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ESE 2026 : Prelims Exam | CLASSROOM TEST SERIES

GS & ENGINEERING APTITUDE

Test 17

Full Syllabus Test 1 : (Paper-I)

ANSWER KEY

1.	(b)	21.	(b)	41.	(d)	61.	(b)	81.	(b)
2.	(a)	22.	(c)	42.	(c)	62.	(b)	82.	(c)
3.	(a)	23.	(b)	43.	(c)	63.	(b)	83.	(c)
4.	(b)	24.	(b)	44.	(a)	64.	(b)	84.	(a)
5.	(d)	25.	(b)	45.	(d)	65.	(a)	85.	(a)
6.	(b)	26.	(a)	46.	(d)	66.	(a)	86.	(d)
7.	(c)	27.	(d)	47.	(b)	67.	(a)	87.	(c)
8.	(a)	28.	(d)	48.	(a)	68.	(a)	88.	(d)
9.	(c)	29.	(b)	49.	(b)	69.	(b)	89.	(c)
10.	(b)	30.	(c)	50.	(d)	70.	(b)	90.	(b)
11.	(b)	31.	(d)	51.	(d)	71.	(a)	91.	(c)
12.	(b)	32.	(d)	52.	(b)	72.	(c)	92.	(b)
13.	(a)	33.	(b)	53.	(c)	73.	(c)	93.	(c)
14.	(c)	34.	(c)	54.	(b)	74.	(b)	94.	(c)
15.	(c)	35.	(d)	55.	(b)	75.	(c)	95.	(c)
16.	(a)	36.	(d)	56.	(b)	76.	(a)	96.	(c)
17.	(a)	37.	(a)	57.	(d)	77.	(d)	97.	(b)
18.	(c)	38.	(c)	58.	(c)	78.	(d)	98.	(b)
19.	(a)	39.	(c)	59.	(d)	79.	(b)	99.	(c)
20.	(c)	40.	(d)	60.	(d)	80.	(b)	100.	(b)

1. (b)

In the Gini Index, 0 represents perfect equality and 100 represents perfect inequality. India's low score of 25.5 places it as the 4th most equal country globally behind Slovak Republic, Slovenia, and Belarus.

2. (a)

- The 56th GST Council meeting focused on rate rationalisation to benefit the common man. It introduced a special 40% rate for luxury items while slashing rates on hygiene products (soaps, shampoos) to 5%.
- Crucially, it exempted all life and health insurance policies and set zero GST for 33 life-saving drugs.
- While the standard high slab is 28%, the 56th GST Council meeting recommended a special rate of 40% for specific sin and luxury goods.

3. (a)

4. (b)

- The overall unemployment rate in urban areas actually dropped to 5.2%.
- The Worker Population Ratio (WPR) showed positive growth, indicating more people were employed.
- The reports highlighted a significant rise in Female LFPR, reflecting higher women's participation in the formal economy.

5. (d)

The Waqf (Amendment) Bill, 2025 seeks to reform how Waqf properties are managed and claimed, introducing oversight by senior government officers (above Collector rank) for claims on government land and ensuring gender justice in inheritance before a property can be dedicated as Waqf.

6. (b)

India has emerged as the world's fifth-largest market, handling 211 million passengers in the year 2024.

7. (c)

An error of judgment made in good faith, while following all standard codes and safety factors, does not necessarily constitute negligence.

8. (a)

Skills are "what you can do," while Values are "what you believe is important."

9. (c)

The Fundamental Canons of almost every engineering code of ethics state that the safety and well-being of the public take precedence over all other obligations, including loyalty to a client or employer.

10. (b)

Virtue Ethics (rooted in Aristotle's philosophy) emphasizes that if you develop a virtuous character (honesty, courage, integrity), you will naturally make the right decisions without needing a strict list of rules.

11. (b)
Patents are time-limited, as these are granted usually for 20 years.

12. (b)
Plan stamping is a major ethical violation. An engineer's seal is a guarantee of safety; if they sign off on work they didn't personally verify, they are deceiving the public and potentially endangering lives.

13. (a)
Most professional codes explicitly state that engineers must "seek to promote the public good" as a professional duty.

14. (c)
Unlike technical engineering problems, ethical dilemmas often involve competing goods where no single perfect solution exists, requiring professional judgment and compromise.

