

ESE-2019 PRELIMS TEST SERIES

Date: 9<sup>th</sup> December, 2018

**GS FULL LENGTH TEST-01 OBJECTIVE SOLUTION...** 

**ANSWERS**

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

1. (b)

2. (a)

3. (c)

4. (d)

$$t_e = \frac{t_0 + 4t_m + t_p}{6}$$

$$= \frac{2 + (4 \times 4) + 6}{6}$$

$$= 4 \text{ days}$$

5. (c)

One or more critical activities can be crashed at a time. It doesn't strictly say one activity only at a time.

6. (b)

$$(CV) = EV - AC = 450 - 500 = - 50$$

7. (a)

Fishbone diagram gives cause-effect relationship

8. (c)

9. (a)

10. (a)

11. (c)

This is done for safety testing of boiler drum in steam plant.

12. (a)

Rupture disc break when pressure in pipeline increased to design value otherwise pipeline will get fail.

13. (a)

14. (b)

15. (b)

Option (a) is called rapid prototyping.

16. (c)

17. (d)

18. (a)

Value engineering establishes the cost and performance of alternative proposals and provides useful information to the design team.

19. (a)

20. (c)

DIPP is the nodal agency for regulation of IPRs in India.

Furthermore, National intellectual property right policy is in line with India's commitment to Doha Development agenda regarding IPR and TRIPS agreement.

The Policy lays down the following seven objectives:

- IPR Awareness: Outreach and Promotion
- Generation of IPRs
- Legal and Legislative Framework.
- Administration and Management
- Commercialization of IPRs
- Enforcement and Adjudication
- Human Capital Development

21. (b)

22. (d)

23. (b)

24. (a)

25. (c)

26. (a)

*Biomes* are distinct biological communities that have formed in response to a shared physical climate. "*Biome*" is a broader term than "habitat"; any *biome* can comprise a variety of habitats.

27. (c)

- National Park-park in use for conservation purposes.
- Biosphere Reserve-area where flora and fauna are protected
- Zoo-facility in which animals are housed within enclosures, displayed to the public, and in which they may also breed.

28. (d)

Each biosphere reserve is supposed to fulfil three harmonizing functions:

- Conservation function: to conserve genetic resources, species, ecosystems and landscapes
- Development function: to promote

sustainable human development and economic

- Logistic support function: to provide support for research and analyzing the issues of conservation and sustainable development.

29. (b)

The atmosphere can be heated from below by the radiation that is reflected back or re-radiated by the land or water bodies. On being heated, convection currents are set up in the air. Land gets heated and cooled up faster than water.

30. (d)

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. The combustion of fossil fuels also increases the amount of suspended particles in air.

31. (b)

Modern farming practices involve the use of large amounts of fertilizers and pesticides.

32. (a)

It is a type of collaborative software (application software) that integrates work on a single project by several concurrent users at separated workstation. E.g.: Google spreadsheet.

33. (c)

The use of ICT in healthcare can be categorized into 4 main streams such as: Health & Education, Hospital Management System, Health Research, Health Data Management.

Health education creates awareness among the public about the communicable diseases, health status, prevention measures and various current diagnostic & therapeutic procedures. This gives a freedom to the people to choose the best hospitals and doctors to approach for treatment and to have their life in a healthy way.

ICT helps the Hospital management to lead the organization in a successful way. This helps the management to overcome the challenges faced by the Hospital. ICT helps the management to improve the patient safety and satisfaction, get

updated to the latest technology, have knowledge on population health & statistics and keep a note on the government mandates on track. Primarily, the workplace can be strengthened.

ICT in healthcare research helps in finding the possible prevention measures to eradicate and reduce the spread of diseases.

34. (a)

The ongoing push by the Reserve Bank to revolutionize banking through the Unified Payments Interface (UPI) will leave mobile wallets redundant. If the UPI adoption continues mobile wallets like SBI's Buddy, ICICI Bank's Pockets, HDFC Bank's Chillr and Paytm will be redundant. The RBI wants to cut down on cash dependence and the UPI has been brought in to do just that. It will reduce the effort, time and cost incurred on simple transactions, below Rs 1 lakh.

35. (b)

Internet of things (IoT) is the network of physical objects which are accessed through the Internet.

