

GS FULL LENGTH TEST-02 OBJECTIVE SOLUTION... 

ANSWERS

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

1. (d)

A composite is a multiphase material that exhibits a significant proportion of properties of both constituents. These constituents phase must be chemically dis-similar and separated by a distinct interface. A composite has a surrounding matrix and a reinforced phase.

2. (a)

Degree of polymerization

$$= \frac{\text{molecular weight of PVC}}{\text{molecular weight of vinyl chloride}}$$

Molecular weight of PVC = 25000 × 62.5

3. (d)

In order to protect the brick masonry walls and columns from the ill effects of earthquake a steel band can be provided at corners, to make the cross walls behave as one unit. A band can also be provided at lintel level (i.e. above windows) or at roof level (i.e. below ceiling) or at plinth level.

4. (a)

Classical free electron theory says that a constant potential will be experienced to electrons in metal.

5. (b)

According to ohm's law, resistance can be defined as the ratio of voltage across the conductor to the current through the conductor

$$\text{Resistance } R = \rho \frac{l}{A} = \frac{1}{\sigma} \times \frac{l}{A}$$

Where σ is conductivity

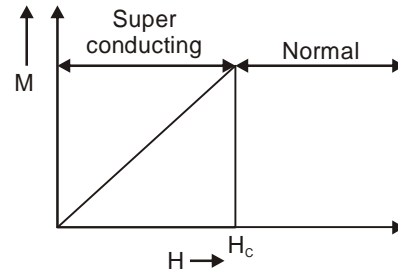
$l \rightarrow$ length

6. (b)

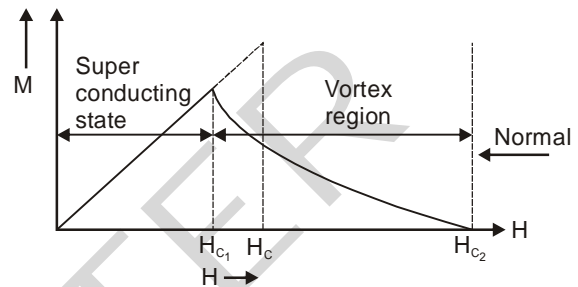
Fuse has very low melting point. When high current flows, heat is produced in fuse and it melts, Hence circuit breaks.

7. (c)

Type-I superconductor undergo to the normal state above critical magnetic field.



Type-II superconductor



Type-II superconductors are known as hard superconductors because they lose their superconductivity gradually. Besides being mechanically harder than type I superconductors they exhibit higher critical magnetic fields, so these are used in the construction of high field superconducting magnets.

8. (b)

Thermoplastics are long chain - molecules held together by van der waals forces which can be softened again and again after being hardened. They can be easily shaped Ex - polyethylene, polystyrene, PVC etc.

9. (d)

In first angle method, following statements are true.

- (a) FV is above XY
- (b) TV is below XY
- (c) LHSV is on the right side of FV
- (d) RHSV is on the left side of FV

10. (c)

In third angle method, following statements are true

- (a) FV is below XY
- (b) TV is above XY
- (c) LHSV is on the left side of FV
- (d) RHSV is on the right side of FV