15. (c)
While competitive intelligence (public research) is legal, industrial espionage involves illegal or unethical theft of proprietary information.

16. (a)
Edge Effect usually refers to the increase in species diversity and population density at the boundary (ecotone) rather than a decrease.

17. (a)
Nitrogen fixation converts N_2 to ammonia. Denitrification converts nitrates back into atmospheric N_2.

18. (c)
Incineration uses oxygen, while Pyrolysis occurs in the absence/limited supply of oxygen.

19. (a)
Secondary pollutants (like Ozone or PAN) are formed by chemical reactions, whereas primary pollutants (like SO_2) are emitted directly from a source.

20. (c)
Eutrophication leads to an increase in Biological Oxygen Demand (BOD) because as algae die, bacteria consume vast amounts of oxygen to decompose them.

21. (b)
Certain small-scale or strategic projects are exempt from public hearings under specific categories.

22. (c)
Biomass is considered carbon-neutral in a short-cycle sense, though transport and processing emissions must be accounted for.

23. (b)
PM 2.5 refers to particles with a diameter of 2.5 micrometers or less.

24. (b)

- In SRAM, a flip-flop circuit is used to store data, whereas DRAM uses a capacitor to store data which requires constant refreshing.
- The correct sequence for speed is Hard Disk < RAM < Cache < Memory Registers. Therefore, CPU registers are faster than Cache.

25. (b)

- Routers operate at the Network Layer (Layer 3) of the OSI model.
- Their primary function is to route packets between different networks based on network (IP) addresses.

26. (a)

- Passive tags have no power supply; they acquire power from the reader's incoming radio waves.
- Semi-passive tags comprise an internal circuit with a power source but still rely on radio waves received from the reader to transmit the response.
- Because passive tags rely on reader energy, their reading range is shorter, whereas semi-passive tags can support a longer range when compared to passive tags due to the battery installed.

27. (d)

- A key feature of the NeGP is the development of a common support infrastructure, i.e. State Data Centre, State Wide Area Network and Common Service Centres
- The plan utilizes Public-Private Partnerships (PPP).
- The plan follows the structure of being a centralized initiative with decentralized implementation.

28. (d)

- The three core components of the Digital India initiative are digital infrastructure creation, digital delivery of services, and digital literacy.
- The motto of the mission is 'Power to Empower'.

29. (b)

- Fireball is a browser hijacking malware that collects user information, manipulates web traffic to generate ad-revenue, and executes malicious code.
- Trojan disguises itself as a standard program.
- Botnet is a network of hijacked computer devices used to carry out various scams and cyberattacks.
- Saposhi is capable of turning devices into bots for DDoS attacks.

30. (c)

AMOLED screens work using organic light-emitting diodes (OLEDs), which are made from thin films of organic material that emit light when electricity is applied. Unlike LCDs which require constant backlighting, AMOLED pixels only draw power when switched on. Displaying black uses minimal electricity. This enables reduced energy consumption. Hence, both the given statements are correct.

31. (d)

- The Reserve Bank of India launched a pilot for CBDC, which stands for Central Bank Digital Currency.
- **Digital Rupee:** Digital Rupee is the electronic version of currency which can be used to carry out transactions or store value digitally, similar to the manner in which currency notes can be used in physical form.
- The Justice Srikrishna Report "Data Protection Framework" deals with Data Protection and privacy.
- A key feature of the Personal Data Protection Bill is its focus on data localisation to protect Indian users.

32. (d)

Failure mode and effects analysis (FMEA) reduces process development time and cost.

33. (b)

Isotonic work is less tiring and more efficient than isometric work. The motion of muscles also help pump blood supplying oxygen and eliminating carbon dioxide.

34. (c)

The ways by which designer can improve fire resistance of materials are:

(i) Oversizing-deliberately increasing the size of an assembly, so that part of it can be destroyed without affecting the structural performance of the rest.

(ii) Insulation-providing a layer of insulating materials around the assembly to protect it from the heat of the fire.

(iii) Dissipation-ensuring that heat applied to the assembly is rapidly dissipated to other materials or to the air, so that the temperature of the assembly is not raised to a critical level.

35. (d)

36. (d)

37. (a)

Perspective projections are not used by engineers for manufacturing, because the perspective view does not reveal the exact size and shape. Perspectives may be used in marketing where a natural view of a product is desirable.