36. (c)

Wanna cry, Petya cry and eternal blue are name of cyberattacks that have happened in recent past.

37. (c)

An open API is different from an open-source software product. The reason that IT experts describe an API as "open" is that it is openly shared and open to public use. One example is the APIs of Facebook and other social media sites that are freely shared in order to entice developers and other users to integrate social media functionality into their software products.

Facebook and other platforms have a lot of success with offering these open APIs, allowing their platforms to be embedded in all sorts of projects.

38. (d)

Capacitive touch sensor

A capacitive touch screen uses your finger as a method to produce a capacitive shift in the system and hence sense a touch.

Advantages of Capacitive Touch screens

More scratch and abrasion resistant due to a glass or acrylic lens

Highly responsive and touch sensitive

Sensor will continue to work even if the top lens is cracked/broken.

39. (d)

Examples of auxiliary memory are flash memory, memory cards, optical discs magnetic tapes etc.

40. (d)

Banihal Qazigund Road Tunnel is a 8.5 km road tunnel at elevation of 1,790 m in the Pir Panjal range in the Indian state of Jammu and Kashmir connecting Banihal and Qazigund. It is a double tube tunnel consisting of two parallel tunnels - one for each direction of travel.

41. (b)

In order to protect and increase wild tiger population, nearly one million acres of protected habitat in India and Bhutan will be covered under a new private conservation effort.

The 'Project C.A.T - Conserving acres for Tigers' by Discovery Communications and NGO World Wildlife Fund (WWF) aims to conserve the wild tiger population, which has dropped by 96% in the last century alone to only 4,000 left in the wild due to habitat loss and pervasive poaching.

42. (a)

Article 370 of the Indian Constitution is a 'temporary provision' which grants special autonomous status to Jammu & Kashmir.

Under Part XXI of the Constitution of India, which deals with "Temporary, Transitional and Special provisions", the state of Jammu & Kashmir has been accorded special status under Article 370.

All the provisions of the Constitution which are applicable to other states are not applicable to J&K.

43. (c)

Constitution day is also known as the Samvidhan Divas.

It is celebrated annually on November 26 to mark the day of adoption of the Constitution of India.

The adoption of the Constitution took place on November 26, 1949, and came into effect on January 26, 1950.

The draft of the constitution was prepared by the

drafting committee under BR Ambedkar's leadership.

44. (a)

Stratospheric Sulphur Aerosols are sulfur-rich particles which exist in the stratosphere region of the Earth's atmosphere. The layer of the atmosphere in which they exist is known as the Junge layer, or simply the stratospheric aerosol layer.

These particles consist of a mixture of sulfuric acid and water. They are created naturally, such as by photochemical decomposition of sulfur-containing gases, e.g. carbonyl sulfide.

Sulfur aerosols are common in the troposphere as a result of pollution with sulfur dioxide from burning coal, and from natural processes.

Volcanoes are a major source of particles in the stratosphere as the force of the volcanic eruption propels sulfur-containing gases into the stratosphere.

45. (c)

Pradhan Mantri Matru Vandana Yojana (PMMVY) is a Maternity Benefit Programme that is implemented by Ministry of Women and Child Development in all the districts of the country in accordance with the provision of the National Food Security Act, 2013.

Objectives:

(a) Providing partial compensation for the wage loss in terms of cash incentives so that the woman can take adequate rest before and after delivery of the first living child.

(b) The cash incentive provided would lead to improved health seeking behaviour amongst the Pregnant Women and Lactating Mothers (PW& LM).

46. (b)

Gurdwara Darbar Sahib Kartarpur is located on the banks of the Ravi River, in Pakistan, where Shri Guru Nanak Devji spent eighteen years.

47. (d)

Ayushman Bharat - Pradhan Mantri Jan Arogya Yojana (AB-PMJAY) is a Centrally Sponsored Scheme having central sector component under Ayushman Bharat Mission anchored in the Ministry of Health and Family Welfare (MoHFW).

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

It is an umbrella of two major health initiatives, namely Health and wellness Centres and National Health Protection Scheme.

**Health and Wellness Centres:** Under this 1.5 lakh existing sub centres will bring health care system closer to the homes of people in the form of Health and wellness centres. These centres will provide comprehensive health care, including for non-communicable diseases and maternal and child health services.