11. (d)
12. (d)
HEA is used to predict human error, not to review what has occurred HEA should be used to identify hazards before they cause accidents.
13. (a)
 - Test shall be carried out once after the every blast or major rock-fall
 - Temperature of work place not more than 40°C dry and 29°C wet.
14. (d)
15. (d)
16. (c)
17. (a)
18. (c)
The Food Sustainability Index is a quantitative and qualitative benchmarking model that measures the sustainability of food systems across three categories: Food Loss and Waste, Sustainable Agriculture and Nutritional Challenges.
It is developed by the Economist Intelligence Unit with the Barilla Center for Food and Nutrition and ranks 67 countries on food system sustainability. Three key types of performance indicators of this index are: (a) environmental, (b) societal and (c) economic.
19. (a)
It is a near-Earth object and a potentially hazardous asteroid of the Apollo group. It measures approximately 1 kilometre in diameter.
20. (d)
The National Institute for Transforming India (NITI) Aayog has developed the Composite Water Management Index (CWMI) to enable effective water management in Indian states in the face of this growing crisis.
Gujarat is the highest performer, closely followed by other High performers such as Madhya Pradesh and Andhra Pradesh.
Objectives: (a) To establish a clear baseline and benchmark for state-level performance on key water indicators, (b) To uncover and explain how states have progressed on water issues over time,
21. (b)
including identifying high-performers and under-performers, thereby inculcating a culture of constructive competition among states.
21. (b)
Ujwal DISCOM Assurance Yojana (UDAY) - A scheme for the financial turnaround of Power distribution companies (DISCOMs) to improve the operational and financial efficiency of the state DISCOMS.
22. (c)
The Van Dhan Scheme has been jointly implemented by Ministry of Tribal Affairs and TRIFED with the main aim to improve tribal incomes through value addition of tribal products.
The Nodal Department to implement the scheme at the Central Level is Ministry of Tribal Affairs and TRIFED is the Nodal Agency at the National Level.
23. (a)
Sampark portal is a digital platform to connect five lakh job seekers with recruiters.
It will be useful in creating a skill pool of workers and connecting trained youth with job opportunities
It is under the Ministry of Micro, Small & Medium Enterprises (MSME).
24. (d)
NABH stands for Nextgen Airports For Bharat Nirman initiative
Its main objective is to increase the number of Airports and their capacity to handle traffic.
It will expand the airports and increase the traffic handling capacity of airports by more than five times the airport capacity to handle a billion trips a year.
Under this initiative, 100 new airports will be constructed in the next 10 years.
25. (b)
26. (c)
It has been launched by the Ministry of Culture of Government of India for the financial year 2018-19 and 2019-20.
Under this scheme, the CGST and the centre's share of IGST paid on the purchase of specific items by charitable/religious institutions for

distributing free food to the public shall be reimbursed as financial assistance by the Government of India.

27. (a)

Hysis is called as the hyper spectral imaging satellite and will be used for detailed analysis of weather patterns, which is expected to aid agriculture.

It will also monitor India's coastlines, to estimate conditions for fishing in the high seas, and possible security matters.

It will provide insights into the Earth's geology, with the possibility of analysing seismic activity.

28. (a)

Shareware is copyrighted software that is distributed on a trial basis before we buy it by paying a nominal shareware fee.

System software is a type of computer program that is designed to run a computer's hardware and application program.

29. (a)

Also known as the Industrial Internet, Industrial Internet of Things (IIoT) incorporates machine learning and big data technology, harnessing the sensor data, machine-to-machine (M2M) communication and automation technologies that have existed in industrial settings. This data can enable companies to pick up on inefficiencies and problems sooner, saving time and money and supporting business intelligence efforts.

30. (a)

United States and global technical standards use the official term additive manufacturing for the broader sense of 3d printing.

Objects can be of almost any shape or geometry and typically are produced using digital model data from a 3D model or another electronic data source such as an Additive Manufacturing File (AMF) file (usually in sequential layers) and different technologies, like stereo-lithography (STL file).

31. (a)

Unlike laser printer, ink jet printer do not have large buffer, so printing is done a bit at a time. This is why printing is sometimes paused since the whole page cannot be stored in buffer.

32. (d)

It is based on the characteristic of organic light emitting diodes.

OLED can be fabricated on flexible plastic substrate and transparent display are also possible using OLEDS.

33. (a)

$2^{10} = 1024$ bytes

Data Measurement Chart

Data Measurement	Size
Bit	Single Binary Digit (1 or 0)
Byte	8 bits
Kilobyte (KB)	1,024 Bytes
Megabyte (MB)	1,024 Kilobytes
Gigabyte (GB)	1,024 Megabytes
Terabyte (TB)	1,024 Gigabytes
Zetta byte (ZB)	1,024 Terabytes
Exabyte (EB)	1,024 Petabytes

34. (d)

The word main is used to distinguish it from external mass storage devices such as disk drives. Other terms used to mean main memory include RAM and primary storage.

The computer can manipulate only data that is in main memory. Therefore, every program you execute and every file you access must be copied from a storage device into main memory.