38. (c)

The PDS lays the ground work for all engineering design activities and ensures the all relevant factors are accounted for all stakeholders are heard form. It will get longer and elaborative as more about the design is known.

39. (c)

Safety rules taken care while carrying demolition of Steel Structures are:

- When a derrick is used, care shall be taken to see that the floor on which it is supported is amply strong for the loading so imposed.
- Overloading of equipment shall not be allowed.

- Tag lines shall be used on all materials being lowered or hoisted up and a standard signal system shall be used.
- No beams shall be cut until precautions have been taken to prevent it from swinging freely and possibly striking any worker or equipment to any part of the structure being demolished.
- All structural steel members shall be lowered from the building and shall not be allowed to drop.

40. (d)

- Archimedean spiral is used in cam design and lathe chucks.
- Logarithmic spiral is used in the construction of loud speakers, audio amplifiers, etc.
- Helical grooves of square shape is used on cylindrical cams, screw conveyors, etc.

41. (d)

- Statement 1 is correct for cost of quality.
- Statement 1 is correct for value of quality.

42. (c)

Quality loss results from customer's dissatisfaction. The loss is measured in monetary terms and includes all costs in excess of the cost of a perfect product. The Taguchi Loss Function is often associated with quadratic forms, but it can be adapted to other loss shapes based on the specific needs of the optimization problem.

43. (c)

Market value of product decreases with poor quality of product.

44. (a)

45. (d)

Techno-craft paradigm : It seeks to employ the custom-craft paradigm in performance while reducing delivery time. It requires a high level of product process flexibility, which enables the customers to get exactly what they desire. The requirement here is to integrate machine, men and automation.

46. (d)

47. (b)

Benefits of ISO Certificate:

- The logo will increase the stature of the company assessed to ISO standard. Company will be able to display the certification body's logo on their correspondence.
- It will open international doors and not just those locally.
- It will satisfy the larger businesses that the company operates and will result in fewer customer audits needed to be carried out to confirm the on-going commitment.
- It will provide an improvement in communications on both internally and to customers.
- Employee will be better aware of their responsibilities and need to satisfy customers.
- Profit of the company increases.

48. (a)

Quality audits should not be directed in a way that results in a transfer of the responsibility to achieve quality from the operating staff to the auditing organization.

49. (b)

Using the PDSA cycle in strategic planning ensure that:

- Plans are developed more systematically.
- Progress on plans is carefully monitored.
- Changes to plans are made where necessary.
- The breakthrough objectives are attained.
- The planning process is continuously improved.
- Organizational learning occurs.

50. (d)

Applicable interest rate for 2 years is 12%

$$\text{Future value, FV} = PV(1+i')^{n'}$$

Quarterly means earning once in 3 months.

$$i' = \frac{i}{12}\times 3 = \frac{0.12}{12}\times 3 = 0.03$$

$$n' = n \times 4 = 2 \times 4 = 8$$

$$\text{FV} = 1000(1 + 0.03)^8$$

$$\text{FV} = 1000 \times (1.03)^8$$

51. (d)

52. (b)

- Resource smoothing is applied if duration of completion of the project is the constraint.
- The periods of minimum demand for resources are located and the activities are shifted according to the float availability and requirement of resources.
- On the other hand, resource levelling is done if the restriction is on the availability of resources. In this process of resource levelling, whenever the availability of resources becomes less than its maximum requirement, the only alternative is to delay the activity having larger float.

53. (c)

54. (b)

Project life cycle has 4 phases:

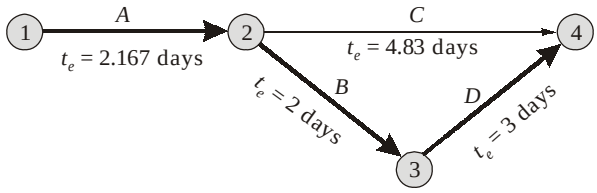
Phase of project life cycle	Input	Output
Project feasibility phase	Business case, project charter, phase charter	Project feasibility study
Project definition phase	Project charter, project feasibility study	Project design, project plan
Project execution phase	Phase charter, project design, project plan	Certificate of completion
Project commissioning and handover phase	Project charter, certificate of completion	Closure report

