGS Ajit and ICGS Aparajit, the two Fast Patrol Vessels (FPVs) were launched at Goa Shipyard Limited (GSL) to bolster the Indian Coast Guard's surveillance and search-and-rescue capabilities.

End of Solution

49. What is the theme of Global Media and Information Literacy (MIL) Week 2025?
(a) Empowering Citizens through Media Literacy
(b) Media Literacy for Peaceful Societies
(c) Building Critical Thinkers in the Digital Age
(d) Minds Over Artificial Intelligence (AI)-MIL in Digital Spaces

Ans. (d)

This UNESCO-led initiative focused on the theme "Minds Over AI," emphasizing the need for critical thinking and human judgment in an era of AI-generated content.

End of Solution

50. The Samriddh Gram Phygital Services Pilot Project was recently launched by which organization?
(a) Telecom Regulatory Authority of India (TRAI)
(b) Bharat Sanchar Nigam Limited (BSNL)
(c) Telecom Centres of Excellence (TCoE)
(d) Ministry of Power

Ans. (c)

The TCoE, under the Department of Telecommunications, launched this pilot project to bridge the digital divide in rural India by integrating physical services with digital infrastructure (BharatNet).

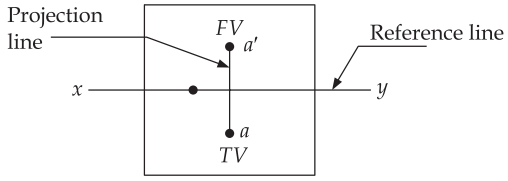
End of Solution

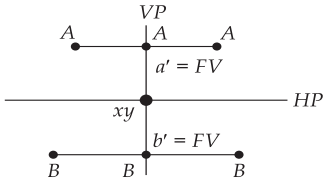
51. Consider the following statements regarding the projection of a point:
1. The line joining the top view and the front view of a point is always perpendicular to xy. It is called a reference line.
2. When a point is above the H.P., its front view is above xy; when it is below the H.P., the front view is below xy.
3. When a point is in front of the V.P., its top view is below xy; when it is behind the V.P., the top view is above xy.
4. As the point is below the H.P. and behind the V.P., its front view will be above xy and the top view is below xy.

Which of the above statements are correct?
(a) 2 and 3 (b) 1 and 4
(c) 1 and 2 (d) 2 and 4

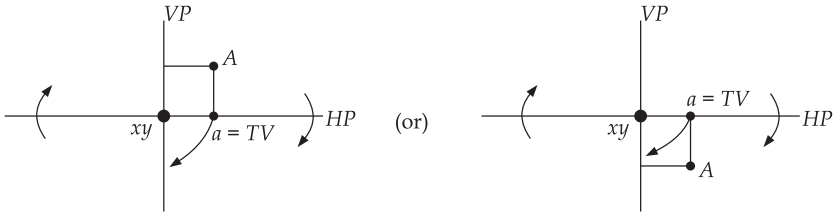
Ans. (a)

1. Line joining FV and TV is perpendicular to *xy* line. It is called projection line. So, statement 1 is false.

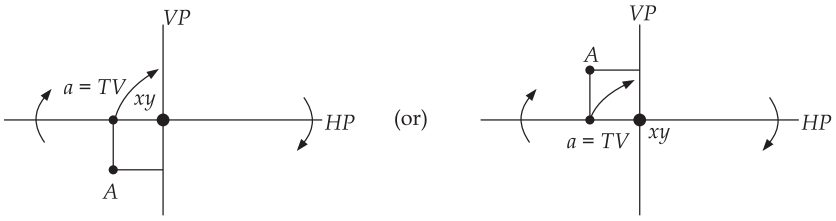


2. 

Hence, 2nd statement is correct.

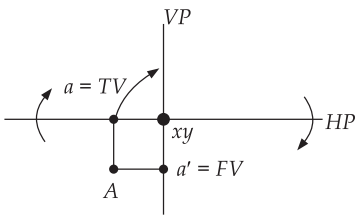
3. 

If point is in front of VP, so its TV is below *xy* line.



If point is behind, VP, TV is above *xy* line.
Hence, 3rd statement is correct.