35. (c)

Despite this, the percentage of carbon dioxide in our atmosphere is a mere fraction of a percent because carbon dioxide is 'fixed' in two ways:

- (i) Green plants convert carbon dioxide into glucose in the presence of Sunlight and
- (ii) Many marine animals use carbonates dissolved in sea-water to make their shells.

36. (c)

The combustion of fossil fuels also increases the amount of suspended particles in air. These suspended particles could be unburnt carbon particles or substances called hydrocarbons. Presence of high levels of all these pollutants

Website : www.iesmaster.org E-mail: info@iesmaster.org
 Office : F-126, Katwaria Sarai, New Delhi-110016 (Phone : 011-41013406, 8010009955, 9711853908)

causes visibility to be lowered, especially in cold weather when water also condenses out of air. This is known as smog and is a visible indication of air pollution.

Studies have shown that regularly breathing air that contains any of these substances increases the incidence of allergies, cancer and heart diseases. An increase in the content of these harmful substances in air is called air pollution.

37. (d)

The availability of water decides not only the number of individuals of each species that are able to survive in a particular area, but it also decides the diversity of life there. Of course, the availability of water is not the only factor that decides the sustainability of life in a region.

Other factors like the temperature and nature of soil also matter. But water is one of the major resources which determine life on land.

38. (a)

The roots of plants have an important role in preventing soil erosion. The large-scale deforestation that is happening all over the world not only destroys biodiversity, it also leads to soil erosion. Topsoil that is bare of vegetation is likely to be removed very quickly. And this is accelerated in hilly or mountainous regions. This process of soil erosion is very difficult to reverse. Vegetative cover on the ground has a role to play in the percolation of water into the deeper layers too.

39. (b)

A greenhouse gas is a gas in an atmosphere that absorbs and emits radiant energy within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

40. (d)

- i. Sense of Discipline – Instilled by head of organisation and leaders of society. e.g.: Lal Bahadur Shastri used to pay when his sons used official car.
- ii. Behavioral change – in bureaucrats through training, performance appraisal
- iii. Effective laws and their enforcement

iv. Effectively prosecution

v. Autonomy of institutions – like CBI, CVC, ED etc

vi. E- governance – Use of ICT for transparency.

41. (c)

42. (b)

Social media is all about creating relationships with your target audience, forming bonds, communities and creating a better understanding of each key target. If you don't stay transparent you risk losing all you have built and your reputation could even be irreparably damaged.

43. (d)

Conflict of interest is a situation in which a person is in a position to derive personal benefit from actions or decisions made in their official capacity. Nepotism is the practice among those with power or influence of favoring relatives or friends, especially by giving them jobs or benefits.

44. (c)

Conflict of interest is a situation in which a person is in a position to derive personal benefit from actions or decisions made in their official capacity.

45. (a)

Someone who works for a government or large organization and deals with the complaints made against it is called ombudsman.

46. (d)

(a) Accuracy: Accuracy firstly involves gathering of all the relevant facts. It also involves verifying and checking the facts thoroughly using more than one source.

(b) Truth: Truth is the oldest and most highly regarded ethical principle of humankind.

Without the truth, a journalist has neither integrity nor credibility.

(c) Fairness: Fair means to balance stories in such a way that no party is misrepresented, either by choice of words or by the lack of proper context.

(d) Objectivity: Objectivity encompasses the commitment to report truthfully, comprehensively, and intelligently.

47. (a)

Whistle blowing occurs when an employee or former employee conveys information about a significant moral problem to someone in a position to take action on the problem and does so outside approved organizational channel.

48. (c)

49. (c)

50. (c)

51. (a)

52. (b)

53. (c)

54. (c)

55. (a)

56. (b)

In ABC analysis, A item requires minimum or low safety stock, as these items are costly are costly monitored frequently.

57. (b)

- PERT uses probabilistic activity time estimates
- Total slack along critical path is zero
- There slack along critical path is zero
- There can be more then critical path in PERT network

58. (a)

setting standards is always the first step in a control process so that actual performance can be measured against, those standards.

59. (c)

60. (b)

61. (b)

- Top down budgeting starts by first deciding the whole project cost and dividing the amount between work packages.
- Budgeting is mostly done by senior managers.
- It allows lower level managers to work their regular business.