55. (b)

$$\text{Expected time, } t_e = \frac{t_0 + 4t_m + t_p}{\sigma}$$

$$\text{and standard deviation, } \sigma = \left(\frac{t_p - t_0}{\sigma}\right)^2$$

Now,



Now, standard deviation of project, σ is given as

$$\sigma = \sqrt{(\sigma_A)^2 + (\sigma_B)^2 + (\sigma_D)^2}$$

$$= \sqrt{(0.5)^2 + (0.33)^2 + (0.67)^2}$$

$$= 0.898 \text{ days}$$

56. (b)

The payback period is the length of time required to recover the initial cash outlay on the project.

57. (d)

58. (c)

Debenture capital does not become share capital of the company.

59. (d)

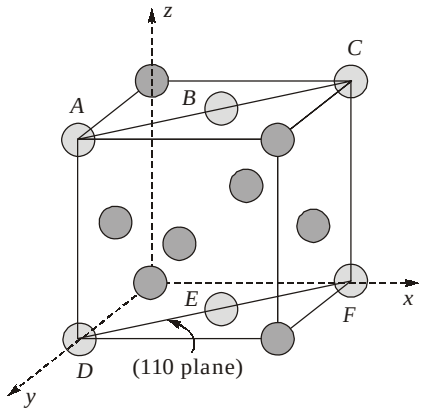
- Materials that are utilized in high technology (or high-tech) applications are termed advanced materials.
- Advanced materials include semiconductors, biomaterials, and what we may term “materials of the future” (that is smart materials and nanoengineered materials).

60. (d)

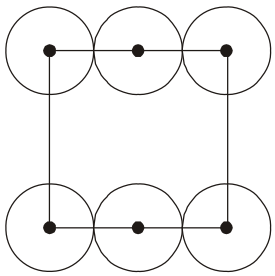
- Three different types of primary or chemical bonds are found in solids-ionic, covalent and metallic.
- Van der Waal's forces are secondary bonds as they do not involve the exchange or sharing of valence electrons and rely on dipole-dipole interactions.
- Secondary or Van der Waals or physical bonds are weak in comparison to the primary or chemical ones.

61. (b)

$$\text{Planar density} = \frac{\text{Number of atoms centered on a plane}}{\text{Area of plane}}$$



On (110) plane of FCC crystal, 6 atoms centres lie on plane (one-quarter of 4 corner atoms and one-half of two face-centered atoms).



FCC: $a = 2\sqrt{2}R$

$$\text{Total equivalent atoms} = \frac{1}{4}\times 4+\frac{1}{2}\times 2 = 2$$

$$PD_{110} = \frac{2 \text{ atoms}}{\sqrt{2}a^2} = \frac{\sqrt{2}}{a^2}$$

62. (b)

$$\text{Intercepts} : \frac{a}{2} \quad b \quad c$$

Writing Intercepts as multiples of unit cell constants,

$$\Rightarrow \quad \text{Intercepts} : \frac{1}{2} \quad 1 \quad 1$$

$$\text{Reciprocal} \Rightarrow 2 \quad 1 \quad 1$$

$$\text{Enclosure} \Rightarrow (2 \quad 1 \quad 1)$$

63. (b)

- Frenkel defect : Cation vacancy and a cation interstitial pair. (Frenkel defect is caused if some of the ions of the lattice occupy interstitial sites, leaving a corresponding number of normal lattice sites vacant).

- Schottky defect : A cation vacancy-anion vacancy pair. (Schottky defect arises due to the missing of an equal number of cations and anions from the crystal lattice)
- Linear defects : Linear defects, also called dislocations, are one-dimensional imperfections in a crystal lattice, representing a line where atoms are misaligned, eg. Edge dislocation, Screw dislocation.
- Interfacial defects : Interfacial (or planar) defects are two-dimensional boundaries separating regions of materials possessing different crystal structure. Eg.
  - Grain boundaries
    - → Tilt boundary
    - → Twist boundary
    - → Twin boundary

  (The atomic arrangement on one side of a twin boundary is a mirror reflection of the arrangement on the other side.)
  - Stacking faults
  - Phase boundaries
  - Ferromagnetic domain walls

64. (b)

Polymer consists of repeating units that represent the monomers. When all the repeating units along a chain are of the same type, the resulting polymer is called a homopolymer. Chains may be composed of two or more different repeat units, in what are termed copolymers.