4. FV is below *xy* line.
TV is above *xy* line.



End of Solution

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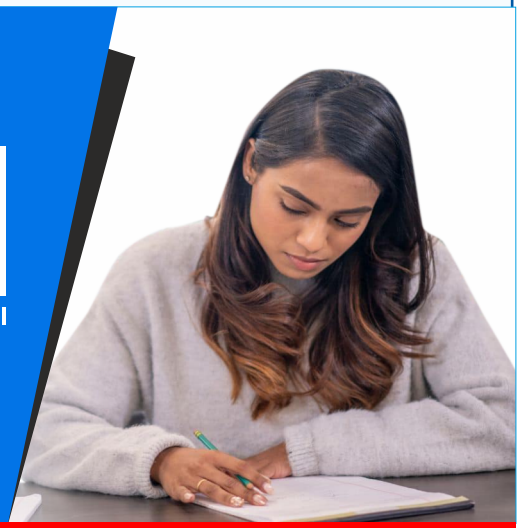

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52. Consider the following statements regarding the traces of a line:
1. When a line is parallel to the HP and the VP, it has no trace.
2. When a line is inclined to HP and parallel to VP, it has only the VT but no HT.
3. A line PQ is perpendicular to the HP. Its HT coincides with its top view which is a point. It has no VT.
4. A line RS is perpendicular to the VP. Its VT coincides with its front view which is a point. It has no HT.

Which of the following statements are correct?

(a) 2, 3 and 4 (b) 1, 3 and 4
(c) 1, 2 and 3 (d) 1, 2 and 4

Ans. (b)

A trace is formed when TL (or) its extension intersects HP (H.T. is formed) or VP (vertical trace is formed) (or both).
1. Since line is parallel to both VP and HP, hence no trace is formed. So, statement '1' is not correct.
2. Line is inclined to HP, hence there will be H.T. Line is parallel to VP, hence no V.T. So, statement '2' is false.
3. Line is perpendicular to HP. Hence, TV gives a point view which will be also its H.T. There will be not V.T. Hence statement '3' is correct.
4. Line is perpendicular to VP. Hence, FV gives a point view which will be also its V.T. There will be no H.T. Hence, Statement '4' is correct.

End of Solution

53. Consider the following statements regarding the projections of planes:
1. When a plane is perpendicular to both the reference planes, its traces lie on a straight line perpendicular to xy.
2. When a plane is perpendicular to a reference plane, its projection on that plane is a straight line.
3. When a plane is parallel to a reference plane, its projection on that plane shows its reduced shape and size.
4. When a plane is parallel to the VP, beginning should be made with the front view and the top view projected from it.

Which of the following statements are correct?

(a) 1, 3 and 4 (b) 2, 3 and 4
(c) 1, 2 and 3 (d) 1, 2 and 4

Ans. (d)
1. A plane perpendicular to both reference plane is called as an normal plane whose FV and TV will be a line perpendicular to xy line. Further its FV and TV will also give V.T. and H.T. So, statement '1' is correct.
2. A plane gives an edge view or a line view in that projection plane to which it is perpendicular. Hence, statement '2' is correct.
3. The true shape and size of a plane is seen in that plane to which it is parallel. Hence, statement '3' is false.

4. That view is drawn first in multiview orthographic projection in which true shape and size is obtained and other views are projected out of it. Hence, statement '4' is correct.

End of Solution

54. Consider the following statements regarding the projections of solids:

1. When the axis of a solid is perpendicular to a plane, its base will be parallel to that plane.
2. The projection of a solid on the plane to which its axis is perpendicular, will show the true shape and size of its base.
3. When the axis is perpendicular to the HP, the top view should be drawn first and the front view projected from it.
4. A solid in simple position has its axis parallel to one reference plane and perpendicular to other.

Which of the following statements are correct?

(a) 1, 2 and 3 (b) 2, 3 and 4
(c) 1 and 2 only (d) 3 and 4 only

Ans. (a)

1. If axis is perpendicular to a plane then its base is parallel to that plane since axis and base of the solid are perpendicular to each other. So, statement '1' is correct.
2. That view is drawn first in case of projection of solid, in which axis is perpendicular to that plane. Hence, it shows true shape and size of the base. So, '2' statement is correct.
3. As stated above, hence, statement '3' is correct.
4. A solid in simple position does not justify that its axis is parallel to one reference plane and perpendicular to other as the axis may be inclined to one reference plane and may be parallel or inclined to other. Hence, statement '4' is wrong.