**National Health Protection Mission (AB-PMJAY):** It provides a defined benefit cover of Rs. 5 lakh per family per year. This cover will take care of almost all secondary care and most of tertiary care procedures. The benefit cover will also include pre and post-hospitalisation expenses.

48. (c)

Anchor investors are institutional investors who are offered shares in an Initial Public Offerings (IPO) a day before the offer opens and 'anchor' the issue by agreeing to subscribe to shares at a fixed price so that other investors may know that there is demand for the shares offered. Each anchor investor has to put a minimum of ₹ 10 crore in the issue.

This concept of anchor investors in IPOs was introduced by Security Exchange Board of India (SEBI) in 2009.

49. (a)

Bharatmala Pariyojana is a new umbrella program for the highways sector that focuses on optimizing efficiency of freight and passenger movement across the country by bridging critical infrastructure gaps through effective interventions like development of Economic Corridors, Inter Corridors and Feeder Routes, National Corridor Efficiency Improvement, Border and International connectivity roads, Coastal and Port connectivity roads and Green-field expressways.

Main features: (a) Improvement in efficiency of existing corridors through development of Multimodal Logistics Parks and elimination of choke point, (b) Enhance focus on improving connectivity in North East and leveraging synergies with Inland Waterways, (c) Emphasis on use of technology & scientific planning for Project Preparation and Asset Monitoring, (d) Delegation of powers to expedite project delivery - Phase I to complete by 2022, (e) Improving

connectivity in the North East.

50. (d)

Let  $\lambda_1, \lambda_2, \lambda_3$  be the eigen values of A.

Then considering  $\lambda_1$  we can say

$$|A - \lambda_1 I| = 0$$

$$\Rightarrow \begin{vmatrix} (1-\lambda_1) & 2 & 5 \\ 1 & (-1-\lambda_1) & 1 \\ 3 & -6 & (-3-\lambda_1) \end{vmatrix} = 0$$

$$\Rightarrow (1-\lambda_1)[(\lambda_1+1)(\lambda_1+3)+6] + 2[3+3+\lambda_1]+5[-6+3+3\lambda_1] = 0$$

$$\Rightarrow (1-\lambda_1^2)(\lambda_1+3)+6-6\lambda_1$$

$$+12+2\lambda_1-15+15\lambda_1 = 0$$

$$\Rightarrow \lambda_1+3-\lambda_1^3-3\lambda_1^2+3+11\lambda_1 = 0$$

$$\Rightarrow \lambda_1^3+3\lambda_1^2-12\lambda_1-6 = 0$$

Therefore, the characteristic equation is

$$\lambda^3+3\lambda^2-12\lambda-6 = 0$$

where  $\lambda$  is any eigen value of A.

$$\lambda_1 + \lambda_2 + \lambda_3 = -3$$

$$\lambda_1\lambda_2 + \lambda_2\lambda_3 + \lambda_3\lambda_1 = -12$$

$$\lambda_1\lambda_2\lambda_3 = 6$$

Now, the eigen values of inverse matrix are

$$\frac{1}{\lambda_1}, \frac{1}{\lambda_2}, \frac{1}{\lambda_3}.$$

$$\text{Thus, } \frac{1}{\lambda_1} + \frac{1}{\lambda_2} + \frac{1}{\lambda_3} = \frac{\lambda_1\lambda_2 + \lambda_2\lambda_3 + \lambda_3\lambda_1}{\lambda_1\lambda_2\lambda_3}$$

$$= \frac{-12}{6} = -2$$

51. (b)

Given matrix is

$$\begin{bmatrix} 1 & 4 & 8 \\ 2 & 10 & 22 \\ 0 & 4 & 12 \end{bmatrix}$$

Apply  $R_2 \rightarrow R_2 - 2R_1$

$$\Rightarrow \begin{bmatrix} 1 & 4 & 8 \\ 0 & 2 & 6 \\ 0 & 4 & 12 \end{bmatrix}$$

Apply  $R_3 \rightarrow R_3 - 2R_2$

$$\Rightarrow \begin{bmatrix} 1 & 4 & 8 \\ 0 & 2 & 6 \\ 0 & 0 & 0 \end{bmatrix}$$

Now since the echelon form of matrix has two non-zero rows. Hence rank (A) = 2.