65. (a)

Given, $\mu = 0.126\ N/A^2$

$$\text{Relative permeability, } \mu_r = \frac{\mu}{\mu_0} = \frac{0.126}{4\pi \times 10^{-7}} = 10^5$$

$$\text{Magnetic susceptibility, } x_m = \mu_r - 1 = 10^5 - 1 = 99999$$

66. (a)

- Paramagnetic materials are characterized by a small positive magnetic susceptibility, meaning they are weakly attracted to magnetic fields. However, they do not retain the magnetic properties when the external field is removed.
- Paramagnetic materials follows Curie's Law i.e.

$$\chi_m \propto \frac{1}{T}$$

Hence, only statements 1 and 3 are correct.

67. (a)

Electromagnets are temporary magnets, which means they only exhibit magnetic properties when an electric current is applied. Electromagnets need soft iron with low coercivity and low retentivity, so magnetism disappears when current is switched off.

68. (a)

In a non-uniform magnetic field, a magnetic dipole experiences torque (to align with the field) and force (due to field gradient causing the needle to move in space rather than just rotating).

69. (b)

When an external field is applied to a paramagnetic material, the dipoles align with the field creating a weak net magnetization in the same direction.

Paramagnetic materials lose magnetisation after field removal but show saturation and cooling via adiabatic demagnetisation.

70. (b)

Here, coercivity, $H = 5 \times 10^3$ A/m; $l = 10$ cm and total turns = 500

$$\text{Turns per meter} = \frac{500}{10} \times 100 = 5000 \text{ turns/m}$$

To demagnetize the magnet, the magnetic field produced by the solenoid shall equal to the material's coercivity i.e.,

$$H = Ni$$
$$5 \times 10^3 = 5000 \times i$$
$$i = 1\text{A}$$

71. (a)

Permanent magnets require high retentivity and coercivity to retain magnetism for long durations. High retentivity ensures that the magnet remains magnetized over time, while high coercivity ensures that magnet resists demagnetization from external influences.

72. (c)

In ferromagnetic materials, magnetic susceptibility depends strongly on both curie temperature and applied field strength, unlike diamagnetic or paramagnetic materials.

73. (c)

The singularities of $f(z) = \dfrac{e^z}{(z^2+\pi^2)^2}$ are given by $z = \pm \pi i$, which lies inside c.

$$\text{Residue at } z = \pi i \text{ is } \lim_{z\to\pi i} \frac{d}{dz}\left\{(z-\pi i)^2 \frac{e^z}{\left(z^2+\pi^2\right)^2}\right\}$$

$$= \lim_{z\to\pi i} \frac{d}{dz}\left\{\frac{e^z}{\left(z^2+\pi i\right)^2}\right\} = \lim_{z\to-\pi i} \frac{e^z(z+\pi i)^2 + 2e^z(z+\pi i)}{(z+\pi i)^4}$$

$$= \frac{(-1)(2\pi i)+2(-1)}{(2\pi i)^3} = \frac{\pi-1}{4\pi^3}$$

$$\text{Residue at } z = -\pi i \text{ is } \underset{x\to -\pi i}{Lt}\frac{d}{dz}\left\{(z+\pi i)^2\frac{e^z}{\left(z^2+\pi^2\right)^2}\right\}$$

$$= \lim_{x\to -\pi i}\frac{d}{dz}\left\{\frac{e^z}{(z-\pi i)^2}\right\} = \lim_{x\to -\pi i}\frac{e^z(z-\pi i)^2+2e^z(z-\pi i)}{(z-\pi i)^4}$$

$$= \frac{(-1)(-2\pi i)+2(-1)}{(-2\pi i)^3} = \frac{\pi+i}{4\pi^3}$$

$\therefore$ The given integral $= 2\pi i\left(\frac{\pi+i}{4\pi^3}+\frac{\pi-i}{4\pi^3}\right) = \frac{i}{\pi}$

74. (b)

By addition theorem,

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

$$\Rightarrow 1-P\left(\overline{E_1\cup E_2}\right) = \frac{\alpha}{2}+\alpha-0.5$$