End of Solution

55. Match the following lists:

List I (Name of the curve)	List II (Eccentricity)
P. Hyperbola	1. $e > 1$
Q. Ellipse	2. $c = 1$
R. Parabola	3. $e < 1$

Select the correct answer using the code given below:

	P	Q	R
(a)	1	2	3
(b)	1	3	2
(c)	2	3	1
(d)	2	1	3

Ans. (b)

From concept of conics

if $e > 1$ => Hyperbola
if $e = 1$ => Parabola
if $e < 1$ => Ellipse

End of Solution

56. Which one of the following statements comes under robust design in process design?
(a) A tennis racket that returns the ball just as well when hit near the rim as when hit in dead center.
(b) A hospital operating room that maintains lighting and life support systems when the electric power to the hospital is interrupted.
(c) An airplane that flies as well in stormy weather as in clear weather.
(d) A turning operation that produces a good surface finish throughout a wide range of cutting speeds.

Ans. **(d)**
Robust process design refers to a manufacturing or operational process that gives consistent output quality even when process parameter vary. Hence
Statement 1: about the product design.
Statement 2: about Reliability of System.
Statement 3: about product design.
Statement 4: about manufacturing process.

End of Solution

57. Which one of the following is used to show whether or not a characteristic or a property of the item complies with the stated specification under maintenance actions?
(a) Compliance test
(b) Overhaul
(c) Monitoring
(d) Rebuilding

Ans. **(a)**
Compliance test ⇒ comply how the maintenance given.

End of Solution

58. Action taken after maintenance actions to verify that the item is able to perform the required function, is known as
(a) Fault diagnosis
(b) Turnaround maintenance
(c) Function check-out
(d) Modification

Ans. **(c)**
(a) **Fault diagnosis:** Done before maintenance to find problem.
(b) **Turn around maintenance:** Activity in which plant is shut down for a short period of time for servicing.
(c) **Function check out:** It is done after maintenance is done to check whether desired function has been carried out or not.
(d) **Modification:** Change in design.

End of Solution

59. Consider the following statements regarding maintenance of machineries:
1. Corrective maintenance actions are maintenance activities that are carried out after a failure has occurred.
2. Corrective maintenance must be initiated immediately to restore critical systems to their functional state or can be deferred to a more convenient timing if the failure is not critical and does not need immediate action.
3. Preventive maintenance must be initiated immediately to restore critical systems to their functional state or can be deferred to a more convenient timing if the failure is not critical and does not need immediate action.

Which of the above statements is/are correct?

(a) 1 and 2 (b) 2 only
(c) 1 only (d) 1 and 3

Ans. **(a)**

Preventive maintenance is given before failure at predetermined intervals (kind of proactive action).

End of Solution

60. Which one of the following technologies is used to monitor the condition of an object and to decide on maintenance based on the condition?

(a) Information and Communication Technology
(b) Sensor Technology
(c) Transit Technology
(d) Risk based Technology

Ans. **(b)**

Condition based maintenance (CBM) is done by sensor technology as ear & nose (human sensor) has limitation to sense monitor.

End of Solution

61. How many total number of lattice parameters are required to fully specify Rhombohedral crystal system?

(a) 2 (b) 3
(c) 4 (d) 6

Ans. **(a)**

Rhombohedral crystal system

$a = b = c$

$\alpha = \beta = \gamma \neq 90°$

Hence 2 parameters are required to fully specify Rhombohedral crystal system.

End of Solution

62. If a and c represent, respectively, the short and long unit cell dimensions for Hexagonal crystal, the ideal c/a ratio should be

(a) 1.433 (b) 1.633
(c) 2.833 (d) 4.533

Ans. (b)

The ideal c/a ratio for Hexagonal crystal should be

$$\frac{c}{a} = 1.633$$

End of Solution

63. In characteristics of cubic crystal, the planes and directions having the same indices are always at the angle of

(a) 15° to one another
(b) 30° to one another
(c) 45° to one another
(d) 90° to one another

Ans. (d)

Plane and corresponding direction are perpendicular to each other.

End of Solution

64. Consider the following statements regarding Face Centered Cubic Crystal Structure:

1. There are eight corner atoms, six face atoms and no interior atoms, then the number of atoms per unit are 6.
2. Coordination Number is 12.
3. Atomic packing factor is 0.74.
4. Volume of unit cell is $V = 16R^3\sqrt{2}$, where R is atomic radius.