52. (b)

$$f(x) = \begin{cases} \frac{-x \sin x}{x}, & x < 0 \\ \frac{x \sin x}{x}, & x \geq 0 \end{cases}, f(x) = \begin{cases} -\sin x, & x < 0 \\ \sin x, & x \geq 0 \end{cases}$$

$$\text{Now, } f'(0^+) = \lim_{h \rightarrow 0} \frac{f(0+h) - f(0)}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\sin h - 0}{h} = \lim_{h \rightarrow 0} \frac{\sin h}{h} = 1$$

$$\text{and } f'(0^-) = \lim_{h \rightarrow 0} \frac{f(0-h) - f(0)}{-h}$$

$$= \lim_{h \rightarrow 0} \frac{-\sin(-h) - 0}{-h} = \lim_{h \rightarrow 0} \frac{-\sin h}{h} = -1$$

Since,  $f'(0^+) \neq f'(0^-)$ , hence  $f(x)$  is not differentiable at  $x = 0$ .

$$\text{But } \lim_{x \rightarrow 0} f(x) = \lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^+} f(x) = 0$$

Hence it is continuous.

Thus A1 is true but A2 is false.

53. (b)

Since  $f(x)$  must be continuous at  $x = 0$  and  $x = 1$ , we have

$$(i) \lim_{x \rightarrow 0^+} f(x) = a = f(0)$$

$$\Rightarrow a = 3$$

$$(ii) \lim_{x \rightarrow 1^-} f(x) = \lim_{x \rightarrow 1^+} f(x)$$

$$\Rightarrow 2 + a = m + b$$

$$\Rightarrow m + b = 5$$

Now, since  $f(x)$  must also be differentiable at  $x = 1$ , we have

$$\lim_{x \rightarrow 1^-} f'(x) = \lim_{x \rightarrow 1^+} f'(x)$$

$$\Rightarrow \lim_{x \rightarrow 1^-} (-2x + 3) = \lim_{x \rightarrow 1^+} m$$

$$\Rightarrow m = 1$$

Therefore  $a = 3$ ,  $m = 1$ ,  $b = 4$

54. (b)

$$\text{Let } f(x) = \frac{\sqrt{x+|x|}}{\sqrt{x-5|x|}}$$

$$\text{Then } f(x) = \begin{cases} \frac{\sqrt{x-x}}{\sqrt{x+5x}}, & x < 0 \\ \frac{\sqrt{x+x}}{\sqrt{x-5x}}, & x \geq 0 \end{cases}$$

$$\text{Now, } \lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} \frac{\sqrt{x-x}}{\sqrt{x+5x}} \left( \frac{0}{0} \text{ form} \right)$$

$$= \lim_{x \rightarrow 0^-} \frac{\frac{1}{2} \cdot \frac{1}{\sqrt{x}} - 1}{\frac{1}{2} \cdot \frac{1}{\sqrt{x}} + 5} \quad (\text{by L' Hospital's rule})$$

$$= \lim_{x \rightarrow 0^-} \frac{1 - 2\sqrt{x}}{1 + 10\sqrt{x}} = 1$$

$$\text{Now, } \lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} \frac{\sqrt{x+x}}{\sqrt{x-5x}} \left( \frac{0}{0} \text{ form} \right)$$

$$= \lim_{x \rightarrow 0^+} \frac{\frac{1}{2} \cdot \frac{1}{\sqrt{x}} + 1}{\frac{1}{2} \cdot \frac{1}{\sqrt{x}} - 5} \quad (\text{by L'Hospital's rule})$$

$$= \lim_{x \rightarrow 0^+} \frac{1 + 2\sqrt{x}}{1 - 10\sqrt{x}} = 1$$

Since,  $\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^+} f(x)$ , limit does exist at  $x = 0$ .