Using De-Morgan's Law in probability,

$$\Rightarrow 1-P\left(\bar{E}_1\cap\bar{E}_2\right) = \frac{3\alpha}{2}-0.5$$

$$\Rightarrow 1-0.5 = \frac{3\alpha}{2}-0.5$$

$$\Rightarrow \alpha = \frac{2}{3}$$

75. (c)

The auxiliary equation is

$$m^2+1 = 0$$

$$m = \pm i$$

$$\text{The complementary function} = C_1\cos x + C_2\sin x$$

$$\text{Particular integral} = \frac{x^2}{D^2+1} = (1+D^2)^{-1}x^2$$

$$= (1-D^2+D^4\_\_\_\_)x^2 = x^2-2$$

$$\text{The solution is } u = C_1\cos x + C_2\sin x + x^2 - 2$$

76. (a)

For a square matrix A, X is an eigenvector with corresponding eigenvalue. if $AX = \lambda X$

$$\Rightarrow \begin{bmatrix}1&0&1&0\\0&1&0&1\\1&0&1&0\\0&1&0&1\end{bmatrix}\begin{bmatrix}1\\0\\1\\0\end{bmatrix} = \lambda\begin{bmatrix}1\\0\\1\\0\end{bmatrix}$$

$$\Rightarrow \quad \begin{bmatrix}2\\0\\2\\0\end{bmatrix} = \lambda\begin{bmatrix}1\\0\\1\\0\end{bmatrix}$$

$$\therefore \quad \lambda = 2$$

77. (d)

If the system $AX = B$ is inconsistent, then rank of $A <$ rank of $[A \mid B] \le n$

$\Rightarrow$ rank of $A < n$

$\Rightarrow$ The highest possible rank of $A = n - 1$

78. (d)

The integrand is an analytical function.

The value of the integral is independent of the path joining the given points.

Thus, the given integral equals

$$\int_{1+i}^{2+3i}(12z^2 - 4iz)dz = (4z^3 - 2iz^2)\Big|_{1+i}^{2+3i}$$

$$= 4[(2+3i)^3 - (1+i)^3] - 2i[(2+3i)^2 - (1+i)^2]$$

$$= 4[(8+36i-54-27i) - (1+3i-3-i)] - 2i[(4+12i-9) - (1+2i+1]$$

$$= 4(-44+7i) - 2i\,[-5+10i\,]$$

79. (b)

Let $z + 2 = u$ or $z = u - 2$

Then $$(z-3)\sin\frac{1}{z+2} = (u-5)\sin\frac{1}{u}$$

Using $$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \ldots, \text{we get}$$

$$(z-5)\sin\frac{1}{u} = (u-5)\left\{\frac{1}{u} - \frac{1}{3!u^3} + \frac{1}{5!u^5} + ----\right\}$$

$$= 1 - \frac{5}{u} - \frac{1}{3!u^2} + ------ \qquad \text{where } u = z+2$$

$\therefore$ Coefficient of $\frac{1}{z+2} = -5$

80. (b)

M $\xrightarrow{+2}$ O I $\xrightarrow{-2}$ G K $\xrightarrow{+2}$ M E $\xrightarrow{-2}$ C

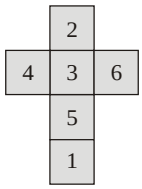
Similarly, C $\xrightarrow{+2}$ E I $\xrightarrow{-2}$ G A $\xrightarrow{+2}$ C D $\xrightarrow{-2}$ B

Therefore, option (b) is correct.

81. (b)

From dice II and III, 3 and 5 are common numbers.

From the given information, the dice pattern can be obtained as below:



1 is opposite to 3

2 is opposite to 5

4 is opposite to 6

82. (c)

In the above given figure, in one quadrant, Number of squares are 3

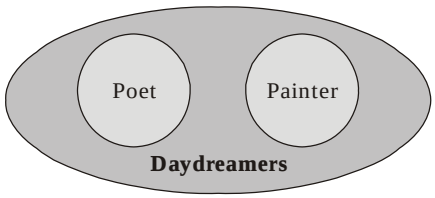
Number of squares = $3 \times 4 = 12$

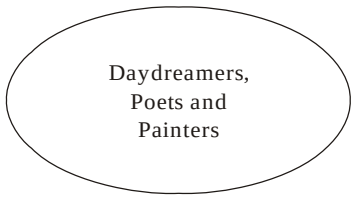
Combined squares = 3

Total squares = $12 + 3 = 15$

$\therefore$ Total number of squares are 15.