Which of the above statements are correct?

(a) 1, 2 and 3 only
(b) 1, 3 and 4 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

Ans. (c)

For FCC crystal

$$CN = 12$$
$$APF = 0.74$$

$$\text{Volume} = a^3 = \left(2\sqrt{2}R\right)^3 = 16\sqrt{2}R^3$$

End of Solution

65. In crystal materials, the equilibrium number of vacancies in crystalline solid increases

(a) linearly with temperature
(b) exponentially with temperature
(c) exponentially and then decreases with temperature
(d) linearly and then exponentially with temperature

Ans. (b)

$$N_v = Ne^{-Q_v/KT}$$

Vacancies increases exponentially with temperature.

End of Solution

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66. Consider the following statements regarding quantum dots:
1. A photon's polarization can be vertical or horizontal, or a superposition of both, and we can use this as a qubit.
2. Neutral atoms can be trapped at low temperatures using a magneto optical trap, which uses magnetic fields and lasers to cool and trap the atoms.
3. An electron can be bound to a small semiconductor device, similar to an electron bound to the nucleus of an atom. In these "artificial atoms", the spin of an electron, which can be "spin up" or "spin down", can be used as a qubit.

Which of the above statements is/are correct?

(a) 1 only (b) 2 only
(c) 3 only (d) 1, 2 and 3

Ans. (d)

End of Solution

67. Five routers are to be connected in a point-to-point subnet. Between each pair of routers, the designers may put a high-speed line, a medium-speed line, a low-speed line, or no line. If it takes 100 ms of computer time to generate and inspect each topology, how long will it take to inspect all of them?

(a) 108,578.6 sec (b) 102,785.6 sec
(c) 110,857.6 sec (d) 104,857.6 sec

Ans. (d)

No. of topology to inspect = 4^{10} = 1048576

Time taken = 1048576 × 0.1 sec = 104857.6 sec

End of Solution

68. A group of N stations share a 56-kbps pure ALOHA channel. Each station outputs a 1000-bit frame on average once every 100 sec, even if the previous one has not yet been sent (e.g., the stations can buffer outgoing frames). What is the maximum value of N?

(a) 1003 stations (b) 1100 stations
(c) 1010 stations (d) 1030 stations

Ans. (d)

End of Solution

69. Which one of the following protocols is suitable for IoT communication that though it was originally designed to support IEEE 802.15.4 low-power wireless networks in the 2.4-GHz band?

(a) Routing Protocol for Low power and Lossy networks (RPL)
(b) IPv4/IPv6
(c) 6LoWPAN
(d) MQTT

Ans. (c)

6LoWPAN stands for IPv6 over Low-Power Wireless Personal Area Networks. It was specifically designed to enable the smallest devices - running on the IEEE 802.15.4 standard - to communicate directly with the internet using IPv6. It uses header compression and encapsulation to make heavy internet protocols fit into small, low-power wireless data packets.

End of Solution

70. Which one of the following statements is related to key feature of Threat Radar reputation to prevent DDoS attacks on cloud infrastructure?

(a) Threat Radar reputation service keeps track of users who are attacking other websites. By using this information, it will filter off any request from those users and prevent them from getting into the cloud system

(b) Threat Radar reputation service helps to monitor and keep track of both user agents and DDoS attacks vectors

(c) Threat Radar reputation service helps to detect users who have the pattern of generating and sending HTTP requests with long response times

(d) Threat Radar reputation service has the capability to send a JavaScript challenge to users' browsers. The JavaScript challenge has the capacity to detect and block bots

Ans. (a)

Threat Radar functions as a reputation-based filtering system. It works on the principle of "community defense": if a specific IP address or user is identified as a source of an attack on one website, that intelligence is shared across the network. The firewall then proactively blocks requests from that "bad" source for all other protected cloud infrastructures.

End of Solution

71. How much estimated amount of power can be derived from solid energy mineral of 1 kg of coal?

(a) 1 kWh power
(b) 3 kWh power
(c) 4 kWh power
(d) 50,000 kWh power

Ans. (a)

On average, standard thermal power plants produce approximately 1 kilowatt-hour (kWh) of electricity from 1 kg of coal. While the actual energy content of coal is higher, energy is lost as heat during the conversion process in turbines.