$$\text{Hence, } \lim_{x \rightarrow 0} f(x) = 1.$$

55. (a)

$$\text{Volume} = \int_{x=-a}^{x=a} \int_{y=-a}^{y=a} \int_{z=0}^{z=x^2+y^2} dx dy dz$$

$$= \int_{x=-a}^{x=a} \int_{y=-a}^{y=a} (x^2 + y^2) dy dx$$

$$= \int_{x=-a}^{x=a} \left[ x^2 y + \frac{y^3}{3} \right]_{-a}^a dx$$

$$= \int_{x=-a}^{x=a} \left( 2x^2 a + \frac{2a^3}{3} \right) dx$$

$$= \left[ \frac{2x^3a}{3} + \frac{2a^3x}{3} \right]_{-a}^a = \frac{8a^4}{3}$$

Given volume =  $\frac{a^4 X}{9}$

$\Rightarrow X = 24$

56. (b)

Let  $Z = x + iy$

$$\frac{Z+i}{Z+2} = \frac{[x+i(y+1)]}{[(x+2)+iy]} \times \frac{[(x+2)-iy]}{[(x+2)-iy]}$$

$$= \frac{x(x+2) - ixy + i(y+1)(x+2) + y(y+1)}{(x+2)^2 + y^2}$$

$$= \frac{x(x+2) + y(y+1) + i(x+2y+2)}{(x+2)^2 + y^2}$$

Since  $\frac{Z+i}{Z+2}$  is real,  $x+2y+2=0$ .

Therefore locus of  $Z$  is straight line.

57. (b)

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

$$= \left( -\frac{1}{3} + \frac{z^2}{5} - \frac{z^4}{7} + \dots \right) + \frac{1}{z^2}$$

Hence,  $z = 0$  is a pole of order 2.

58. (d)

Let  $D = \frac{d}{dx}$

P.I. =  $\frac{1}{D^4 - 1} e^x \cos x$

$$= e^x \frac{1}{(D+1)^4 - 1} \cos x$$

$$= e^x \frac{1}{[(D+1)^2 - 1][(D+1)^2 + 1]} \cos x$$

$$= e^x \frac{1}{[D^2 + 2D + 1 - 1][D^2 + 2D + 2]} \cos x$$

$$= e^x \frac{1}{[-1 + 2D][-1 + 2D + 2]} \cos x$$

$$= e^x \frac{1}{4D^2 - 1} \cos x$$

$$= -\frac{e^x \cos x}{5}$$

59. (c)

Event A : Scoring a total of 7 points

A' -complementary event

$$P(A) = \frac{1}{6}$$

$$P(A') = \frac{5}{6}$$

Let the probability of scoring a total of 7 points at least once in two losses of a pair of dice by P(E).

Therefore  $P(E) = 1 - P(\text{not scoring 7 points in any toss})$

$$= 1 - \frac{5}{6} \times \frac{5}{6} = \frac{11}{36}$$

60. (b)

$$R \left( \frac{(1!)^3 + (2!)^3 + (3!)^3 + (4!)^3 + (1152!)^3}{1152} \right) = 1$$

$$1152 = 2^7 \cdot 3^2$$

$$(3!)^3 = 3^3 \times 2^3$$

$$(4!)^3 = 4^3 \times 3^3 \times 2^3 = 2^9 \times 3^3$$

$$(4!)^3 = \text{divisible by } 1152$$

$$(5!)^3 = \text{divisible by } 1152$$

rest all terms after  $(4!)^3$  will be divisible by 1152

$$\Rightarrow \text{Remainder would be } ((1!)^3 + (2!)^3 + (3!)^3)$$

$$R = 225$$

So option 'b' is correct.

61. (a)

Salary of Ramesh in 2001 = salary of Rakesh in 2001

$$= 24000 \left( 1 - \frac{20}{100} \right) = 19200$$

Salary of Ramesh in 2002

$$= 19200 \left( 1 + \frac{20}{100} \right) = \text{Rs } 23040$$

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



Total salary of Rakesh in both the years = 19200 + 24,000 = Rs 43200.