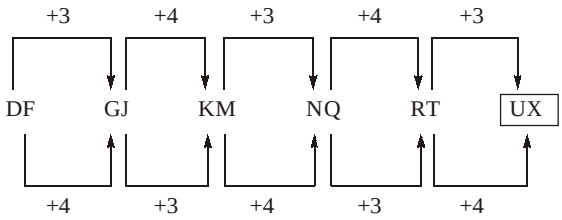
83. (c)





All painters and poets are daydreamers allows for the possibility that the set of painters, poets and the set of daydreamers are identical i.e. every single daydreamer is a painter and poet. Hence, it cannot be said with certainty that all painters are poets and there are daydreamers who are not painters. Hence, neither conclusion (I) nor (II) follows.

84. (a)



Hence, option (a) is correct.

85. (a)

According to the given information, we can conclude that

V > W > Z > X > Y > U

W ↓ Husband

U ↓ Niece

Thus, V won the game and U got the lowest point.

86. (d)

$$15 \text{ men} \times 20 = 24 \text{ Women} \times 20$$

$$\Rightarrow 15 \text{ men} = 24 \text{ women}$$

$$\Rightarrow 10 \text{ men} = 16 \text{ women}$$

Let us assume that the 10 men and 8 women can complete the work in 'D' days.

Now, $(10 \text{ men} + 8 \text{ women}) \times D = 24 \text{ women} \times 20$

$$\Rightarrow (16 \text{ women} + 8 \text{ women}) \times D = 24 \text{ women} \times 20$$

$$24 \text{ women} \times D = 24 \text{ women} \times 20$$

$$\therefore D = 20 \text{ days}$$

87. (c)

Here, cost price of retailer = 24×5 = Rs. 120

Selling price of retailer = 25×6 = Rs. 150

Profit = 150 – 120 = Rs. 30

$$\therefore \text{Profit percentage} = \frac{30}{120} \times 100 = 25\%$$

88. (d)

If the length, breadth and height of the cuboid be x, y and z cm respectively, then

$$xy = 12,\ yz = 20,\ zx = 15$$

$$x^2y^2z^2 = 12 \times 20 \times 15 = 3600 \text{ cm}^6$$

$$\text{Volume, } V = xyz = \sqrt{3600} = 60 \text{ cm}^3$$

89. (c)

In the question, the circle represents Noble, triangle represents Hindi speaking people and Rectangle represent Poet, then Noble Poet who can't speak Hindi is represented by area enclosed by both circle and rectangle but not triangle. So, 6 is the only element.

90. (b)

91. (c)

Inter-generational equity advocates for the preservation and sustainable use of resources so that future generations have access to the same opportunities as the present one.

92. (b)

93. (c)

94. (c)

Control rods in a nuclear reactor are made of materials like Cadmium or Boron to absorb neutrons.

95. (c)

Solar cells produce Direct Current (DC), which must be converted to AC using an inverter for most household uses.

96. (c)

Energy flow in an ecosystem is unidirectional; energy lost as heat cannot be recycled back to the previous trophic level.

97. (b)

AI is technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy. Both the statements are correct but Statement (II) is not the correct explanation of Statement (I).

98. (b)

- Blockchain is a decentralized digital database or ledger that securely stores records across a network of computers in a way that is transparent, immutable, and resistant to tampering. Each "block" contains data, and the blocks are linked in a chronological chain.
- Block time measures the average time it takes for a new block to be added to the blockchain. It reflects the speed at which the network processes transactions and updates its state.

Thus, both the statements are correct but Statement (II) is not the correct explanation of Statement (I).

99. (c)

100. (b)

Both statements are independently correct.

- Ionic bonding is considered non-directional ; i.e. the magnitude of the electrostatic force is equal in all directions around an ion.
- Ionic materials are characteristically hard and brittle and, furthermore , electrically and thermally insulative. They are characterized by strong electrostatic bonding forces and thus, relatively high binding energies and melting points. They are poor conductors of electricity because the energy required to transfer electrons from anions to cations is very large. These properties are a direct consequence of electron configuration and / or the nature of the ionic bond.

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