End of Solution

72. Which one of the following types of coal has high calorific value and lowest volatile content?

(a) anthracite
(b) subbituminous
(c) bituminous
(d) lignite

Ans. (a)

Anthracite is the highest grade of coal. It contains the highest carbon content (86%-97%), the highest heating value, and the lowest volatile matter, making it burn cleaner and longer than bituminous or lignite coal.

End of Solution

73. A fuel cell in electric car generates electrical energy by combining

(a) Carbon dioxide (CO_2) and Hydrogen (H_2)
(b) Oxygen (O_2) and Hydrogen (H_2)
(c) Sulphur dioxide (SO_2) and Hydrogen (H_2)
(d) Carbon monoxide (CO) and Hydrogen (H_2)

Ans. (b)

A hydrogen fuel cell generates electricity through a chemical reaction between hydrogen and oxygen. The only by-products of this clean energy process are water, electricity, and heat.

End of Solution

74. Electrical power generation usually links to the load demand by a common regional or national network, often called

(a) Station
(b) Embedded Generator
(c) Grid
(d) Distributor

Ans. (c)

An electrical grid is an interconnected network for delivering electricity from producers to consumers. It consists of generating stations, high-voltage transmission lines, and distribution lines that link the load demand across regions.

End of Solution

75. 1 kg of Hydrogen fuel burns with 8 kg of oxygen to give the product as

(a) 9 kg of hydrogen peroxide
(b) 9 kg of water
(c) 18 kg of hydrogen peroxide
(d) 18 kg of water

Ans. (b)

According to the law of conservation of mass and the chemical equation $2H_2 + O_2 \rightarrow 2H_2O$, the ratio of hydrogen to oxygen by mass is 1:8. Therefore, 1 kg of Hydrogen + 8 kg of Oxygen = 9 kg of Water

End of Solution

76. Consider the following statements regarding project:
1. Temporary project has a beginning and an end.
2. Project has predefined work assignments.
3. Project produces a unique output or deliverable.

Which of the above statements are correct?

(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

Ans. (c)

End of Solution

77. Which one of the following usually provides the resources, particularly the people who are involved in the project?

(a) Sponsor (b) Project Leader
(c) Project Customer (d) Functional Manager

Ans. (d)

Sponsor : Funds and high level support not day to day.
Functional Manager: People, equipment and technical expertise.

End of Solution

78. PERT calls for the following estimates to be provided for each activity:
1. Pessimistic
2. Optimistic
3. Most Likely

Which of the above estimates are correct?

(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

Ans. (d)

PERT calles for the all pessimistic, optimistic and most likely estimates to be provided for each activity.

End of Solution

79. Which one of the following means closing down a company and selling its assets?

(a) Liquidation (b) Revitalize
(c) Resurrect (d) Enliven

Ans. (a)

Liquidation means selling assets.

End of Solution

80. Which one of the following is NOT a step comprised in the completion of a project?

(a) Final inspection (b) Defects liability period
(c) Maintenance retention sum (d) Problem identification

Ans. (d)

Problem identification is NOT a step involved in closure phase.

End of Solution

81. Consider the following statements regarding ethics :

1. Ethics is to provide us with moral principles or universal rules that tell us what to do.
2. The fundamental question of ethics is not "What should I do ?" but "What kind of person should I be ?"

Which of the above statements is/are correct ?

(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

Ans. (c)

End of Solution

82. Consider the following statements regarding Risk-Benefit Analysis:
The major reason for the analysis of the risk benefit are

1. to know risks and benefits and weigh them each.
2. to decide on designs, advisability of product/project.
3. to suggest and modify the design so that the risks are eliminated or reduced.

Which of the above statements are correct?

(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

Ans. (d)

Risk benefit analysis helps in evaluating risks vs benefits, deciding project feasibility and improving design to minimum risks.

1. Primary purpose.
2. Decision of design - whether project should be taken.
3. Suggest methods to mitigate risk.

End of Solution

83. Consider the following regarding intellectual property rights:
The agreements with World Trade Organization (WTO) and Trade-Related aspects of Intellectual Property System (TRIPS) establish norms and conditions for following instruments of intellectual properties:

1. Patents 2. Copyright
3. Trademark 4. Trade secret

Which of the above instruments of intellectual properties are correct?