62. (d)

63. (d)

Functions of production control department one:-

- operation scheduling with desired quality
- Resource planning
- Process selection
- Capacity planning
- facility location
- Machine loading
- follow up.

64. (c)

Let us assume that it took 't' hours to complete the work working together.

$$\therefore \text{Time taken by Sudha} = t + 3$$

$$\text{Time taken by Ramya} = t + \frac{1}{2}$$

$$\text{Time taken by Shanti} = 2t$$

$$\therefore \frac{1}{t+3} + \frac{1}{t+\frac{1}{2}} + \frac{1}{2t} = \frac{1}{t}$$

Substituting the given values, we can identify the equation is satisfied

$$\text{when } t = 20 \text{ min} = \frac{1}{3} \text{ hours} = 20 \text{ minutes.}$$

65. (a)

$$\frac{1}{\log_3 e} + \frac{1}{\log_3 e^2} + \frac{1}{\log_3 e^4} + \dots$$

$$\Rightarrow \log_e 3 + \frac{1}{2} \log_e 3 + \frac{1}{4} \log_e 3 + \dots$$

$$\Rightarrow \log_e 3 \left[1 + \frac{1}{2} + \frac{1}{4} + \dots \right]$$

$$\Rightarrow \log_e 3 \times \frac{1}{1 - \frac{1}{2}}$$

$$\Rightarrow 2 \log_e 3$$

$$\Rightarrow \log_e 9$$

So option 'a' is correct

66. (d)

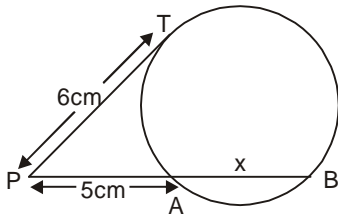
Every two seconds the monkey gains 1 ft. Climbs 3 feet in 1st second and slips 2 feet in the next.

However, when it has reached 27 ft, in the next jump (3ft upwards) it will reach the top.

It will take $27 \times 2 = 54$ seconds to reach 27ft and then 1 sec to reach the top.

Hence 55 seconds.

67. (a)



$$PT^2 = PA \times PB$$

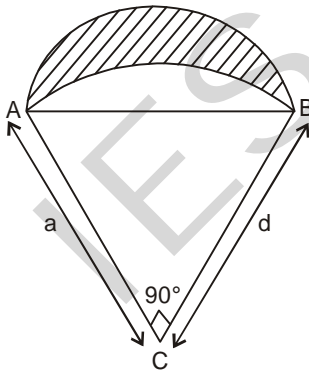
$$6^2 = 5 \times (5 + x)$$

$$\frac{36 - 25}{5} = x$$

$$\Rightarrow x = \frac{11}{5} = 2.2 \text{ cm}$$

So option 'a' is correct.

68. (c)



$$\text{Area of sector} = \frac{\pi}{4} a^2$$

$$\text{Area of semi circle} = \frac{\pi}{4} (\sqrt{2}a)^2 / 2$$

$$= \frac{\pi}{8} \times 2a^2 = \frac{\pi}{4} a^2$$

$$\text{Area of } \Delta = \frac{1}{2} \times a^2 = \frac{a^2}{2}$$

Area of shaded region

$$= \text{Area of semi-circle } \widehat{AB}$$

$$- (\text{Area of sector} - \text{Area of } \Delta)$$

$$= \frac{\pi}{4} a^2 - \left(\frac{\pi}{4} a^2 - \frac{a^2}{2} \right) = \frac{a^2}{2}$$

So option 'c' is correct.

69. (b)

If T is the total number of books in the library

$$\text{then } \frac{1}{4}T + \frac{1}{3} \left(1 - \frac{1}{4} \right) T + 750 = T$$

$$\Rightarrow T = 1500$$

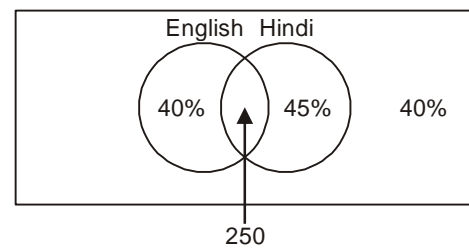
70. (a)

$$S = 5[3+4+5+6+ \dots + 51]$$

$$= 5[(1+2+3+ \dots + 51)(1+2)]$$

$$= 5 \left[\frac{51 \times 52}{2} - 3 \right] = 6615$$

71. (a)



Total number of students = x

$$\frac{40x}{100} + \frac{45x}{100} - 250 + \frac{40x}{100} = x$$

$$\Rightarrow x = 1000$$

72. (c)

Assuming that number of toffees is A.