Total salary of Ramesh in both the years = 19200 + 23040 = Rs 42240, which is Rs 960 less than that of Rakesh.

$$\begin{aligned} \therefore \text{Required percentage} &= \frac{960}{43200} \times 100 \\ &= 2\frac{2}{9}\% \end{aligned}$$

62. (c)

Let the cost price of each camera = x

Case I :

$$\text{Profit I} = 0.2 \times 12x + 0.1 \times 8x$$

Case II :

$$\text{Profit II} = 0.15 \times 20 \times x$$

$$\text{Profit II} + 36 \text{ Rs.} = \text{Profit I}$$

$$0.15x \times 20 + 36 = 0.2 \times 12x + 0.1 \times 8x$$

$$\Rightarrow x = 180 \text{ Rs}$$

So C.P of each camera = 180 Rs

63. (c)

$$r = \frac{40}{3 \times 2} = \frac{20}{3}\% \text{ half yearly}$$

Let the equal installments be 'A'

$$10815 = A \left[ \left(1 + \frac{r}{100}\right) + \left(1 + \frac{r}{100}\right)^2 + \left(1 + \frac{r}{100}\right)^3 \right]$$

$$= A \left[ \left(1 + \frac{20}{300}\right) + \left(1 + \frac{20}{300}\right)^2 + \left(1 + \frac{20}{300}\right)^3 \right]$$

$$\Rightarrow 10815 = A \left[ \frac{15}{10} + \left(\frac{15}{10}\right)^2 + \left(\frac{15}{10}\right)^3 \right]$$

$$10815 = 2.64 A$$

$$A = 4096 \text{ Rs}$$

So option (c) is correct.

64. (d)

Let P, Q and R can empty a tank in x, y and z hour respectively.

Part of the tank that can be emptied by P, Q and

$$\text{R per hour} = \frac{1}{6}$$

$$6 \left( \frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right) = 1 \quad \dots(i)$$

Part of the tank that was emptied by P, Q and R in 2 hours =  $\frac{1}{3}$

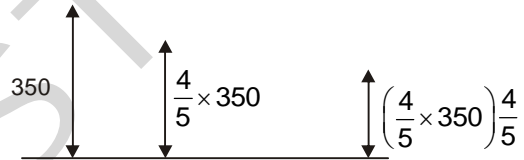
Q and R empty the remaining  $\left(\frac{2}{3}\right)$  of tank in 6 hours.

$$\therefore 6 \left( \frac{1}{y} + \frac{1}{z} \right) = \frac{2}{3} \quad \dots(ii)$$

From (i) & (ii)

$$\frac{6}{x} = \frac{1}{3} \Rightarrow x = 18 \text{ hrs.}$$

65. (c)



Total distance

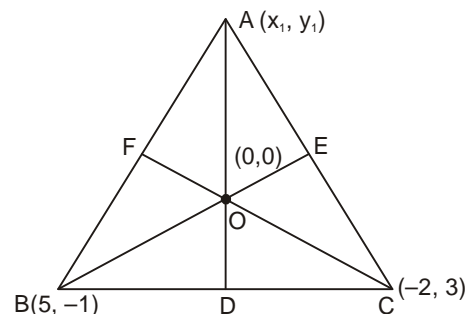
$$= 350 + 2 \times \frac{4}{5} \times 350 + 2 \times \frac{4}{5} \times \left( \frac{4}{5} \times 350 \right) + \dots$$

$$= 350 + 2 \times \frac{4}{5} \times 350 \left( 1 + \frac{4}{5} + \left( \frac{4}{5} \right)^2 + \dots \right)$$

$$= 350 + \frac{8}{5} \times 350 \times \frac{1}{1 - \frac{4}{5}}$$

$$= 350 + 350 \times 8 = 3150 \text{ m}$$

66. (c)



Slope of OA  $\times$  slope of BC = - 1

$$\frac{y_1 - 0}{x_1 - 0} \times \frac{3 - (-1)}{-2 - 5} = - 1$$

$$y_1 = \frac{7x_1}{4} \quad \dots(1)$$



∴ OE is ⊥ CA

$$\Rightarrow -\frac{1-0}{5-0} \times \frac{y_1-3}{x_1+2} = -1$$

$$5x_1 + 10 = y_1 - 3$$

$$\Rightarrow 5x_1 - y_1 = -13$$

$$x_1 = -4$$

$$\text{so, } y_1 = \frac{7x_1}{4} = \frac{7(-4)}{4} = -7$$

Required coordinates of third vertex is

$$(x_1, y_1) = (-4, -7)$$

hence option (c) is correct

67. (d)