(a) 1 and 3 only (b) 1, 2 and 3 only
(c) 2 and 3 only (d) 1, 2, 3 and 4

Ans. (d)

The TRIPS Agreement (Trade-Related Aspects of Intellectual Property Rights) covers all major forms of IP, including Patents, Copyrights, Trademarks, and Trade Secrets (undisclosed information), along with Industrial Designs and Geographical Indications.

End of Solution

84. Consider the following statements regarding value education:

1. Value education is that part of education which deals with understanding one's participation in the larger order, and thus ensuring it in living.
2. The content of value education must be all encompassing, i.e., it must include all dimensions of a human being as well as all levels of human living.
3. The process of value education is essentially a process of self-exploration (self-reflection and self-discovery). Self-exploration does not include self-verification at the level of natural acceptance and experiential validation in living.

Which of the above statements are correct?

(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

Ans. (d)

End of Solution

85. Consider the following elements regarding quality characteristics :

1. Physical 2. Sensory
3. Time based

Which of the above elements are correct?

(a) 1 and 3 only (b) 2 and 3 only
(c) 1 and 2 only (d) 1, 2 and 3

Ans. (d)

Quality characteristics are:

1. Physical
2. Sensory
3. Time based

End of Solution

86. Consider the following methods regarding quality improvements in TQM :

1. Robust design
2. Taguchi loss function

Which of the above methods is/are correct?

(a) 1 only (b) 2 only
(c) Neither 1 nor 2 (d) Both 1 and 2

Ans. (d)

Taguchi methods include:

1. **Robust design**
   (product & process less sensitive to variation or noise factors)

2. Taguchi loss function
(loss accelerates as design is done at points away from target, i.e. deviation ↑ ⇒ loss↑)

Taguchi methods are key methods of **TQM**.

End of Solution

87. Consider the following statements regarding variations in quality control tools :
1. Common/Random/Chance variations are difficult to trace and difficult to control even under the best condition of operation.
2. Assignable variations are of higher magnitude which can be easily traced and detected.

Which of the above statements is/are correct ?
(a) 1 only (b) 2 only
(c) Neither 1 nor 2 (d) Both 1 and 2

Ans. (d)

1. Common / Random / Chance variation:
Inherent to a process, small, difficult trace to a specifically source.
2. Assignable variations are special variation caused by identifiable factors, hence higher magnitude than common variations.

End of Solution

88. Consider the following statements regarding reverence :
1. Reverence is the feeling of acceptance for excellence.
2. If someone has achieved the state of excellence, we naturally have an acceptance for such a person. This feeling of acceptance for excellence is called reverence.

Which of the above statements is/are correct ?
(a) 1 only (b) 2 only
(c) Neither 1 nor 2 (d) Both 1 and 2

Ans. (a)

End of Solution

89. Consider the following statements regarding fulfilment of relationship in human values:
Fulfilment of relationship means
1. ensuring the naturally acceptable feeling in oneself and sharing it with the other.
2. living with responsibility with the other unconditionally.
3. making effort for mutual development, i.e. development of one's own competence and being of help to the other in developing their competence.

Which of the above statements are correct ?
(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

Ans. (d)

In human values, relationship fulfillment isn't just about emotion; it's about:

1. **Acceptance:** Having the right feelings (trust, respect) within.
2. **Responsibility:** Living unconditionally for the other's well-being.
3. **Competence:** Helping each other grow (Mutual Development).

End of Solution

90. Consider the following characteristics regarding Harmony in the society- understanding universal human order :

1. Behaviour with Human Being
2. Continuous Happiness and Prosperity
3. Work with Rest of Nature

Which of the above statements are correct ?

(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

Ans. (d)

A universal human order is achieved when:

- Behavior leads to mutual happiness.
- Work with nature leads to mutual prosperity.
- This results in a state of Continuous Happiness and Prosperity for all.