Number of toffee left in the bowl, when R returned the toffees is

Website : www.iesmaster.org E-mail: info@iesmaster.org

Office : F-126, Katwaria Sarai, New Delhi-110016 (Phone : 011-41013406, 8010009955, 9711853908)

IES MASTER
Institute for Engineers

$$\left(\frac{2}{3}A + 4\right).$$

The number of toffee left in the bowl, when S returned the toffees is

$$\left[\frac{2}{4}\left(\frac{2}{3}A + 4\right)\right] + 3.$$

The number of toffee left in the bowl, when T returned the toffees is

$$\frac{1}{2}\left(\frac{A}{2} + 6\right) + 2.$$

finally

$$\frac{A}{4} + 3 + 2 = 17$$

A = 48 toffees

73. (c)

The required probability is

$$= \frac{39}{52} \times \frac{39}{52} \times \frac{39}{52} = \left(\frac{3}{4}\right)^3 = \frac{27}{64}$$

74. (c)

$$f(x) = |x|^3 = \begin{cases} x^3 & \text{if } x > 0 \\ -x^3 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \end{cases}$$

$f(x)$ is continuous at $x = 0$
 $(\because \text{LHS} = \text{RHS} = f(0) = 0)$

$$\text{Now, } f'(x) = \begin{cases} 3x^2 & \text{if } x > 0 \\ -3x^2 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \end{cases} \quad \therefore$$

LHD = 0 = RHD so $f(x)$ is once differentiable

$$\text{Again } f''(x) = \begin{cases} 6x & \text{if } x > 0 \\ -6x & \text{if } x < 0 \\ 0 & \text{if } x = 0 \end{cases}$$

\therefore LHD = 0 = RHD so $f(x)$ is twice differentiable

$$\text{Again } f'''(x) = \begin{cases} 6 & \text{if } x > 0 \\ -6 & \text{if } x < 0 \\ \text{Does not if } x = 0 \end{cases}$$

\therefore LHD = -6 & RHD = 6 ie LHD \neq RHD

So $f(x)$ is not thrice differentiable.

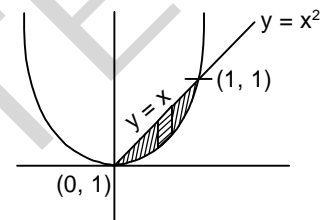
75. (a)

Given, equation of straight line is

$$y = x \dots (1)$$

And equation of parabola is

$$y = x^2 \dots (2)$$



From equation (1) and (2) we get

$$x^2 = x$$

$$\Rightarrow x^2 - x = 0$$

$$\therefore x = 0, 1$$

$$x = 0 \text{ and } x = 1$$

$$\Rightarrow y = 0 \text{ and } y = 1$$

(Using vertical strip)

$$\text{Enclosed Area} = \iint (1) \, dy \, dx$$

$$= \int_{x=0}^1 \int_{y=x^2}^x (1) \, dy \, dx$$

$$= \int_0^1 (x - x^2) \, dx$$

$$= \left[\frac{x^2}{2} - \frac{x^3}{3} \right]_0^1$$

$$= \frac{1}{2} - \frac{1}{3} = \frac{1}{6}$$

76. (a)

Given, $\nabla \cdot (f \vec{v}) = x^2y + y^2z + z^2x$

and $\vec{v} = y\hat{i} + z\hat{j} + x\hat{k} \Rightarrow \nabla \cdot \vec{v} = 0$