The actual time is 7 hours 15 minutes. The time shown by this clock when seen in the mirror is (12 - 7 hours 15 minutes) = 4 hours 45 minutes

68. (b)

$$x^2 + 5 < 5x + 14$$

$$\Rightarrow x^2 - 5x - 9 < 0$$

Roots of  $x^2 - 5x - 9 = 0$  are

$$\frac{5 \pm \sqrt{61}}{2} = 6.4, -1.4$$

$$\Rightarrow (x - 6.4)(x + 1.4) < 0$$

$$\Rightarrow -1.4 < x < 6.4$$

69. (b)

$$AM \geq GM$$

$$\frac{\frac{1}{a} + \frac{1}{b} + \frac{1}{c}}{3} \geq \left(\frac{1}{abc}\right)^{1/3} \quad \dots(1)$$

$$\Rightarrow \frac{a+b+c}{3} \geq (abc)^{1/3} \quad \dots(2)$$

$$(1) \times (2)$$

$$\frac{(a+b+c)}{3} \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) \geq 1$$

$$\Rightarrow (a+b+c) \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) \geq 9$$

So option (b) is correct

70. (c)

71. (d)

72. (c)

73. (c)

74. (b)

75. (a)

76. (c)

77. (d)

78. (c)

79. (b)

80. (d)

The H-to-H bond would have to be broken, thus requiring energy.

81. (a)

Unlike ion attract. Fcc metals possess four atoms per unit cell; bcc metals have two.

82. (b)

The (110) plane lies diagonally through the unit cell parallel to the c-axis. The [110] direction is perpendicular to the c-axis.

83. (d)

the curves of a phase diagram are solubility limits for the phases within the single-phase regions.

Since copper is the solvent for the β structure, β has no upper limit of copper solubility (other than 100%).

84. (d)

Stresses will relax below the melting temperature. Tensile stresses facilitate the cracking of brittle materials; compression limits cracking.

85. (a)

86. (d)

Ethics is not following the law, In law, a man is guilty when he violates the rights of another. In ethics, he is guilty if he thinks of doing so (Immanuel Kant). A good system of law does incorporate many ethical standards, but law can deviate from what is ethical.

Law may have a difficult time designing or enforcing standards in some important areas, and may be slow to address new problems

87. (a)

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

Ethics is not religion. Many people are not religious, but ethics applies to everyone. Most religions do advocate high ethical standards but sometimes do not address all the types of problems we face.

88. (b)

89. (b)

90. (c)

A core definition of total quality management (TQM) describes a management approach to long-term success through customer satisfaction. In a TQM effort, all members of an organization participate in improving processes, products, services, and the culture in which they work.

91. (c)

The virgin vegetation, which are purely Indian are known as endemic or indigenous species but those which have come from outside India are termed as exotic plants.

92. (d)

The diversity in flora and fauna is due to various factors like Relief, temperature, climate etc.

93. (a)

The atmosphere can be heated from below by the radiation that is reflected back or re-radiated by the land or water bodies. On being heated, convection currents are set up in the air.

94. (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 as hydrocarbons. Presence of high levels of all these pollutants 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.

95. (c)

In telemedicine, healthcare professional use ICT tools to check the status of patient. Patients visiting a telemedicine clinic are brought face-to-face with medical experts across India through a laptop that allows patients and doctors to see one another. What a telemedicine clinic does is bring patients in touch with doctors who are experts in their fields. This means that a top orthopedist in New Delhi can offer his services to a patient in a small UP town that is lacking the services of an expert orthopedist.

96. (c)

The chief disadvantage to computer-based medical records is privacy concerns: can records be hacked, illegally downloaded, lost in a crash, etc

97. (a)

Color centres are –ve ion vacancies in which an electron is trapped. Presence of such color centre, in ionic crystals result in selective absorption in the visible radiation range of electromagnetic radiation.

98. (a)

These alloys have unique combinations of properties. These are alloys of cobalt, nickel and iron with refractory metals, or chromium, titanium etc. These alloys have superior mechanical properties and are highly corrosion resistance even at very high temperature.

99. (a)

100. (a)

The distorted lattice results in imperfections in the lattice which act as scattering centre increases resistivity of the metal.

The effect of magnetic field on resistance is termed as magneto restriction

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