End of Solution

91. In an RSA system, the public key of a given user is $e = 65$, $n = 2881$ .What is the private key of this user?

(a) 638 (b) 725
(c) 2031 (d) 3031

Ans. (b)

End of Solution

92. What happens if a k value used in creating a Digital Signature Algorithm (DSA) signature is compromised ?

(a) A user's public key is compromised if k is discovered
(b) A user's private key is not compromised if k is discovered
(c) A user's private key is compromised if k is discovered
(d) A user's public key is not compromised if k is discovered

Ans. (c)

End of Solution

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2	CE	Harshvardhan Singh	Classroom Course
2	ME	Gollangi Sateesh	Online Course
2	EE	Kailash Goyal	Classroom Course
2	EC	Ankush Philip John	Postal Package & Test Series
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6	CE	Nimish Upadhyay	Online Course
6	EE	Puneet Soni	Test Series
6	EE	Shivam Kr. Gupta	Test Series
6	EC	Pentela J. Bhavani	Test Series
6	IN	Utkarsh P. Patil	Classroom Course
7	PI	Waleed Shaikh	Test Series
7	ME	Abhinn	Online Course
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7	ES	Ankit Kumar	Classroom Course
8	ME	Goutam Kumar	Test Series
9	CE	Tarun Yadav	Classroom Course
9	CS	Omhari	Test Series
9	EC	Chilukuri S. Charan	Test Series
9	XE	Apar Harsh Chandra	Classroom Course
10	CE	Adnan Quasain	Classroom Course
10	CE	Rahul Singh	Online Course
10	ME	Ashutosh Kumar	Classroom Course
10	ME	Jetti Ganateja	Test Series
10	ME	Muhammed Sinan K	Test Series
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93. Which one of the following is the time complexity of Iterative Deepening in Uninformed Search Strategies?

(a) O (bd)
(b) O (b^l)
(c) O (b^d)
(d) O (b^l)

Ans. (c)

End of Solution

94. Which one of the following algorithms is used in logic programming systems, which employ sophisticated compiler technology to provide very fast inference ?

(a) Backward chaining
(b) Forward chaining
(c) Constraint Satisfaction problem
(d) A* algorithm

Ans. (a)

Logic programming systems, most notably Prolog, primarily use Backward Chaining (specifically SLD resolution) as their inference engine. Modern systems have refined this through compiler technology (like the Warren Abstract Machine) to make it extremely fast.

End of Solution

95. Which one of the following is a disadvantage of call-by-reference technique of passing arguments ?

(a) Since arguments are not copied into the new variables, it provides greater time and space efficiency
(b) The function can change the value of the argument and the change is reflected in the calling function
(c) A function can return only one value. In case we need to return multiple values, we can pass those arguments by reference, so that the modified values are visible in the calling function
(d) If inadvertent changes are caused to variables in called function then these changes would be reflected in calling function as original values would have been overwritten

Ans. (d)

In Call-by-Reference, the function receives the actual memory address (reference) of the argument, not a copy. While this is efficient, the major disadvantage is the lack of data protection. If a programmer accidentally modifies a parameter inside the function, that "mistake" permanently changes the original variable in the main program.

End of Solution

96. Which one of the following types of programming languages is NOT used to develop the large of contents dynamically for server side scripts ?
(a) PHP (Hypertext Pre-processor)
(b) Java Server Pages (JSP)
(c) Active Server Page (ASP)
(d) HTML

Ans. (d)
HTML (Hypertext Markup Language) is a client-side markup language used to define the structure and static content of a webpage. It cannot, on its own, perform server-side logic, interact with databases, or generate content "on the fly" (dynamically).

End of Solution

97. In which one of the following layers, the firewalls can be installed to keep good packets and bad packets out ?
(a) Physical layer
(b) Transport layer
(c) Network layer
(d) Application layer

Ans. (c)
Traditional firewalls act as Packet Filters at the Network Layer (Layer 3) of the OSI model. They inspect the header of each packet to check the source and destination IP addresses. If the packet matches the allowed "good" rules, it passes; otherwise, it is blocked.

End of Solution

98. In cryptography, to construct an unbreakable cipher text, which one of the following logical operations is used in one-time pads ?
(a) XOR
(b) AND
(c) NAND
(d) XNOR

Ans. (a)
The XOR (Exclusive OR) operation is the fundamental building block of the One-Time Pad (OTP), which is mathematically proven to be unbreakable if the key is truly random and used only once.

End of Solution

99. Which one of the following digital certificate standards is used for certificate-based authentication security frame work that can be used for providing secure transaction processing and private information ?
(a) X.502
(b) X.501
(c) X.510
(d) X.509

Ans. (d)

End of Solution

100. Which one of the following IEEE standard protocols prescribes a data link-level security which is designed to make the security of a wireless LAN as well as that of a wired LAN ?

(a) IEEE 802.11
(b) IEEE 802.3
(c) IEEE 802.1
(d) IEEE 802.4

Ans. (a)

End of Solution

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