Now, using vector identity,

$$\nabla \cdot (f \vec{v}) = f(\nabla \cdot \vec{v}) + \nabla f \cdot \vec{v}$$

$$= 0 + \vec{v} \cdot \nabla f$$

(as dot product is commutative)

$$\vec{v} \cdot \nabla f = \nabla \cdot (f \vec{v})$$

$$= x^2y + y^2z + z^2x$$

77. (b)

$$f(z) = \frac{1}{(z-4)(z+1)^3}$$

Residue for

$$\frac{1}{(z-4)} = \lim_{z \rightarrow 4} [(z-4)f(z)]$$

$$= \frac{1}{(5)^3} = \frac{1}{125}$$

Residue for

$$\frac{1}{(z+1)} = \lim_{z \rightarrow -1} \frac{1}{2!} \frac{d^2}{dz^2} \left[(z+1)^3 \times \frac{1}{(z-4)(z+1)^3} \right]$$

$$= \frac{1}{2!} \times \frac{2}{(-5)^3} = \frac{-1}{125}$$

So, residue is $\frac{1}{125}$ and $\frac{-1}{125}$.

78. (a)

$$\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 5\cos x$$

$$P.I. = \frac{1}{(D^2 + 3D + 2)} \cdot 5\cos x$$

Using:

$$\frac{1}{f(D^2)} \cos(ax+b) = \frac{1}{f(-a^2)} \cos(ax+b)$$

$$P.I. = 5 \frac{1}{(-1^2) + 3D + 2} \cos x$$

$$= \frac{5}{(3D+1)} \cos x$$

$$= 5 \times \frac{3D-1}{9D^2-1} \cos x$$

$$= 5 \times \frac{3D-1}{9(-1)-1} \cos x$$

$$= \frac{5}{-10} \times (3D-1) \cos x$$

$$P.I. = -\frac{1}{2} \times (3D-1) \cos x$$

$$= -\frac{1}{2} \times [(3(-\sin x) - \cos x)]$$

$$P.I. = 1.5 \sin x + 0.5 \cos x$$

79. (d)

$$L^{-1} \left[\frac{1}{s^2 + 2s} \right] = L^{-1} \left[\frac{1}{s(s+2)} \right]$$

$$= L^{-1} \left[\frac{1}{2} \left(\frac{2+s-s}{s(s+2)} \right) \right]$$

$$= \frac{1}{2} L^{-1} \left[\frac{1}{s} - \frac{1}{s+2} \right]$$

$$= \frac{1}{2} (1 - e^{-2t})$$

80. (b)

$$f(x) = x \cos x \text{ in } (-\pi, \pi)$$

$$\therefore f(-x) = (-x) \cos(-x) = -x \cos x = -f(x)$$

so $f(x)$ is an odd function

Now using Fourier series.

Website : www.iesmaster.org E-mail: info@iesmaster.org

Office : F-126, Katwaria Sarai, New Delhi-110016 (Phone : 011-41013406, 8010009955, 9711853908)

IES MASTER
Institute for Engineers (IES/GATE/PSUs)

$$a_0 = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) dx = 0$$

(\because $f(x)$ is an odd)

81. (a)

$$[A : B] = \begin{bmatrix} 1 & -2 & 3 & : & -1 \\ 1 & -3 & 4 & : & 1 \\ -2 & 4 & -6 & : & K \end{bmatrix}$$

$$R_2 \rightarrow R_2 - R_1, R_3 \rightarrow R_3 + 2R_1$$

$$= \begin{bmatrix} 1 & -2 & 3 & : & -1 \\ 0 & -1 & 1 & : & 2 \\ 0 & 0 & 0 & : & K-2 \end{bmatrix}$$

The system has infinite many solutions.

$$\Rightarrow \text{rank}(A) = \text{rank}(A : B) < n$$

$$\Rightarrow K - 2 = 0$$

$$K = 2$$

82. (d)

$$P = \begin{bmatrix} \frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} \\ 0 & 1 & 0 \\ -\frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} \end{bmatrix}$$

$$(i) |P| = 1$$

$$(ii) P^T = \begin{bmatrix} \frac{1}{\sqrt{2}} & 0 & \frac{-1}{\sqrt{2}} \\ 0 & 1 & 0 \\ \frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} \end{bmatrix}$$

$$P.P^T = \begin{bmatrix} \frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} \\ 0 & 1 & 0 \\ -\frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} \end{bmatrix} \begin{bmatrix} \frac{1}{\sqrt{2}} & 0 & \frac{-1}{\sqrt{2}} \\ 0 & 1 & 0 \\ \frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = I$$

Hence P is orthogonal as $P.P^T = I$

$$(iii) P^{-1} = \begin{bmatrix} \frac{1}{\sqrt{2}} & 0 & \frac{-1}{\sqrt{2}} \\ 0 & 1 & 0 \\ \frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} \end{bmatrix} = P^T$$

Hence (iv) is wrong.

83. (a)

Obviously, probability of using a car

$$= 0.45$$

Probability of using a bus = Probability of using public transport \times prob. of commuting by a bus

$$= (1 - 0.45) \times (0.55)$$

$$= 0.3025$$

$$\approx 0.30$$

Probability of using a metro = (Prob. of using public transport) \times (Prob. of commuting by metro)

$$= (1 - 0.45) (1 - 0.55)$$

$$= 0.2475$$

$$\approx 0.25$$

84. (c)

85. (b)

In the down-drought kiln hot gases from burning fuel are deflected to the top of the kiln which must have a permanent roof. They then flow down between the green bricks to warm and fire then burn them uniformly. These kilns are either rectangular or circular in plan.

86. (b)

The plotter can draw continuous point to point lines directly from vector graphics or command.

Printer brings images and texts on the page with the help of commands given through a network.

87. (d)

Transparent display is possible using OLEDs.

Website : www.iesmaster.org E-mail: info@iesmaster.org

Office : F-126, Katwaria Sarai, New Delhi-110016 (Phone : 011-41013406, 8010009955, 9711853908)

IES MASTER
Institute for Engineers



88. (a)

Optical character recognition (also optical character reader, OCR) is the mechanical or electronic conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image.

Widely used as a form of information entry from printed paper data records – whether passport documents, invoices, bank statements, computerised receipts, business cards, mail, printouts of static-data, or any suitable

89. (a)

The fossil fuels like coal and petroleum contain small amounts of nitrogen and sulphur. When these fuels are burnt, nitrogen and sulphur too are burnt and this produces different oxides of nitrogen and sulphur. Not only is the inhalation of these gases dangerous, they also dissolve in rain to give rise to acid rain.

90. (a)

Some gases prevent the escape of heat from the Earth. An increase in the percentage of such gases in the atmosphere would cause the average temperatures to increase world-wide and this is called the greenhouse effect. Carbon dioxide is one of the greenhouse gases. An increase in the carbon dioxide content in the atmosphere would cause more heat to be retained by the atmosphere and lead to global warming.

91. (a)

Water pollution can affect the life-forms that are found in these water bodies in various ways. It can encourage the growth of some life-forms and harm some other life-forms. This affects the balance between various organisms which had been established in that system.

92. (a)

A constant interaction between the biotic and abiotic components of the biosphere makes it a dynamic, but stable system. These interactions

consist of a transfer of matter and energy between the different components of the biosphere.

93. (c)

Vienna Convention acts as a framework for the international efforts to protect the ozone layer. However, it does not include legally binding reduction goals for the use of CFCs, the main chemical agents causing ozone depletion. These are laid out in the accompanying Montreal Protocol.

94. (b)

Accountability is mostly a legal answerability. Responsibility is both legal and moral answerability.

95. (c)

Citizens' Charters initiative is a response to the mission for solving the problems which a citizen meets, day in and day out, while dealing with the organizations providing public services. The charter is the declaration of commitment to superiority in service to customers of the department.

96. (b)

97. (d)

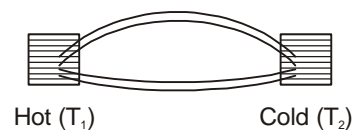
98. (b)

99. (d)

AON network diagrams eliminate the use of dummies as activity is represented by nodes and logical relationship can be shown by arrows

100. (a)

Thermocouple



When two ends of a metallic rod is subjected to different temperature. Then a thermocouple voltage is induced due to temperature gradient ($T_1 - T_2$) and hence current flows.

Website : www.iesmaster.org E-mail: info@iesmaster.org

Office : F-126, Katwaria Sarai, New Delhi-110016 (Phone : 011-41013406, 8010009955, 9711853908)

IES MASTER
Institute for Engineers

